

B.Com (Tax Procedure)(Basic/Hons)(Vocational)

Programme Objectives:

1. To provide the knowledge of Taxation system in India and to enhance employability skills of the Commerce students
2. To motivates the learners towards higher education and The course helps the students to prepare for competitive and professional examination
3. The introduction of updated and the need of the hour concepts and contents will make a student employable and at the same time confident in his/her day to day transactions.
4. The programme cultivates the habit of entrepreneur and there by motivates student to start entrepreneurship.
5. To provide inter-disciplinary knowledge through non-major elective courses and develops research culture by incorporating projects both practical and technical skills in the curriculum.
6. To provide practical exposure by providing opportunities for industrial visit, CA office visit, Visit to Tax Offices, Meeting Tax Officials and so on.

Programme Outcome:

1. The students can get the knowledge, skills and attitudes during the end of the B.com degree course.
2. Students will be able to do their higher education and can make research in the field of finance and commerce
3. The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day to day business activities.
4. Students will prove themselves in different professional exams like C.A.,C S, CPA, CMA, MPSC, UPSC. as well as other courses.
5. Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer and also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator as well as other financial supporting services.
6. By goodness of the preparation they can turn into a Manager, Accountant, Management Accountant, cost Accountant, Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government employments and so on.,

B.COM.PROGRAM
Proposed Scheme of Teaching & Evaluation for B.Com (Tax Procedure) (Basic/Hons) with Commerce as Core subject

Semester I								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Lang.1.1	Language-I	AECC	3+1+0	60	40	100	3
2	Lang.1.2	Language-II	AECC	3+1+0	60	40	100	3
3	B.Com.1.1	Financial Accounting	DSC	3+0+2	60	40	100	4
4	B.Com.1.2	Income Tax Law and Practice- I	DSC	3+0+2	60	40	100	4
5	B.Com.1.3	Goods and Service Tax Law and Practice- I	DSC	3+0+2	60	40	100	4
6	B.Com.1.4	Digital Fluency	SEC-SB	1+0+2	60	40	100	2
7	B.com. 1.5	Yoga	SEC-VB	0+0+2	-	50	50	1
8	B.com. 1.6	Health and Wellness	SEC-VB	0+0+2	-	50	50	1
9	B.Com.1.7	Accounting for Everyone/Financial Literacy/Managerial Economics	OEC	3+0+0	60	40	100	3
Sub-Total(A)					420	380	800	25

Semester II								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
10	Lang.2.1	Language-I	AECC	3+1+0	60	40	100	3
11	Lang.2.2	Language-II	AECC	3+1+0	60	40	100	3
12	B.Com.2.1	Advanced Financial Accounting	DSC	3+0+2	60	40	100	4
13	B.Com.2.2	Income Tax Law and Practice- II	DSC	3+0+2	60	40	100	4
14	B.Com.2.3	Goods and Service Tax Law and Practice- II	DSC	3+0+2	60	40	100	4
15	B.Com.2.4	Sports	SEC-VB	0+0+2	-	50	50	1
16	B.Com.2.5	NCC/NSS/R&R(S&G)/Cultural	SEC-VB	0+0+2	-	50	50	1
17	B.Com.2.6	Environmental Studies	AECC	2+0+0	60	40	100	2
18	B.Com.2.7	Financial Environment/Investments In Stock Markets	OEC	3+0+0	60	40	100	3
Sub-Total(B)					420	380	800	25

EXIT OPTION WITH CERTIFICATION - with ability to solve well defined problems

Semester III								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
19	Lang.1.1	Language-I	AECC	3+1+0	60	40	100	3
20	Lang.1.2	Language-II	AECC	3+1+0	60	40	100	3
21	B.Com.3.1	Corporate Accounting	DSC	3+0+2	60	40	100	4
22	B.Com.3.2	Income Tax Law and Practice- III	DSC	3+0+2	60	40	100	4
23	B.Com.3.3	Goods and Service Tax Law and Practice- III	DSC	3+0+2	60	40	100	4
24	B.Com.3.4	Artificial Intelligence	SEC	1+0+2	60	40	100	2
25	B.Com.3.5	Sports	SEC-VB	0+0+2	-	50	50	1
26	B.Com.3.6	NCC/NSS/R&R(S&G)/Cultural	SEC-VB	0+0+2	-	50	50	1
27	B.Com.3.7	Advertising Skills/Entrepreneurial Skills	OEC	3+0+0	60	40	100	3
Sub–Total(C)					420	380	800	25

Semester IV								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
28	Lang.1.1	Language-I	AECC	3+1+0	60	40	100	3
29	Lang.1.2	Language-II	AECC	3+1+0	60	40	100	3
40	B.Com.4.1	Advanced Corporate Accounting	DSC	3+0+2	60	40	100	4
31	B.Com.4.2	Income Tax Law and Practice- IV	DSC	3+0+2	60	40	100	4
32	B.Com.4.3	Goods and Service Tax Law and Practice- IV	DSC	3+0+2	60	40	100	4
33	B.Com.4.4	Constitution of India	AECC	2+0+0	60	40	100	2
34	B.Com.4.5	Sports	SEC-VB	0+0+2	-	50	50	1
35	B.Com.4.6	NCC/NSS/R&R(S&G)/Cultural	SEC-VB	0+0+2	-	50	50	1
36	B.Com.4.7	Business Ethics/ Corporate Governance	OEC	3+0+0	60	40	100	3
Sub –Total(D)					420	380	800	25

EXIT OPTION WITH DIPLOMA – Ability to solve broadly defined problems.

Semester V								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
37	B.Com.5.1	Financial Management	DSC	3+0+2	60	40	100	4
38	B.Com.5.2	Advance Income Tax Law and Practice	DSC	3+0+2	60	40	100	4
39	B.Com.5.3	Auditing and Assurance	DSC	4+0+0	60	40	100	4
40	B.Com.5.4 Elective	One Course from the Selected Elective Group	DSE-1	3+1+0	60	40	100	3
41	B.Com.5.5 Elective	GST-Law & Practice /Basics of Spread Sheet Modeling OR Report on Study of Startups and Innovative Business Ideas	Vocational-1	2+0+2	60	40	100	3
42	B.Com.5.6 Elective	Internship	Internship - 1	0+0+4	-	50	50	2
43	B.Com.5.7	Sports	SEC-VB	0+0+2	-	50	50	1
44	B.Com.5.8	NCC/NSS/R&R(S&G)/Cultural	SEC-VB	0+0+2	-	50	50	1
45	B.Com.5.9	Cyber Security/Ethics& Self Awareness	SEC-VB	1+0+2	60	40	100	2
Sub-Total(E)					360	390	750	24

Semester VI								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
46	B.Com.6.1	Management Accounting	DSC	3+0+2	60	40	100	4
47	B.Com.6.2	Customs Duty Law and Practice	DSC	3+0+2	60	40	100	4
48	B.Com.6.3	Financial Derivatives	DSC	3+0+2	60	40	100	4
49	B.Com.6.4 Elective	One courses from the Selected Elective Group	DSE-2	3+1+0	60	40	100	3
50	B.Com.6.5	GST-Assessment Procedure	Vocational-2	2+0+2	60	40	100	3
51	B.Com.6.6 Elective	Internship	Internship - 2	0+0+4	-	50	50	2
52	B.Com.6.7	Sports	SEC-VB	0+0+2	-	50	50	1
53	B.Com.6.8	NCC/NSS/R&R(S&G)/Cultural	SEC-VB	0+0+2	-	50	50	1
54	B.Com.6.9	Professional Communication	SEC-SB	2+0+0	60	40	100	2
Sub-Total(F)					360	390	750	24
Grand Total-Degree					2400	2300	4700	148

EXIT OPTION WITH BACHELOR DEGREE - Ability to solve complex problems that are ill-structured requiring multi-disciplinary skills to solve them.

Semester VII								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
55	B.Com.7.1	International Business	DSC	4+1+0	60	40	100	4
56	B.Com.7.2	Business Analytics	DSC	4+1+0	60	40	100	4
57	B.Com.7.3	Advanced Financial Management	DSC	4+1+0	60	40	100	4
58	B.Com.7.4	One Course from the Selected Elective Group	DSE-5	3+1+0	60	40	100	3
59	B.Com.7.5	ERP Applications	Vocational-3	2+0+2	60	40	100	3
60	B.Com.7.6	Research Methodology	-	2+0+2	60	40	100	3
Sub-Total(G)					360	240	600	21

Semester VIII								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L+T+P)	SEE	CIE	Total Marks	Credits
61	B.Com.8.1	Financial Reporting-IND.AS	DSC	3+1+0	60	40	100	3
62	B.Com.8.2	Strategic Financial Management	DSC	3+1+0	60	40	100	3
63	B.Com.8.3	Advanced Business Statistics OR Data Analysis & Decision Sciences	DSC	3+1+0	60	40	100	3
64	B.Com.8.4	One Course from the Selected Elective Group	DSE - 5	3+1+0	60	40	100	3
65	B.Com.8.5	Managing Digital Platforms	Vocational-4	2+0+2	60	40	100	3
66	B.Com.8.6	Research Projects/Internship with Viva-voce	-	0+0+12	120	80	200	6
		OR						
		Two Courses from the Selected Elective Group 8.5(A) & 8.5 (B)	DSE-6	3+1+0	60*	40*	100*	3*
			DSE-7	3+1+0	60*	40*	100*	3*
Sub-Total(H)					420/ 420*	280/ 280*	700/ 700*	21/ 21*
Grand Total-Honors					3180/ 3180*	2820/ 2820*	6000/ 6000*	190

* Students who do not opt Research Project/Internships he will take two elective courses such as 8.5(A) & 8.5(B). Sub Total(H) and Grand Total Honors varies accordingly.

BACHELOR DEGREE WITH HONORS - Experience of workplace problem solving in the form of internship or research experience preparing for higher education or entrepreneurship experience.

Notes:

- One Hour of Lecture is equal to 1 Credit.
- One Hour of Tutorial is equal to 1 Credit (Except Languages).
- Two Hours of Practical is equal to 1 Credit

Acronyms Expanded

- AECC :Ability Enhancement Compulsory Course
- DSC© : Discipline Specific Core(Course)
- SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based
- OEC : Open Elective Course
- DSE : Discipline Specific Elective
- SEE : Semester End Examination
- CIE : Continuous Internal Evaluation
- L+T+P : Lecture+Tutorial+Practical(s)

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 50 or less than 50 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 50 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching.

ELECTIVEGROUPSANDCOURSES:

Discipline Specific Electives-V Semester						
Sl. No	Accounting	Finance	Banking& Insurance	Marketing	Human Resources	IT
1	Ind.AS and IFRS	Financial Markets& Intermediaries	Indian Banking System	Retail Management	Human Resources Development	Financial Analytics

Discipline Specific Electives -VI Semester						
1	e-Business &Accounting	Investment Management	Banking Innovations &Technology	Customer Relationship Marketing	Cultural Diversity at Work Place	HR Analytics
2	Accounting for Services Sector	Strategic Financial Management	Principles& Practice of Insurance	Digital Marketing	New Age Leadership Skills	Marketing Analytics
3	Accounting for Government and Local Bodies	Risk Management	Insurance Law and Regulations	Consumer Behavior &Marketing Research	Labour Laws & Practice	ICT Application in Business

Discipline Specific Electives-VII Semester						
1	Forensic Accounting	Security Analysis &Portfolio Management	Banking Products &Services	Logistics & Supply Chain Management	Strategic HRM	DBMS&SQL

Discipline Specific Electives-VIII Semester						
1	Innovations in Accounting	Corporate Valuation	e-Banking	E-Commerce	International HRM	Web &Social Intelligence
2	Accounting Information System	Analysis of Financial Statements	Insurance Planning &Management	Services Marketing	Employee Welfare& Social Security	Artificial Intelligence& Machine Learning in Business

NOTE: Student shall continue with the same elective group in V and VI semesters, however, he/she may change the elective group in VII semester, but shall continue in the same group in VIII semester

B.com- Question Paper Pattern
End Semester Exams Bachelor of Commerce- B.Com

Course Code:
Duration: 2Hour

Name of the Course:
Total Marks: 60

SECTION-A

I. Answer any five of the following questions.

Questions are asked on Remembering (5x2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION-B

II. Answer any four of the following questions.

Questions are asked on Understanding & Applying (4x5=20)

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

III. Answer any two of the following questions.

Questions are asked on analyzing &evaluating (2x15=30)

- 15.
- 16.
- 17.
- 18.

Note: Break up of 40 marks for Continuous Internal Evaluation (CIE) is as follows:

- 20 marks for 2 internal exams per course per semester.
- 10 marks for Seminar/ Presentation/Activity/Project/Field work/ Assignment.
- 10 marks for Case study/ Excel/ Zoho books.

Course Contents

- 1.1 Financial Accounting**
- 1.2 Income Tax Law and Practice- I**
- 1.3 Goods and service Tax Law and Practice-I**
- 1.4 Digital Fluency**
- 1.5 Yoga**
- 1.6 Health and wellness**
- 1.7 Accounting for Everyone / Financial Literacy/Managerial Economics**

Name of the Program: Bachelor of Commerce (B.Com.) Course Code: B.Com.1.1 Name of the Course: Financial Accounting		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> Understand the theoretical framework of accounting as well accounting standards. Demonstrate the preparation of financial statement of manufacturing and non-manufacturing entities of sole proprietors. Exercise the accounting treatments for consignment transactions & events in the books of consignor and consignee. Understand the accounting treatment for royalty transactions & articulate the Royalty agreements. Outline the emerging trends in the field of accounting. 		
Syllabus:		Hours
Module No. 1: Theoretical Framework of Accounting		10
Introduction-Meaning and Scope of Accounting- Accounting Terminologies- Uses and Users of Accounting information-Accounting Process-Basis of Accounting: Cash and Accrual basis-Branches of Accounting-Accounting Principles-Concepts and Conventions-Accounting Standards-Indian Accounting Standards (IND AS).		
Module No. 2: Financial Statements of Sole Proprietors		10
Introduction-Meaning of Sole Proprietor-Financial Statements of Non-Manufacturing Entities: Trading Account-Income Statement/Profit & Loss Account-Balance Sheet;Financial Statements of Manufacturing Entities: Manufacturing Account-Trading Account-Profit & Loss account-Balance Sheet.		
Module No. 3: Consignment Accounts		10
Introduction-Meaning of Consignment-Consignment vs Sales-Pro-forma Invoice-Accounts Sales-Types Commission-Accounting for Consignment Transactions & Events in the books of Consignor and Consignee - Treatment of Normal & Abnormal Loss. -Valuation of Closing Stock-Goods sent at Cost Price and Invoice Price.		
Module No. 4:Royalty Accounts		10
Introduction-Meaning-Types of Royalty-Technical Terms: Lessee, Lessor, Minimum Rent - Short Workings -Recoupment of Short Working-Accounting Treatment in the books of Lessee and lessor - Journal Entries and Ledger Accounts including minimum rent account.		
Module No. 5: Emerging Trends in Accounting		08
Digital Transformation of Accounting-Big Data Analytics in Accounting-Cloud Computing in accounting- Accounting with drones- Forensic Accounting- Accounting for Planet--Creative Accounting-Outsourced Accounting- Predictive Accounting (Theory Only).		
Skill Developments Activities: <ol style="list-style-type: none"> Collect Annual Reports of soleproprietors and identify accounting concepts and conventions followed in the preparation of the annual reports. Collect Annual Reports of soleproprietors and identify the different components. Preparation of Proform invoice and accounts sales with imaginary figures. Collect Royalty Agreements and draft dummy royalty agreements with imaginary figures. 		

5. Identify latest innovations and developments in the field of accounting.
6. Any other activities, which are relevant to the course.

Text Books:

1. ICAI Study Materials on Principles & Practice of Accounting, Accounting and Advanced Accounting.
2. SP Iyengar (2005), Advanced Accounting, Sultan Chand & Sons, Vol. 1.
3. Robert N Anthony, David Hawkins, Kenneth A. Merchant, (2017) Accounting: Text and Cases, McGraw-Hill Education, 13th Edition.
4. Charles T. Horngren and Donna Philbrick, (2013) Introduction to Financial Accounting, Pearson Education, 11th Edition.
5. J.R. Monga, Financial Accounting: Concepts and Applications. Mayur Paper Backs, New Delhi, 32nd Edition.
6. S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi, 6th Edition.
7. B.S. Raman (2008), Financial Accounting Vol. I & II, United Publishers & Distributors
8. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce) (Tax Procedure) Course Code: B.Com.1.2 Name of the Course: Income Tax Law and Practice- I		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs
Pedagogy: Classrooms lecture, tutorials, Maintaining Record Book for practical class, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> After studying this subject students will get to know the amendments made to Direct Tax Laws of India by Finance Acts passed in the Parliament from time to time. Understand the theoretical framework of Direct Tax. Students are able to understand legal provisions and deductions available under Income tax. It enables the students to compute salary income of individual 		
Syllabus:		Hours
Module No. 1: Introduction to Income-tax Act		10
Extent, Application, Definitions – Income, Agricultural income, Assessee, Person, Previous Year, Assessment Year, Gross Total Income, Total Income, Distinction between capital receipts and revenue receipts.		
Module No. 2: Rule of Residence and Incidence of tax based on residence		10
Rule of residence in relation to an individual – Resident, Non-resident and Not Ordinarily Resident – Incidence of tax based on residence. Simple problems determining residential status of individuals– simple problems determining taxable incomes in the hands of residents, not ordinarily residents and non-residents.		
Module No. 3: Income which does not form part of total income		10
Exemptions under Section 10 with reference to individuals only. Simple problems on computing exempt Gratuity/leave encashment/commuted pension/house rent allowance.		
Module No. 4: Deductions under Chapter VI-A of the Income-tax Act		10
Deductions under Chapter VI-A with reference to individuals. Simple problems on computing deductions.		
Module No. 5: Income from salaries		08
Meaning and definition, characteristics of Salary Income, Allowances, Perquisites, Deduction, Provident fund; Simple problems on computation of Taxable Salary		
Skill Developments Activities: <ol style="list-style-type: none"> Visit to CA office for asking about Practical application. Collect the salary details of individual and calculate salary income of individual. Case study discursion. Any other activities, which are relevant to the course. 		
Text Books: <ol style="list-style-type: none"> ICAI Study Materials related to Direct tax law and practice. Direct Tax Law and Practice- - Taxman’s Publication Income Tax law and practice- taxman’s Publication 		

4. Income Tax law and practice- V.P. Gaur, D.B. Narang, Puja Gaur, Rajeev Puri

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce) (Tax Procedure) Course Code: B.Com.1.3 Name of the Course: Goods and Service Tax Law and Practice-I		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs
Pedagogy: Classrooms lecture, tutorials, Maintaining Record Book for practical class, Group discussion, Seminar, Case studies & Visit to Income tax office/ CA offices etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> The study familiarizes the students with the provisions of Indirect Taxation Laws in India. This subject is to be taught with reference to the relevant amendments made to GST by GSTC and by Finance Acts passed in the Parliament from time to time so that students are undated with the learning and it enhances learning objective After studying this subject students will get in depth knowledge of concept and registration under GST. 		
Syllabus:		Hours
Module No. 1: Introduction		10
Amendment to Constitution and GST – Applicability of GST – Types of GST - Goods and Services Tax Council.		
Module No. 2: Definitions under CGST Act		10
Aggregate turnover – Agriculturist – Business – Business Vertical – capital goods –electronic commerce operator – fixed establishment – goods – Inward Supply – Job work – Manufacture – Person – services – supplier.		
Module No. 3: Concept of Supply		10
Meaning and Scope of Supply under Section 7 of the CGST Act – Inward and Outward Supply – Composite Supply – Principal Supply – Mixed Supply – Tax liability under Section 8 – Determination of Nature of Supply under Section 7 of the IGST Act – Intra-state supply under Section 8 of the IGST Act – Brief mention of Schedule I, Schedule II and Schedule III of the CGST Act and their relevance. Simple cases to identify whether the transaction constitutes supply or not – Simple case studies on how to distinguish between composite supply and mixed supply		
Module No. 4: Registration under GST		10
Persons liable for registration – Aggregate turnover – Persons not liable for registration – compulsory registration cases under Section 24 –Issue of Registration Certificate including Goods and Services Tax Registration Number – Amendment of registration – cancellation of registration. Simple problems on computation of aggregate turnover for eligibility for registration – Filling and Filling of -Form REG-01 Application for Registration		
Module No. 5: Composition levy		08
Applicability – Rate of tax of the composition levy – Conditions and restrictions for opting for composition levy – Validity of composition levy Simple problems on application of composition levy – Form GST CMP-01 Intimation upon provisional registration to opt for composition levy - Form GST CMP-02 – Option for composition levy prior to the commencement of financial year.		
Skill Developments Activities: <ol style="list-style-type: none"> Visit to CA office for asking about Practical application. Collect the Inward and outward supply of enterprise and identify. Collect the transaction details of composition levy dealer and identify the eligibility Any other activities, which are relevant to the course. 		
Text Books:		

1. Indirect Tax Laws- Bangar's Publication- Dr. Yogendra Bangar, Dr. Vandana Bangar
2. Students guide to Income Tax (including GST- Taxman's publication- Dr. Vinod Singhania and Dr. Monica Singhania
3. Business Taxation- Dr. Ravi MN, Mr. Bhanu Praksh B.E, Dr. Suman Shetty N
4. ICAI study materials related to Indirect tax.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce (B.Com) Course Code: B.Com. 1.7 (Open Elective Course) Name of the Course: Financial Literacy		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	40 Hrs
Pedagogy: Classrooms lecture, Case studies, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to 1. Describe the importance of financial literacy and list out the institutions providing financial services; 2. Prepare financial plan and budget and manage personal finances; 3. Open, avail, and manage/operate services offered by banks; 4. Open, avail, and manage/operate services offered by post offices; 5. Plan for life insurance and property insurance & select instrument for investment in shares		
Syllabus:		Hours
Module No. 1: Introduction		08
Meaning, importance and scope of financial literacy; Prerequisites of Financial Literacy – level of education, numerical and communication ability; Various financial institutions – Banks, Insurance companies, Post Offices; Mobile App based services. Need of availing of financial services from banks, insurance companies and postal services.		
Module No. 2: Financial Planning and Budgeting		08
Concept of economic wants and means for satisfying these needs; Balancing between economic wants and resources; Meaning, importance and need for financial planning; Personal Budget, Family Budget, Business Budget and National Budget; Procedure for financial planning and preparing budget; Budget surplus and Budget deficit, avenues for savings from surplus, sources for meeting deficit.		
Module No. 3: Banking Services		08
Types of banks; Banking products and services – Various services offered by banks; Types of bank deposit accounts – Savings Bank Account, Term Deposit, Current Account, Recurring Deposit, PPF, NSC etc.; Formalities to open various types of bank accounts, PAN Card, Address proof, KYC norm; Various types of loans – short term, medium term, long term, micro finance, agricultural etc. and related interest rates offered by various nationalized banks and post office; Cashless banking, e-banking, Check Counterfeit Currency; CIBIL, ATM, Debit and Credit Card, and APP based Payment system; Banking complaints and Ombudsman.		
Module No. 4: Financial Services from Post Office		08
Post office Savings Schemes: Savings Bank, Recurring Deposit, Term Deposit, Monthly Income Scheme, Kishan Vikas Patra, NSC, PPF, Senior Citizen Savings Scheme (SCSS), Sukanya Samriddhi Yojana/ Account (SSY/SSA); India Post Payments Bank (IPPB). Money Transfer: Money Order, E-Money order. Instant Money Order, collaboration with the Western Union Financial Services; MO Videsh, International Money Transfer Service, Electronic Clearance Services (ECS), Money gram International Money Transfer, Indian Postal Order (IPO).		
Module 5: Protection and Investment Related Financial Services		08
Insurance Services: Life Insurance Policies: Life Insurance, Term Life Insurance, Endowment Policies, Pension Policies, ULIP, Health Insurance and its Plans, Comparison of policies offered by various life insurance companies. Property Insurance: Policies offered by various general insurance companies. Post office life Insurance Schemes: Postal Life Insurance and Rural Postal Life Insurance (PLI/RPLI). Housing Loans: Institutions providing housing		

loans, Loans under Pradhanmantri Awas Yojana – Rural and Urban.

Investment avenues in Equity and Debt Instruments: Portfolio Management: Meaning and importance; Share Market and Debt Market, Sensex and its significance; Investment in Shares – selection procedure for investment in shares; Risk element; Investment Management - Services from brokers and Institutions, and self-management; Mutual Fund.

Skill Development Activities:

1. Visit banks, post offices, and insurance companies to collect information and required documents related to the services offered by these institutions and to know the procedure of availing of these services.
2. Fill up the forms to open accounts and to avail loans and shall attach photocopies of necessary documents.
3. Prepare personal and family budget for one/six/ twelve month on imaginary figures.
4. Try to open Demat account and trade for small amount and submit the report on procedure on opening of Demat account and factors considered for trading.
5. Any other activities, which are relevant to the course.

Text Books:

1. Avadhani, V. A. (2019). Investment Management. Mumbai: Himalaya Publishing House Pvt. Ltd.
2. Chandra, P. (2012). Investment Game: How to Win. New Delhi: Tata McGraw Hill Education.
3. Kothari, R. (2010). Financial Services in India-Concept and Application. New Delhi: Sage Publications India Pvt. Ltd.
4. Milling, B. E. (2003). The Basics of Finance: Financial Tools for Non-Financial Managers. Indiana: universe Company.
5. Mitra, S., Rai, S. K., Sahu, A. P., & Starn, H. J. (2015). Financial Planning. New Delhi: Sage Publications India Pvt. Ltd.
6. Zokaityte, A. (2017). Financial Literacy Education. London: Palgrave Macmillan.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce (B.Com) Course Code: B.Com. 1.7 (Open Elective Course) Name of the Course: Managerial Economics		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	40 Hrs
Pedagogy: Classrooms lecture, Case studies, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to 1. Describe the importance of managerial economics in decision making process. 2. Learners would be able to apply the concepts and principles in their day to day life. 3. Analyze how economic agents make decisions and choices using theoretical knowledge & practical approach.		
Syllabus:		Hours
Module No. 1: Nature and scope of business economics		08
Nature of Business Economics: Meaning, definitions, nature, scope and significance of business economics. Economic laws and principles: Meaning and nature of economic laws. Economics and business environment: Economic and Non-economic factors determining business. Business objectives: Economic, Non-Economic, Human, Social and National objectives of business.		
Module No. 2: Demand Analysis		08
Law of diminishing marginal utility: Meaning, Assumptions, Illustration, Exceptions and Uses law of demand: Meaning, Demand Function, why does the demand curve slope downwards? Exceptions to the Law of demand, determinants of demand, increase and decrease in demand. Price elasticity: Meaning, types of price elasticity and methods of measurement of price elasticity. Factors of determining elasticity demand. Income elasticity, cross elasticity and promotional elasticity.		
Module No. 3: Supply, Cost and Revenue analysis		08
Supply: Meaning, Law of supply, exceptions to the law of supply and determinants of supply. Elasticity of supply: Meaning and types of elasticity of supply. Cost concepts: Opportunity cost, total cost, variable cost, fixed cost and marginal cost. Cost-output relationships in the short run and long run. Concepts of revenue: Total revenue, average revenue and marginal revenue. Revenue curves under perfect and imperfect competition.		
Module No. 4: Production and market analysis		08
Production analysis: Law of variable proportion and law of returns to scale. Perfect competition: Meaning and features. Monopoly: Meaning, features and price-output determination. Price discrimination: types, price- output determination under discriminating monopoly. Monopolistic competition: Meaning, features and price-output determination under monopolistic competition. Oligopoly: Meaning, features and types. Kinked demand curve.		
Module No. 5: Business Cycles Analysis		08
Business Cycles Analysis: Business Cycles Nature and Phases of a Business Cycle, Game Theory, Information Super Highways, Small-world Model, Theories of Business Cycle – Psychological, Profit, Monetary, Innovation, Cobweb, Samuelson and Hicks Theories.		
Skill Development Activities:		

1. Prepare personal and family budget for one/six/ twelve month on imaginary figures.
2. Study the supply and demand theory of a product as your choice.
3. Any other activities, which are relevant to the course.

References:

1. Sundharam K.P.M. & Sundharam E.N. – Business Economics, Sultanchand & Sons, New Delhi.
2. Ahuja H.L. –Business Economics, Sultanchand & Sons, New Delhi
3. Mehta P.L., Managerial Economics, Sultanchand & Sons, New Delhi.
4. Dwivedi D.N., Managerial Economics, Vikas Publishing House Pvt. Ltd., New Delhi.
5. Mithani D.M., Managerial Economics, Himalaya Publishing House, Mumbai.
6. Peterso H. Craig and W.Cris Lewis – Managerial Economics, Pearson Education, Singapore.
7. Salvatore Dominic – Managerial Economics, McGraw Hill, New York.

Note: Latest edition of text books may be used.

IInd Semester B.Com (Tax Procedure)
B. Course Contents

2.1 Advanced Financial Accounting

2.2 Income Tax Law and Practice- II

2.3 Goods and Service Tax Law and Practice- II

2.4 Sports

2.5 NCC/NSS/R&R(S&G)/Cultural

2.6 Environmental Studies

**2.7 Financial Environment / Investing in Stock
Markets/Public Finance**

Name of the Program: Bachelor of Commerce (B.Com.) Course Code: B.Com.2.1 Name of the Course: Advanced Financial Accounting		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs
Pedagogy: Classrooms lecture, Case studies, Tutorial classes, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> Understand & compute the amount of claims for loss of stock & loss of Profit. Learn various methods of accounting for hire purchase transactions. Deal with the inter-departmental transfers and their accounting treatment. Demonstrate various accounting treatments for dependent & independent branches. Prepare financial statements from incomplete records. 		
Syllabus:		Hours
Module No. 1: Insurance Claims for Loss of Stock & Loss of Profit		10
Introduction-Meaning of fire-computation of Claim for loss of stock- Computations of Claim for loss of Profit-Average Clause.		
Module No. 2: Hire Purchase Accounting		10
Introduction-Meaning of hire purchase-difference between hire purchase and instalment-Nature-features-terms used-Ascertainment of Interest-Accounting for hire purchase transactions-Repossession.		
Module No. 3: Departmental Accounts		10
Introduction-meaning-advantages and disadvantages-methods of departmental accounting-basis of allocation of common expenditure among different departments-types of departments-inter department transfer and its treatment		
Module No. 4: Accounting for Branches		10
Introduction-difference between branch accounts and departmental accounts-types of branches-Accounting for dependent & independent branches; Foreign branches: Accounts for foreign branches-Techniques for foreign currency translation. (Theory only).		
Module No. 5: Conversion of Single Entry into Double Entry		08
Introduction - Meaning-Limitations of Single Entry System-Difference between Single entry and Double entry system - Problems on Conversion of Single Entry into Double Entry.		
Skill Developments Activities: <ol style="list-style-type: none"> Identify the procedure & documentations involved in the insurance claims. Collect hire purchase agreements and draft dummy hire purchase agreements with imaginary figures. Identify the common expenditures of an organisation among various departments. Collect the procedure and documentations involved in the establishment of various branches. Visit any sole proprietor firm and identify the steps involved in the conversion of single entry into double entry system. Any other activities, which are relevant to the course. 		
Text Books: <ol style="list-style-type: none"> ICAI Study Materials on Principles & Practice of Accounting, Accounting and Advanced Accounting. 		

2. SP Iyengar (2005), *Advanced Accounting*, Sultan Chand & Sons, Vol. 1.
3. Robert N Anthony, David Hawkins, Kenneth A. Merchant, (2017) *Accounting: Text and Cases*, McGraw-Hill Education, 13th Edition.
4. Charles T. Horngren and Donna Philbrick, (2013) *Introduction to Financial Accounting*, Pearson Education, 11th Edition.
5. J.R. Monga, *Financial Accounting: Concepts and Applications*. Mayur Paper Backs, New Delhi, 32nd Edition.
6. S.N. Maheshwari, and. S. K. Maheshwari. *Financial Accounting*. Vikas Publishing House, New Delhi, 6th Edition.
7. B.S. Raman (2008), *Financial Accounting Vol. I & II*, United Publishers & Distributors
8. *Compendium of Statements and Standards of Accounting*. The Institute of Chartered Accountants of India, New Delhi.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce) (Tax Procedure) Course Code: B.Com.2.2 Name of the Course: Income Tax Law and Practice- II		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs
Pedagogy: Classrooms lecture, tutorials, Maintaining Record Book for practical class, Group discussion, Seminar, Case studies & Visit to Income tax department/CA office etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to		
f) After studying this subject students will get to know the amendments made to Direct Tax Laws of India by Finance Acts passed in the Parliament from time to time. g) Understand the theoretical framework of Direct Tax. h) Students are able to understand legal provisions i) This subject gives in-depth knowledge of five heads of income.		
Syllabus:		Hours
Module No. 1: Income from House Property		10
Meaning, computation of Annual Value of let out property and self-occupied house property, Unrealized rent, deductions from Annual value. Simple problems on computation of income from house property.		
Module No. 2: Depreciation under the Income tax Act		10
Detailed discussion on Depreciation provisions. Simple problems on computation of depreciation		
Module No. 3: Profits and Gains from Business or Profession		10
Meaning business profession occasion speculative business permissible deduction, payments not deductible deemed income, Presumptive income. Simple Problems on computation of taxable income from business or profession including presumptive incomes.		
Module No. 4: Income from Capital Gains – Income from Other Sources		10
Income from capital Gains; Meaning, Definition, Transfer capital assets- short term and long term, Cost of acquisition, exemptible capital gains. Problems of computation of taxable capital gains. Income from Other Source; Meaning, Interest on securities and other incomes, Grossing up of Interest, Deduction, Exemption; problems on computation of income from other source.		
Module No. 5: Clubbing of Income – Deemed Income		08
Clubbing of Income – Deemed Income, Set off and carry forward of losses – computation of total income with reference to an individual Assessee. Simple problems on clubbing provisions /set off and carry forward of losses and computation of total income.		
Skill Developments Activities: <ol style="list-style-type: none"> 1. Visit to CA office for asking about Practical application. 2. Collect the salary details of individual and calculate salary income of individual. 3. Any other activities, which are relevant to the course. 		
Text Books: <ol style="list-style-type: none"> 1. ICAI Study Materials related to Direct tax law and practice. 2. Direct Tax Law and Practice- - Taxman's Publication 3. Income Tax law and practice- taxman's Publication 4. Income Tax law and practice- V.P. Gaur, D.B. Narang, Puja Gaur, Rajeev Puri 		
Note: Latest edition of text books may be used.		

Name of the Program: Bachelor of Commerce) (Tax Procedure)

Course Code:B.Com.2.3

Name of the Course: Goods and Service Tax Law and Practice- II

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	48 Hrs

Pedagogy: Classrooms lecture, tutorials, Maintaining Record Book for practical class, Group discussion, Seminar, Case studies & Visit to Income tax office/ CA offices etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- The study familiarize the students with the provisions of Indirect Taxation Laws in India.
- This subject is to be taught with reference to the relevant amendments made to GST by GSTC and by Finance Acts passed in the Parliament from time to time so that students are undated with the learning and it enhances learning objective

Syllabus:	Hours
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Module No. 1: Levy and Collection of Tax	08
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Charge of CGST under Section 9. Simple Problems on computation of GST – CGST, SGST, UTGST and IGST

Module No. 2: Concept of Reverse Charge	10
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Section 9(3) and 9(4) of the CGST Act–List of goods where reverse charge is applicable – List of services under reverse charge – Exemption to reverse charge as per Central Government Notification. Simple problems on identification of goods and service covered under Section 9(3)&(4).

Module No. 3: Time of Supply	10
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Time of Supply of goods under Section 12–Time of Supply of services under Section 13– Change in rate of tax in respect of supply of goods or services.

Simple Problems on identifying Time of Supply - Simple Problems on identifying time of supply when there is change of rate of tax

Module No. 4: Place of Supply	10
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Place of business - location of supplier of services – location of recipient of services – Place of supply of goods other than supply of goods imported into or exported out of India – Place of supply of goods imported into or exported out of India – Place of supply of services where location of supplier and recipient is in India – Place of supply of services where location of supplier or location of recipient is outside India.

Simple problems on identifying place of supply.

Module No. 5: Value of Taxable Supply	10
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Specific inclusions – Discount – Value of supply of goods/services where consideration is not wholly in money – Value of supply of goods/services or both between distinct or related persons, other than through an agent – Value of supply of goods received through an agent – Value of supply of goods or services or both based on cost – Residual method for determination of value of supply of goods or services or both – Determination of value under Rule 32 – Value of supply of services in the case of a pure agent.

Simple Problems of computing value of goods/services where consideration is not wholly in money - Simple Problems of computing value of goods/services between distinct or related persons - Simple Problems of computing value of goods received through an agent.

Skill Developments Activities:

1. Visit to CA office for asking about Practical application.
2. Collect the Inward and outward supply of enterprise and identify.
3. Collect the transaction details of composition levy dealer and identify the eligibility
4. Any other activities, which are relevant to the course.

Text Books:

1. Indirect Tax Laws- Bangar's Publication- Dr. Yogendra Bangar, Dr. Vandana Bangar
2. Students guide to Income Tax (including GST- Taxman's publication- Dr. Vinod Singhanian and Dr. Monica Singhanian)
3. Business Taxation- Dr. Ravi MN, Mr. Bhanu Praksh B.E, Dr. Suman Shetty N
4. ICAI study materials related to Indirect tax.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce (B.Com) Course Code: B.Com. 2.6 (Open Elective Course) Name of the Course: Financial Environment		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	2 Hrs	24 Hrs
Pedagogy: Classrooms lecture, Case studies, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> Understand the fundamentals of Indian Economy and its significance. Evaluate the impact of monetary policy on the stakeholders of the Economy. Assess the impact of fiscal policy on the stakeholders of the Economy. Examine the status of inflation, unemployment and labour market in India Inference the financial sector reforms in India. 		
Syllabus:		Hours
Module No. 1: Fundamentals of India Economy		05
Introduction - Production & Cost-Demand & Supply-Perfect & Imperfect Competition-Monopoly-National Income Accounting-Business Cycle-Open Economy-Utility theory-GDP-GNP-impact- other Marco financial indicators.		
Module No. 2: Monetary Policy		05
Introduction - Meaning-objectives-qualitative & quantitative measures for credit control. Influence of policy rates of RBI: Repo-Reverse repo- Marginal standing facility and Bank rate. Influence of reserve ratios of RBI: CRR-SLR-Exchange rates-lending/deposit rates-design & issues of monetary policy-LAF - RBI Role, functions and its Governance		
Module No. 3: Fiscal Policy		05
Introduction - Meanings-objectives- public expenditure-public debt-fiscal & budget deficit-Keynesian approach-fiscal policy tools-fiscal policy effects on employment-supply side approach-design & issues of fiscal policy-fiscal budget- Role of Ministry of Finance in Fiscal Policy.		
Module No. 4: Inflation, Unemployment and Labour market		05
Introduction - Inflation: Causes of rising & falling inflation-inflation and interest rates-social costs of inflation; Unemployment - natural rate of unemployment-frictional & wait unemployment. Labour market and its interaction with production system; Phillips curve-the trade-off between inflation and unemployment-sacrifice ratio-role of expectations adaptive and rational		
Module 5: Financial Sector Reforms:		04
Introduction - Financial sector reforms - Recommendation & action taken -SARFESI Act-Narasimham Committee I & II- Kelkar Committee- FRBM Act - Basel-BIS-history-need-mission-objectives-Basel norms I, II & III- criticism of Basel norms-Implementations of Basel norms in India- impact of Basel norms on Indian banks.		
Skill Development Activities: <ol style="list-style-type: none"> Collect last ten year GDP rate and examine the same. Collect last two years monetary policy rates of RBI and analyse the impact of the same. Collect last five years fiscal policy of Indian Government and analyse the impact of the same on rural poor. 		

4. Collect last five year data on inflation, unemployment rate and labour market conditions and critically prepare the report.
5. Identify the recent financial sector reforms in India.
6. Any other activities, which are relevant to the course.

Text Books:

1. V K Puri and S K Mishra, Indian Economy, HPH.
2. Datt and Sundharam's, Indian Economy, S Chand
3. Ramesh Singh, Indian Economy, McGraw Hill education.
4. Khan and Jain, Financial Services, Mcgraw Hill Education, 8th edition
5. RBI working papers
6. Mistry of Finance, GOI of working papers
7. SEBI Guidelines Issued from time to time.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce (B.Com) Course Code: B.Com.2.7 (Open Elective Course) Name of the Course: Investing in Stock Markets		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	40 Hrs
Pedagogy: Classrooms lecture, Case studies, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to <ol style="list-style-type: none"> Explain the basics of investing in the stock market, the investment environment as well as risk & return; Analyze Indian securities market; Examine EIC framework and conduct fundamental analysis; Perform technical analysis; Invest in mutual funds market. 		
Syllabus:		Hours
Module No. 1: Basics of Investing		08
Basics of Investment & Investment Environment. Risk and Return, Avenues of Investment - Equity shares, Preference shares, Bonds & Debentures, Insurance Schemes, Mutual Funds, Index Funds. Indian Security Markets - Primary Market, Secondary Market and Derivative Market. Responsible Investment.		
Module No. 2: Fundamental Analysis		08
Top down and bottom up approaches, Analysis of international & domestic economic scenario, Industry analysis, Company analysis (Quality of management, financial analysis: Both Annual and Quarterly, Income statement analysis, position statement analysis including key financial ratios, Cash flow statement analysis, Industry market ratios: PE, PEG, Price over sales, Price over book value, EVA), Understanding Shareholding pattern of the company.		
Module No. 3: Technical Analysis		08
Trading rules (credit balance theory, confidence index, filter rules, market breath, advances vs declines and charting (use of historic prices, simple moving average and MACD) basic and advanced interactive charts. Do's& Don'ts of investing in markets.		
Module No. 4: Indian Stock Market		08
Market Participants: Stock Broker, Investor, Depositories, Clearing House, Stock Exchanges. Role of stock exchange, Stock exchanges in India- BSE, NSE and MCX. Security Market Indices: Nifty, Sensex and Sectoral indices, Sources of financial information. Trading in securities: Demat trading, types of orders, using brokerage and analyst recommendations		
Module 5: Investing in Mutual Funds		08
Concept and background on Mutual Funds: Advantages, Disadvantages of investing in Mutual Funds, Types of Mutual funds- Open ended, close ended, equity, debt, hybrid, index funds and money market funds. Factors affecting choice of mutual funds. CRISIL mutual fund ranking and its usage, calculation and use of Net Asset Value.		
Skill Development Activities: <ol style="list-style-type: none"> Work on the spreadsheet for doing basic calculations in finance. Learners will also practice technical analysis with the help of relevant software. Practice use of Technical charts in predicting price movements through line chart, bar chart, candle and stick chart, etc., moving averages, exponential moving average. Calculate of risk and return of stocks using price history available on NSE website. Prepare equity research report-use of spreadsheets in valuation of securities, fundamental analysis of securities with the help of qualitative and quantitative data available in respect of companies on various financial websites, etc. 		

6. Any other activities, which are relevant to the course.

Text Books:

1. Chandra, P. (2017). Investment Analysis and Portfolio Management. New Delhi: Tata McGraw Hill Education.
2. Kevin, S. (2015). Security Analysis and Portfolio Management. Delhi: PHI Learning. Ranganatham,
3. M., & Madhumathi, R. (2012). Security Analysis and Portfolio Management. Uttar Pradesh: Pearson (India) Education.
4. Pandian, P. (2012). Security Analysis and Portfolio Management. New Delhi: Vikas Publishing House.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Commerce (B.Com) Course Code: B.Com.2.7 (Open Elective Course) Name of the Course: PUBLIC FINANCE		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	40 Hrs
Pedagogy: Classrooms lecture, Case studies, Group discussion, Seminar & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will be able to a) Identify the basis of Money and sources of Public Finance b) Identify the stages of business cycles and take appropriate decisions.		
Syllabus:		Hours
Module No. 1: Money		08
Meaning, definitions, functions & classification - money and near money. Demand and supply of money: determinants; High – powered money and the money multiplier.		
Module No. 2: Value of money and its application		08
Value of Money: meaning and theories - The quantity Theory of money – Fisher’s Theory and the Cambridge Equations, Friedman’s restatement of the quantity theory- Measurement of Value of money: Index Numbers – meaning, types and uses. Inflation: meaning, types, causes, effects and remedies - stagflation.		
Module No. 3: Business Cycles		08
Meaning features, phases- causes: Hawtrey’s theory, Hick’s theory and Schumpeter’s Theory – Measures to control business cycles.		
Module No. 4: Public Finance		08
Meaning, Difference between public Finance and Private Finance ; Components of public finance principle of maximum social advantage. Public Revenue – Meaning, Sources, Cannons of taxation. Public Expenditure – Meaning and Classification (Heads of Public Expenditure) Public Debt – Meaning Sources types of Public debt and methods of redemption.		
Module 5: Fiscal Policy and Deficit Finance		08
Public Budget - Meaning, Objectives, Components and types Fiscal Policy – Meaning, Objectives and Components Role of Fiscal policy in developing economy – Deficit finance.		
Skill Development Activities: <ol style="list-style-type: none"> 1. Acquire basics of money market operations& functioning of the money market through intermediaries. 2. Acquire knowledge about the functioning of the economic system & about economic fluctuations. 3. Gains hand on experience of working of the banking system & the monetary policy. 4. Understand the importance of Inter-National Finance 5. Any other activities, which are relevant to the course. 		
Books for reference: <ol style="list-style-type: none"> 1. F. S. Mishkin and S. G. Eakins, Financial Markets and Institutions, Pearson Education, 6thedition, 2009. 2. F. J. Fabozzi, F. Modigliani, F. J. Jones, M. G. Ferri, Foundations of Financial Markets and Institutions, Pearson Education, 3rd edition,2009. 		

3. L. M. Bhole and J. Mahukud, Financial Institutions and Markets, Tata McGraw Hill, 5th edition, 2011.
4. M. Y. Khan, Indian Financial System, Tata McGraw Hill, 7th edition, 2011.
5. N. Jadhav, Monetary Policy, Financial Stability and Central Banking in India, Macmillan, 2006.
6. Musgrave Public Finance theory and Practice, Tata Mc Graw Hill, 5th Edition, 2011.
7. Taylor, 'Public Finance'.

Note: Latest edition of text books may be used.

MANGALORE



UNIVERSITY

MANGALAGANGOTRI

Syllabus

Bachelor of Business Administration (BBA PROGRAMME)

As per NEP 2020 and as per resolutions of BOS on BBA held on 22-10-2021

**Department of Business Administration
(Faculty of Commerce)
Mangalore University, Mangalagangotri**

Bachelor of Business Administration

1. Programme Objectives:

The objectives of BBA Programme are:

- To impart knowledge of the fundamentals of Management theory and its application in problem solving.
- Select and apply appropriate tools for decision making required for solving complex managerial problems.
- To develop problem-solving skills through experiential learning and innovative pedagogy to ensure utilization of knowledge in professional careers.
- To develop sound knowledge of the entrepreneurial process and inculcate creativity and innovation among students.
- To produce industry ready graduates have highest regard for Personal & Institutional Integrity, Social Responsibility, Teamwork and Continuous Learning.
- To develop a positive attitude and life skills to become a multi faceted personality with a sense of environmental consciousness and ethical values.

2. Programme Outcomes (PO):

On successfully completing the program the student will be able to:

- Understand concepts and principles of management/business; identify the opportunities in the corporate environment and manage the challenges
- Demonstrate the knowledge of management science to solve complex corporate problems using limited resources. Display enhanced personality and soft skills
- Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- Demonstrate entrepreneurial competencies
- Exhibit managerial skills in the areas of marketing, finance, HR, etc.
- Identify business opportunities, design and implement innovations in workspace.
- Possess a sturdy foundation for higher education

3. Program Specific Outcomes (PSO):

On the successful completion of B.B.A., the students will be able to:

PSO1: Acquire Practical learning through summer internship, industrial visit and Business Plan etc.

PSO2: Demonstrate analytical and problem-solving skills through specialization in Finance, Human Recourse, and Marketing to solve the business issues.

PSO3: Understand and develop the new dimensions of knowledge through open electives to cater the need of the industry.

PSO4: Comprehend the core concepts, methods and practices in management.

PSO5: Venture into his/her own business or excel in executive roles in private /government sector.

PSO6: Demonstrate the ability to create business plans

PSO7: Develop an understanding of business that reflects the moral responsibility of business to all relevant stakeholders and the natural environment.

PSO8: Matured Individuals and responsible Citizens to the country

PSO9: Demonstrate Ability to work in Groups

4. Structure of BBA Syllabus:

First Semester BBA (Basic/Honors)							
Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L + T + P)	SEE	CIE	Total Marks	Credits
Lang. 1.1	Language - I	AECC	3+1+0	60	40	100	3
Lang. 1.2	Language - II	AECC	3+1+0	60	40	100	3
BBA. 1.1	Management Principles & Practice	DSCC	4+0+0	60	40	100	4
BBA. 1.2	Fundamentals of Business Accounting	DSCC	3+0+2	60	40	100	4
BBA. 1.3	Marketing Management	DSCC	4+0+0	60	40	100	4
BBA. 1.4	Digital Fluency	SEC	1+0+2	30	20	50	2
BBA. 1.5	Business Organization / Office Organization and Management	O E C	3+0+0	60	40	100	3
BBA. 1.6	Health and Wellness +	SEC-VB	0+0+2	-	25	25	1
	Physical Education & Yoga		0+0+2	-	25	25	1
	Total			390	310	700	25
Second Semester BBA (Basic/Honors)							
Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L + T + P)	SEE	CIE	Total Marks	Credits
Lang. 2.1	Language - I	AECC	3+1+0	60	40	100	3
Lang. 2.2	Language - II	AECC	3+1+0	60	40	100	3
BBA. 2.1	Corporate Accounting & Reporting	DSCC	3+0+2	60	40	100	4
BBA. 2.2	Human Resource Management	DSCC	4+0+0	60	40	100	4
BBA. 2.3	Business Environment	DSCC	4+0+0	60	40	100	4
BBA. 2.4	Environmental Studies	AECC	2+0+0	30	20	50	2
BBA. 2.5	People Management / Retail Management	O E C	3+0+0	60	40	100	3
BBA. 2.6	Physical Education-Sports	SEC-VB	0+0+2	-	25	25	1
BBA. 2.6	NCC/NSS/R&R(S&G) /Cultural	SEC- VB	0+0+2	-	25	25	1
	Total			390	310	700	25

EXIT OPTION WITH CERTIFICATION

Acronyms Expanded

➤ AECC	: Ability Enhancement Compulsory Course
➤ DSC C	: Discipline Specific Core (Course)
➤ SEC	: Skill Enhancement Course
➤ SB/VB	: Skill Based/Value Based
➤ OEC	: Open Elective Course
➤ DSE	: Discipline Specific Elective
➤ SEE	: Semester End Examination
➤ CIE	: Continuous Internal Evaluation
➤ L+T+P	: Lecture + Tutorial + Practical(s)

Note:

1. One Hour of Lecture is equal to 1 Credit.
2. One Hour of Tutorial is equal to 1 Credit (Except Languages).
3. Two Hours of Practical is equal to 1 Credit.

Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 30 or less than 30 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 30 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching

5. Pedagogy:

In addition to Conventional Time-Tested Lecture Method, the following approaches may be adopted as and when found appropriate and required:

1. **Case Based Learning:** Practical exposure can be given to students through Case based learning/critical learning tool. It enhances skills of students in analyzing the organizational problems and learning to arrive at critical decisions. They learn to apply concepts, principles and analytical skills to solve the real situation problems.
2. **Experiential/Live Projects/Grass Root Projects:** To bridge the gulf between the theory and practice, the students have to be encouraged to take up experiential projects/Live Projects/Grass Root Projects in companies/organizations/factories.
3. **Team Spirit and Building:** To internalize the core curriculum, working in teams and developing team spirit is essential. Interdisciplinary learning across outside the faculty would help students in equipping with these skills.
4. **ICT enabled teaching with global touch:** With the use of modern ICT technology students' learning in class room marches towards digitization. Getting connected to people through e-mode who are located all over the world and who bring real-time insights from their industries, their customers, happenings in their local place and environment.
5. **Leadership Building:** Apart from developing a strong background in the functional areas of Commerce and Business, the Model Curriculum focuses on developing New Age Leadership capabilities among the students.
6. **Emphasis on Indian Business Models:** Over the past two decades, several Indian Business domains and organizations have made remarkable contribution in developing innovative business models by occupying a space in the global business scenario. The academia can make use of such examples in the pedagogy.

6. Suggestive Guidelines for Continuous Internal Evaluation and Semester End Examination.

The CIE and SEE will carry 40% and 60% weightage each, to enable the course to be evaluated for a total of 100 marks, irrespective of its credits. The evaluation system of the course is comprehensive & continuous during the entire period of the Semester. For a course, the CIE and SEE evaluation will be on the following parameters:

Sl. No.	Parameters for the Evaluation	Marks
1. Continuous Internal Evaluation (CIE)		
A.	Continuous & Comprehensive Evaluation (CCE)	15 Marks
B.	Internal Assessment Tests (IAT)	25 Marks
Total of CIE (A+B)		40 Marks
2. Semester End Examination (SEE)		
C.	Semester End Examination (SEE)	60 Marks
Total of CIE and SEE (A + B + C)		100 Marks

a) **Continuous & Comprehensive Evaluation (CCE):** The CCE will carry a maximum of 15% weightage (15 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty member should choose for his/her course, minimum of five of the following assessment methods with three (3.0) marks each:

- i. Individual Assignments
- ii. Seminars/Class Room Presentations/ Quizzes
- iii. Group Discussions /Class Discussion/ Group Assignments
- iv. Case studies/Case lets
- v. Participatory & Industry-Integrated Learning/ Field visits
- vi. Practical activities / Problem Solving Exercises
- vii. Participation in Seminars/ Academic Events/Symposia, etc.
- viii. Mini Projects/Capstone Projects
- ix. Any other academic activity

b) **Internal Assessment Tests (IAT):** The IAT will carry a maximum of 25% weightage (25 marks) of total marks of a course, under this component, two tests will have to be conducted in a semester for 25 marks each and the same is to be scaled down to 25 marks.

c) In case of 50 percentage of CIE weightage courses, faculty members can choose assessments methods accordingly for the required marks as mentioned above.

7. Suggestive Template for IAT

Internal Assessment Test
Bachelor of Business Administration (BBA)
Course Code: Name of the Course

Duration: 1 Hour

Total Marks: 25

SECTION-A

I. Answer any two of the following questions. (Questions are asked on Remembering)

(2 x 2= 4)

- 1.
- 2.
- 3.

SECTION- B

II. Answer any two of the following questions. (Questions are asked on Understanding and Applying)

(2 x5= 10)

- 4.
- 5.
- 6.

SECTION- C

III. Answer any one of the following questions. (Questions are asked on analyzing and evaluating)

(1x 11=11)

- 7.
- 8.

Note: Internal Test question papers format is prepared based on Revised Bloom's Taxonomy.
(https://www.apu.edu/live_data/files/333/blooms_taxonomy_action_verbs.pdf)

8. Semester End Examination (SEE):

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the Universities/Institutes' norms.

Suggestive Template for SEE

Semester End Examination
Bachelor of Business Administration (BBA)
Course Code: Name of the Course

Duration: 3 Hours

Total Marks: 60

SECTION-A

Answer any five of the following questions. Each question carries 2 marks (5 x 2= 10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

SECTION- B

Answer any four of the following questions. Each question carries 5 marks (4 x5=20)

- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION- C

Answer any three of the following questions. Each question carries 10 marks
(3x 10=30)

- 15.
- 16.
- 17.
- 18.
- 19.

BBA FIRST SEMESTER

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 1.1 Name of the Course: Management Principles & Practice		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will demonstrate <ul style="list-style-type: none"> • The ability to understand concepts of business management, principles and function of management. • The ability to explain the process of planning and decision making. • The ability to create organization structures based on authority, task and responsibilities. • The ability to explain the principles of direction, importance of communication, barrier of communication, motivation theories and leadership styles. • The ability to understand the requirement of good control system and control techniques. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO MANAGEMENT		10
Introduction –Meaning, Evolution of management thought, Pre-Scientific Management Era, Classical Management Era, Neo-Classical Management Era, Modern Management Era; Nature and Characteristics of Management - Scope and Functional areas of Management; Management as a Science, Art or Profession; Management and Administration; Principles of Management.		
Module No. 2: PLANNING AND DECISION MAKING		08
Nature, Importance and Purpose of Planning - Planning Process; Objectives; Types of plans (Meaning only); Decision making- Importance and steps; MBO and MBE (Meaning only)		
Module No. 3: ORGANIZING AND STAFFING		12
Nature and purpose of Organization; Principles of Organizing; Delegation of Authority; Types of Organization - Departmentation, Committees; Centralization vs Decentralization of Authority and Responsibility, Span of Control; Nature and importance of Staffing		
Module No. 4: DIRECTING AND COMMUNICATING		12
Meaning and Nature of Direction, Principles of Direction; Communication - Meaning and Importance, Communication Process, Barriers to Communication, Steps to overcome Communication Barriers, Types of Communication; Motivation theories – Maslow’s Need Hierarchy Theory, Herzberg’s Two Factor Theory, Mc. Gregor’s X and Y theory. Leadership – Meaning, Formal and Informal Leadership, Characteristics of Leadership; Leadership Styles – Autocratic Style, Democratic Style, Participative Style, Laissez Faire Leadership Styles, Transition Leadership, Charismatic Leadership Style.		
Module No. 5: COORDINATING AND CONTROLLING		10
Coordination–Meaning, Importance and Principles. Controlling–Meaning and steps in controlling, Essentials of Effective Control system, Techniques of Control (in brief).		
Module No. 6: BUSINESS SOCIAL RESPONSIBILITY AND MANAGERIAL ETHICS		04

Business Social Responsibility - Meaning, Arguments for and against Business Social Responsibility; Green management - Meaning, Green Management Actions; Managerial Ethics – Meaning - Importance of Ethics in Business, Factors that determine Ethical or Unethical behavior.

Skill Developments Activities:

1. Two cases on the above syllabus should be analyzed by the teacher in the classroom and the same needs to be recorded by the student in the Skill Development Book.
2. Draw different types of Organization structure.
3. Draw Control charts.

Text Books:

1. Stephen P. Robbins, Management, Pearson
2. Koontz and O'Donnell, Management, McGraw Hill.
3. L M Prasad, Principles of management, Sultan Chand and Sons
4. V.S.P Rao /Bajaj, Management process and organization, Excel Books.GH25
5. Appanniah and Reddy, Management, HPH.
6. T. Ramaswamy: Principles of Management, HPH.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 1.2 Name of the Course: Fundamentals of Business Accounting		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classrooms lecture, tutorials, and problem solving.		
Course Outcomes: On successful completion of the course, the Students will demonstrate <ul style="list-style-type: none"> • Understand the framework of accounting as well accounting standards. • The Ability to pass journal entries and prepare ledger accounts • The Ability to prepare subsidiaries books • The Ability to prepare trial balance and final accounts of proprietary concern. • Construct final accounts through application of tally. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO FINANCIAL ACCOUNTING		08
Introduction – Meaning and Definition – Objectives of Accounting – Functions of Accounting – Users of Accounting Information – Limitations of Accounting – Accounting Cycle - Accounting Principles – Accounting Concepts and Accounting Conventions. Accounting Standards – objectives-significance of accounting standards. List of Indian Accounting Standards.		
Module No. 2: ACCOUNTING PROCESS		12
Meaning of Double entry system - Process of Accounting - Kinds of Accounts - Rules - Transaction Analysis - Journal - Ledger - Balancing of Accounts - Trial Balance - Problems on Journal, Ledger Posting and Preparation of Trial Balance.		
Module No. 3: SUBSIDIARY BOOKS		14
Meaning - Significance - Types of Subsidiary Books -Preparation of Purchases Book, Sales Book, Purchase Returns Book, Sales Return Book, Bills Receivable Book, Bills Payable Book. Types of Cash Book- Simple Cash Book , Double Column Cash Book , Three Column Cash Book and Petty Cash Book(Problems only on Three Column Cash Book and Petty Cash Book), Bank Reconciliation Statement - Preparation of Bank Reconciliation Statement (Problems on BRS)		
Module No. 4: FINAL ACCOUNTS OF PROPRIETARY CONCERN		10
Preparation of Statement of Profit and Loss and Balance Sheet of a proprietary concern with special adjustments like depreciation, outstanding and prepaid expenses, outstanding and received in advance of incomes, provision for doubtful debts, drawings and interest on capital.		
Module No. 5: ACCOUNTING SOFTWARE		12

Introduction-meaning of accounting software, types accounting software-accounting software Tally-Meaning of Tally software – Features - Advantages, Creating a New Company, Basic Currency information, other information, Company features and Inventory features. Configuring Tally - General Configuration, Numerical symbols, accounts/inventory info - master configuration -voucher entry configuration. Working in Tally: Groups, Ledgers, writing voucher, different types of voucher, voucher entry Problem on Voucher entry - Generating Basic Reports in Tally-Trail Balance, Accounts books, Cash Book, Bank Books, Ledger Accounts, Group Summary, Sales Register and Purchase Register, Journal Register, Statement of Accounts, and Balance Sheet.

Skill Developments Activities:

1. List out the accounting concepts and conventions.
2. Prepare a Bank Reconciliation Statement with imaginary figures
3. Collect the financial statement of a proprietary concern and record it.
4. Prepare a financial statement of an imaginary company using tally software.

Text Books:

1. Hanif and Mukherjee, Financial Accounting, Mc Graw Hill Publishers
2. Arulanandam & Raman; Advanced Accountancy, Himalaya Publishing House
3. S.Anil Kumar,V.Rajesh Kumar and B.Mariyappa–Fundamentals of Accounting, Himalaya Publishing House.
4. Dr. S.N. Maheswari, Financial Accounting, Vikas Publication
5. S P Jain and K. L. Narang, Financial Accounting, Kalyani Publication
6. Radhaswamy and R.L. Gupta, Advanced Accounting , Sultan Chand
7. M.C. Shukla and Goyel, Advanced Accounting, S Chand.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 1.3 Name of the Course: Marketing Management		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will demonstrate <ul style="list-style-type: none"> Understand the concepts and functions of marketing. Analyse marketing environment impacting the business. Segment the market and understand the consumer behaviour Describe the 4 Ps of marketing and also strategize marketing mix Describe 7 Ps of service marketing mix. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO MARKETING		10
Meaning and Definition, Concepts of Marketing, Approaches to Marketing, Functions of Marketing. Recent trends in Marketing-E- business, Tele-marketing, M-Business, Green Marketing, Relationship Marketing, Concept Marketing, Digital Marketing, social media marketing and E-tailing (Meaning only).		
Module No. 2: MARKETING ENVIRONMENT		10
Micro Environment – The company, suppliers, marketing intermediaries competitors, public and customers; Macro Environment- Demographic, Economic, Natural, Technological, Political, Legal, Socio-Cultural Environment.		
Module No. 3: MARKET SEGMENTATION AND CONSUMER BEHAVIOUR		10
Meaning and Definition, Bases of Market Segmentation, Requisites of Sound Market Segmentation; Consumer Behavior-Factors influencing Consumer Behavior; Buying Decision Process.		
Module No. 4: MARKETING MIX		20
Meaning, Elements of Marketing Mix (Four P's) – Product, Price, Place, Promotion. Product-Product Mix, Product Line, Product Lifecycle, New Product Development, Reasons for Failure of New Product, Branding, Packing and Packaging, Labeling, Pricing – Objectives, Factors influencing Pricing Policy, Methods of Pricing; Physical Distribution–Meaning, Factors affecting Channel Selection, Types of Marketing Channels. Promotion – Meaning and Significance of Promotion, Personal Selling and Advertising (Meaning Only)		
Module No. 5: SERVICES MARKETING		06
Meaning and definition of services, difference between goods and services, features of services, seven P's of services marketing (concepts only).		

Skill Developments Activities:

1. Two cases on the above syllabus should be analyzed and recorded in the skill development
2. Design a logo and tagline for a product of your choice
3. Develop an advertisement copy for a product.
4. Prepare a chart for distribution network for different products.

Text Books:

1. Philip Kotler, Marketing Management, Prentice Hall.
2. Lovelock Christopher, Services Marketing: People, Technology, Strategy, PHI
3. William J. Stanton, Michael J. Etzel, Bruce J Walker, Fundamentals of Marketing, McGraw Hill Education.
4. Bose Biplab, Marketing Management, Himalaya Publishers.
5. J.C. Gandhi, Marketing Management, Tata McGraw Hill.
6. Ramesh and Jayanti Prasad: Marketing Management, I.K. International
7. Sontakki, Marketing Management, Kalyani Publishers.
8. P N Reddy and Appanniah, Marketing Management

Note: Latest edition of text books may be used.

BBA 1.4 – Digital Fluency (SEC)			
Course Credits	02	Total Contact Hours	30
Internal Assessment Marks : 20		Semester End Examination Marks : 30	

Common Syllabus for all UG Programmes

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 1.5 (OEC) Name of the Course: Business Organization		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will demonstrate: <ul style="list-style-type: none"> • An understanding of the nature, objectives and social responsibilities of business • An ability to describe the different forms of organisations • An understanding of the basic concepts of management • An understanding of functions of management. • An understanding of different types of business combinations 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO BUSINESS		10
Business: Meaning, Nature, Scope and Social responsibility of Business, Objectives, Essentials of successful business; Functional areas of business. Concept of Business Organisation.		
Module No. 2: FORMS OF BUSINESS ORGANIZATION:		12
Sole proprietorship: Definitions, Features, Merits and Demerits. Partnership: Definitions, partnership deed, Features, Merits and Demerits. Joint Stock Company: Definitions, Features, Merits and Demerits. Co- operatives: Definitions, Features, Merits and Demerits.		
Module No. 3: PUBLIC ENTERPRISES		08
Departmental Undertaking: Definitions, Features, Merits and Demerits. Public Corporations: Definitions, Features, Merits and Demerits. Government Companies: Definitions, Features, Merits and Demerits		
Module No. 4: BUSINESS COMBINATIONS		08
Meaning Definitions, Causes, Types, Forms, merits and demerits of Business Combinations, Recent Trends in Business Combinations.		
Module No 5: MANAGEMENT OF ORGANIZATIONS		07
Management- Meaning, Definitions, Difference between Management and Administration, Levels of Management, Objectives of Management, Functions of management- planning, organizing, staffing, directing, coordinating, controlling, Principles of Management.		
Skill Developments Activities: <ol style="list-style-type: none"> 1. Preparation of partnership deed 2. Draw a business tree 3. Make a list of 10 PSUs 4. Prepare a list of different types of business combinations 		

Text Books:

1. C B. Guptha - Business Organisation and Management, Sultan Chand & Sons.
2. Dr. S. C. Saxena - Business Administration & Management, Sahitya Bhawan.
3. Y K. Bhushan. Fundamentals of Business Organisation and Management, Sultan Chand & Sons.
4. R K. Sharma, Business – Organisations and Management, Kalyani Publishers.
5. I.M. Sahai, Padmakar Asthana - Business Organisation & Administration, Sahitya Bhawan Publications, Agra

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 1.5 Name of the Course: Office Organization and Management (OEC)		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the Students will demonstrate <ol style="list-style-type: none"> An understanding of basic knowledge of office organisation and management Demonstrate skills in effective office organisation Ability to maintain office records Ability to maintain digital record. Understanding of different types of organisation structures and responsibilities as future office managers. 		
Syllabus:		Hours
Module No. 1: FUNDAMENTALS OF OFFICE MANAGEMENT		08
Introduction: Meaning, importance and functions of modern office Modern Office Organisation: Meaning; Steps in office organisation; Principles of Office organisation, Organisation structure types, Nature of office services: Types of services in a modern office, decentralisation and centralisation of office services, Departmentation of Office Office management: Meaning, Elements and major processes of Office management Office Manager: Functions and qualifications of Office manager.		
Module No. 2: ADMINISTRATIVE ARRANGEMENT AND FACILITIES		07
Office Accommodation and its Importance: Location of Office, Choice of Location: Urban vs Suburban, Factors to be Considered in Selecting the Site, Securing Office Space, Office Lay-out: Objectives of Office Lay-out, Principles of Office Lay-out, Steps in Lay-out Planning, Advantages of a Good Lay-out. Types of offices: Open Office and Private Office- advantages and disadvantages.		
Module No. 3: OFFICE ENVIRONMENT		10
Meaning and Components of Office Environment: Interior Decoration, Colour Conditioning, Floor Coverings, Furnishings, Furniture and Fixtures: Types of Furniture, Choice between Wooden and Steel Furniture, Principles Governing Selection of Furniture Lighting and Ventilation, Noise: Internal Noise, External Noise Cleanliness, Sanitation and Health Safety and Security		
Module No. 4: RECORDS MANAGEMENT		10

<p>Introduction to records: Importance of Records, types of office records, Records Management: Meaning, Principles of Record Keeping, Functions of 'Records Management</p> <p>Filing: Elements of Filing and Filing Functions, Objectives and Importance of Filing, Advantages of Filing, Essentials of a Good Filing System, Classification of Files, Filing Procedure or Routine.</p>	
<p>Filing Methods: Horizontal Filing -meaning, types and advantages, Vertical Filing- meaning, equipment used, advantage and disadvantages.</p> <p>Centralisation and Decentralisation of Filing- Centralised filing and Decentralised Filing Office manual: contents, Importance, types of office manuals.</p> <p>Indexing: Meaning, importance, advantages and essentials of good indexing, type of index Retention and disposal of files: Meaning and benefits of record retention, need for disposal of files, life-cycle stages of files.</p>	
Module No. 5: OFFICE MECHANISATION AND DATA PROCESSING	10
<p>Meaning, Importance and Objectives of Office Mechanisation, Advantages and disadvantages of Office Mechanisation, Factors Determining Office Mechanisation</p> <p>Kinds of Office Machines: Duplicating Machines and Photocopying Machines, Accounting, tabulating and computing machines, communication machines</p> <p>Introduction to Data and Information: Distinction between Data and Information, Importance of Data and Information, Classification of Data, Classification of Information, Data Lifecycle (chart), Data Collection Methods- Primary and secondary data collection methods</p> <p>Data presentation Methods of Presentation of Data</p> <p>Data processing using computers: Components of Computers, Input and Output Devices, Software used in Computers (names and uses only), Computer Applications in Office' Management, Advantages and Limitations of Computerisation</p>	
<p>Skill Developments Activities:</p> <ol style="list-style-type: none"> 1. Visit an office and enlist the different types of machines used in the office 2. Identify the different types of stationery used in offices today 3. Draw a data life cycle chart 4. Draw charts indicating different types of office layouts. 	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. S.P Arora, Office Organisation and Management, Vikas Publishing House Pvt Ltd 2. M.E Thakuram Rao, Office organisation and Management, Atlantic 3. Judith Read, Mary Lea Ginn, Record Management, 10th Edition, Cengage Learning. <p>Note: Latest edition of text books may be used.</p>	

BBA 1.6 – Physical Education- Yoga/Health and Wellness (SEC-VB)	
Course Credits	02
Total Contact Hours	30
Internal Assessment Marks: 25+25	Semester End Examination Marks : Nil

Common Syllabus for all UG Programmes

BBA SECOND SEMESTER

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 2.1 Name of the Course: Financial Accounting and Reporting		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classrooms lecture, tutorials, and Problem Solving.		
Course Outcomes: On successful completion of the course, the Students will demonstrate <ul style="list-style-type: none"> • The ability to prepare final accounts of partnership firms • The ability to understand the process of public issue of shares and accounting for the same • The ability to prepare final accounts of joint stock companies. • The ability to prepare and evaluate vertical and horizontal analysis of financial statements • The ability to understand company's annual reports. 		
Syllabus:		Hours
Module No. 1: FINAL ACCOUNTS OF PARTNERSHIP FIRM		10
Meaning of Partnership Firm, Partnership deed-clauses in partnership deed, Preparation of Final accounts of partnership firm-Trading and Profit and Loss Account, Profit and Loss Appropriation Account, Partners capital account and Balance sheet. Goodwill- Nature, Factors influencing goodwill and methods of valuation of goodwill (Average and super profit methods)		
Module No. 2: ISSUE OF SHARES		08
Meaning of Share, Types of Shares – Preference shares and Equity shares – Issue of Shares at par, at Premium, at Discount: Pro-Rata Allotment; Journal Entries relating to issue of shares; Preparation of respective ledger accounts; Preparation of Balance Sheet in the Vertical form (Practical Problems).		
Module No. 3: FINAL ACCOUNTS OF JOINT STOCK COMPANIES		12
Statutory Provisions regarding preparation of Company Final Accounts – Treatment of Special Items, Managerial Remuneration, Tax deducted at source, Advance payment of Tax, Provision for Tax, Depreciation, Interest on debentures, Dividends, Rules regarding payment of dividends, Transfer to Reserves, Preparation of Profit and Loss Account and Balance Sheet (Vertical Form Schedule -III) (Practical Problems).		
Module No. 4: FINANCIAL STATEMENTS ANALYSIS		12
Comparative Statements - Comparative Income Statement, Comparative Balance Sheet; Common size Statements – Common Size Income Statement, Common Size Balance Sheet – Trend Percentages. (Analysis and Interpretation)		
Module No. 5: CORPORATE FINANCIAL REPORTING PRACTICES		10

Corporate Financial Reporting - meaning, types, characteristics of Corporate financial report, users of corporate financial report; Components corporate financial report– general corporate information, financial highlights, letter to the shareholders from the CEO, management's discussion and analysis; Financial Statements-balance sheet, income statement, cash flow statement, and notes to the financial statements; Auditor's report; Significant Accounting Policies; Corporate Governance Report; Corporate Social Responsibility Report (Discuss only Role and Significance of above components of corporate financial report).

Skill Developments Activities:

1. Collect financial statement of a company for five years and analyse the same using trend analysis.
2. Refer annual reports of two companies and list out the components.
3. Draft a partnership deed as per Partnership Act.
4. List out the accounting policies in annual report of the company

Text Books:

1. Maheshwari S.N & Maheshwari S.K., Advanced Accountancy, Vikas Publication House Pvt. Ltd.
2. Jain and Narang, Advanced Accountancy, Kalyani Publications.
3. R. L. Gupta, Principles and Practice of Accountancy, Sultan Chand & Sons.
4. D. Chandra Bose, Advanced Accounting II, PHI Learning Pvt. Ltd.
5. M.C Shukla, T.S Grewal and S.C Gupta, Advanced Accounts II, Chand & Company.
6. Basu & Das, Advanced Accountancy, Vikas Publication House Pvt Ltd.
7. Arulanandam M.A. and Raman K.S., Advanced Accountancy, Himalaya Publishing House.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 2.2 Name of the Course: Human Resource Management		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,		
Course Outcomes: On successful completion of the course, the students will be able to demonstrate <ul style="list-style-type: none"> • Ability to describe the role and responsibility of Human resources management functions on business • Ability to describe HRP, Recruitment and Selection process • Ability to describe to induction, training, and compensation aspects. • Ability to explain performance appraisal and its process. • Ability to demonstrate Employee Engagement and Psychological Contract. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO HUMAN RESOURCE MANAGEMENT		10
Meaning and Definition of HRM – Features Objectives, Differences between Human Resource Management and Personnel Management, Importance, Functions and Process of HRM, Role of HR Manager, Trends influencing HR practices		
Module No. 2: HUMAN RESOURCE PLANNING, RECRUITMENT & SELECTION		14
Human Resource Planning: Meaning and Importance of Human Resource Planning, Process of HRP HR Demand Forecasting- Meaning and Techniques (Meanings Only) and HR supply forecasting. Succession Planning – Meaning and Features Job Analysis: Meaning and Uses of Job Analysis, Process of Job Analysis – Job Description, Job Specification, Job Enlargement, Job Rotation, Job Enrichment (Meanings Only) Recruitment – Meaning, Methods of Recruitment, Factors affecting Recruitment, Sources of Recruitment Selection – Meaning, Steps in Selection Process, Psychometric tests for Selection, Barriers to effective Selection, Making Selection effective; Placement, Gamification – Meaning and Features.		
Module No. 3: INDUCTION, TRAINING AND COMPENSATION		10
Induction: Meaning, Objectives and Purpose of Induction, Problems faced during Induction, Induction Program Planning. Training: Need for training, Benefits of training, Assessment of Training Needs and Methods of Training and Development; Kirkpatrick Model; Career Development. Compensation: Direct and Indirect forms of Compensation (Meaning Only), Compensation Structure.		
Module No. 4: PERFORMANCE APPRAISAL, PROMOTION & TRANSFERS		14

Performance appraisal: Meaning and Definition, Objectives and Methods of Performance Appraisal – Uses and Limitations of Performance Appraisal, Process of Performance Appraisal
 Promotion: Meaning and Definition of Promotion, Purpose of Promotion, Basis of Promotion.
 Transfer: Meaning of Transfer, Reasons for Transfer, Types of Transfer, Right Sizing of Work Force, Need for Right Sizing

Module No. 5: EMPLOYEE ENGAGEMENT AND PSYCHOLOGICAL CONTRACT

08

Employee Engagement (EE): Meaning and Types of EE, Drivers of Engagement - Measurement of EE, Benefits of EE.
 Psychological contract: Meaning and features.

Skill Developments Activities:

1. Preparation of Job Descriptions and Job specifications for a Job profile
2. Choose any MNC and present your observations on training program
3. Develop a format for performance appraisal of an employee.
4. Discussion of any two Employee Engagement models.
5. Analysis of components of pay structure based on the CTC sent by the Corporate to the institute for the various jobs of different sectors.

Textbooks:

1. Aswathappa, Human Resource Management, McGraw Hill
2. Edwin Flippo, Personnel Management, McGraw Hill
3. C.B.Mamoria, Personnel Management, HPH
4. Subba Rao, Personnel and Human Resources Management, HPH
5. Reddy & Appanniah, Human Resource Management, HPH
6. Madhurimalal, Human Resource Management, HPH
7. S.Sadri & Others: Geometry of HR, HPH
8. Rajkumar: Human Resource Management I.K. Intl
9. Michael Porter, HRM and Human Relations, Juta & Co.Ltd.
10. K. Venkataramana, Human Resource Management, SHBP Chartered Accountants of India, New Delhi.

Note: Latest edition of textbooks may be used.

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 2.3 Name of the Course: BUSINESS ENVIRONMENT		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs
Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies.		
Course Outcomes: On successful completion Student will demonstrate <ul style="list-style-type: none"> • An Understanding of components of business environment. • Ability to analyse the environmental factors influencing business organisation. • Ability to demonstrate Competitive structure analysis for select industry. • Ability to explain the impact of fiscal policy and monetary policy on business. • Ability to analyse the impact of economic environmental factors on business. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION BUSINESS ENVIRONMENT		12
Meaning of business, scope and objectives Business, business environment, Micro and Macro-environment of business (social, cultural, economic, political, legal technological and natural) Impact of these factors on decision making in business, Environmental analysis, and Competitive structure analysis of Business.		
Module No. 2: GOVERNMENT AND LEGAL ENVIRONMENT		16
Government Functions of the State, Economic role of government, State intervention in business- reasons for and types of state intervention in business. Impact of Monetary policy, Fiscal policy, Exim policy and industrial policy on business. Legal environment - Various laws affecting Indian businesses.		
Module No. 3: ECONOMIC ENVIRONMENT AND GLOBAL ENVIRONMENT		13
An overview of economic environment, nature of the economy, structure of economy, factors affecting economic environment. Globalisation of business; meaning and dimensions, stages, essential conditions of globalisation, foreign market entry strategies, merits and demerits of globalisation of business, Impact of Globalisation on Indian businesses, Forms of globalisation of businesses- MNCs, TNCs etc.		
Module No. 4: TECHNOLOGICAL ENVIRONMENT		10
Meaning and features; types of innovation, Impact of Technological changes on business, Technology and Society, Technological Acquisition modes, IT revolution and business, Management of Technology.		
Module No. 5: NATURAL ENVIRONMENT		05
Meaning and nature of physical environment. Impact of Natural environment on business.		

Skill Developments Activities:

- a) List out key features of recent Monetary policy published by RBI impacting businesses.
- b) Give your observation as to how technology has helped society.
- c) Draft Five Forces Model for Imaginary business.
- d) Identify the benefits of Digital transformation in India.

Text Books:

1. Dr. K Ashwatappa: Essentials Of Business Environment
2. Sundaram & Black: The International Business Environment; Prentice Hall
3. Chidambaram: Business Environment; Vikas Publishing
4. Upadhyay, S: Business Environment, Asia Books
5. Chopra, BK: Business Environment in India, Everest Publishing
6. Suresh Bedi: Business Environment, Excel Books
7. Economic Environment of Business by M. Ashikary.
8. Business Environment by Francis Cherrinulam

Note: Latest edition of text books may be used.

BBA 2.4 – Environment Studies (AECC)			
Course Credits	02	Total Contact Hours	30
Internal Assessment Marks : 20		Semester End Examination Marks : 30	

Common Syllabus for all UG Programmes

Name of the Program: Bachelor Business Administration (BBA) Course Code: BBA.2.5 (OEC) Name of the Course: People Management		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs
Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies.		
Course outcome: On successful completion of the course, student will demonstrate: <ol style="list-style-type: none"> 1. Ability to examine the difference between People Management with Human resource Management 2. Ability to explain the need for and importance of People Management. 3. Ability to explain role of manager in different stages of performance management process 4. Ability to list modern methods of performance and task assessment. 5. Ability to analyse the factors influencing the work life balance of an working individual. 		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO PEOPLE MANAGEMENT		06
Diversity in organisation: age, gender, ethnicity, race, and ability. People Management: Meaning, Features, Significance of people management, Difference between People Management and Human Resource Management, impact of individual and organizational factors on people management.		
Module No. 2: GETTING WORK DONE AND ASSESSMENT AND EVALUATION		12
Getting work done: Challenges of getting work done, significance of prioritization and assigning work to team members. Performance Management: meaning, role of a manager in the different stages of the performance management process, Types of Performance assessment, Assessment and Evaluation Process of evaluation of tasks in the organisation. Modern tools of assessment and evaluation of tasks and performance.		
Module No. 3: BUILDING PEER NETWORKS AND ESSENTIALS OF COMMUNICATION		12
Building Peer Networks: Understanding the importance of peer networks in an organization; being able to influence those on whom you have no authority; challenges Peer networking and different types of people networking in the workplace. Essentials of Communication: Concept of the communication process with reflection on various barriers to effective communication and ways to overcome, Types of Communication and Channels of Communication.		
Module No. 4: MOTIVATION		08
Meaning, Importance and need for motivation, team motivation- meaning, importance team motivation, types of Motivators and Modern methods of motivation		
Module No. 5: MANAGING SELF		07

Reflection on what does it mean to be a people manager; building a personal development plan for oneself, Self-Stress Management: Causes for stress, work life Balance, Importance of Work life balance, Factors influencing Work life Balance.

Skill Developments Activities:

1. Analyse two cases on any of the above content indicated above.
2. List out the modern tools to performance assessment and evaluation.
3. Conduct a survey of work life balance of working individuals
4. Draft a Career development of working individual in the middle level management.

Text Books:

1. Mc. Shane, Steven L. and Mary Ann Von Glinow, Organizational Behavior: Emerging Knowledge and Practice for the Real World. McGraw-Hill, latest edition, ISBN: 0-07-115113-3.
2. Bernardin, H. John and Joyce E. A. Russell. Human Resource Management: An Experiential Approach. McGraw-Hill, 6/e. ISBN: 0078029163
3. Argyris, C. (1974). Personality vs. Organization. Organizational Dynamics. Vol. 3. No. 2, Autumn.
4. Blume, B. Baldwin, T. and Ryan, K. (2013). Communication Apprehension. A barrier to students leadership, adaptability and multicultural appreciation. Academy of Management Learning & Education, Jun, Vol. 12 Issue 2, p158-172.
5. Colquitt, J.A., LePine, J.A., & Wesson, M.J. (2009) Organizational Behavior: Improving Performance and Commitment in the Workplace (International edition). New York: McGraw-Hill.
6. Goleman, D. (1998). Working with Emotional Intelligence. Bantam Books,

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA) Course Code: BBA 2.5 (OEC) Name of the Course: RETAIL MANAGEMENT		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs
Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies.		
Course Outcomes: On successful completion Student will demonstrate ; a) An understanding of the types and forms of Retail business. b) Ability to examine Consumer Behaviour in various environments. c) Ability to analyse various Retail operations and evaluate them. d) Ability to analyse various marketing mix elements in retail operations. e) An understanding of Information Technology in retail business.		
Syllabus:		Hours
Module No. 1: INTRODUCTION TO RETAIL BUSINESS		08
Definition – functions of retailing - types of retailing – forms of retail business ownership. Retail theories – Wheel of Retailing – Retail life cycle. Retail business in India: Influencing factors – present Indian retail scenario.		
Module No. 2: CONSUMER BEHAVIOUR IN RETAIL BUSINESS		08
Buying decision process and its implication on retailing – Influence of group and individual factors, Customer shopping behaviour, Customer service and customer satisfaction.		
Module No. 3: RETAIL OPERATIONS		08
Factors influencing location of Store - Market area analysis – Trade area analysis – Rating Plan method - Site evaluation. Retail Operations: Stores Layout and visual merchandising, Stores designing, Space planning, Inventory management, Merchandise Management, Category Management.		
Module No. 4: RETAIL MARKETING MIX		14
Introduction -Product: Decisions related to selection of goods (Merchandise Management revisited) – Decisions related to delivery of service. Pricing: Influencing factors – approaches to pricing – price sensitivity - Value pricing – Markdown pricing. Place: Supply channel – SCM principles – Retail logistics – computerized replenishment system – corporate replenishment policies. Promotion: Setting objectives – communication effects - promotional mix.		
Module No. 5: INFORMATION TECHNOLOGY IN RETAILING		07
Non store retailing (e-retailing) - The impact of Information Technology in retailing - Integrated systems and networking – EDI – Bar coding – Electronic article surveillance – Electronic shelf labels – Customer database management system.		
Skill Developments Activities: 1. Draw a retail life cycle chart and list the stages 2. Draw a chart showing a store operations 3. List out the major functions of a store manager diagrammatically 4. List out the current trends in e-retailing 5. List out the Factors Influencing in the location of a New Retail outlet		
Text Books:		

1. Suja Nair; Retail Management, HPH
2. Karthic – Retail Management, HPH
3. S.K. Poddar & others – Retail Management, VBH.
4. R.S Tiwari ; Retail Management, HPH

Note: Latest edition of text books may be used.

BBA 2.6 – Physical Education-Sports/ NCC/NSS/R&R(S&G) /Cultural (SEC-VB)	
Course Credits	02
Total Contact Hours	30
Internal Assessment Marks : 25+25	Semester End Examination Marks : Nil

Common Syllabus for all UG Programmes



ಕ್ರಮಾಂಕ/No. :MU/ACC/CR.32/2021-22/A8

ಕುಲಸಚಿವರ ಕಛೇರಿ

ಮಂಗಳಗಂಗೋತ್ರಿ - 574 199

Office of the Registrar

Mangalagangothri - 574 199

ದಿನಾಂಕ/Date:04.12.2021

CIRCULAR

Sub: Practical lists and Blown up syllabus for first semester BCA(Basic/Hons)/
B.Sc. (Basic/Hons) in Computer Science)-reg

Ref: 1) This Office Notification of No: MU/ACC/CR.15/2021-22/A8,
Dated:4/11/2021.

2) E-mail letter dated 26/11/2021 from the Chairman, UG combined BOS in
Computer Science & Computer Applications, Mangalore University.

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In continuation to this office Notifications cited under reference (1), above, the practical lists and blown up syllabus for I Semester BCA(Basic/Hons) and B.Sc. (Basic/Hons) in Computer Science) to be implemented under NEP-2020 and sent vide reference 2 are enclosed herewith for information and necessary action.

REGISTRAR.

To:

- 1) The Principals of affiliated Colleges offering B.Sc. (Basic/Hons) in Computer Science)/BCA(Basic/Hons) Programmes.
- 2) The Registrar (Evaluation), Mangalore University.
- 3) Dr. Manjaiah D.H., Chairman, U.G. combined BOS in Computer Science and Computer Applications and Professor, Dept. of Computer Science, Mangalore University.
- 4) The A.R/ Superintendent, Academic Section, O/o the Registrar, Mangalore University.
- 5) The Director, DUIMS, Mangalore University - with a request to publish in Website.
- 6) Guard File.



# MANGALORE UNIVERSITY

## Choice Based Credit System Semester Scheme with Multiple Entry and Exit Options in the UG Programmes under NEP 2020

### Bachelor of Computer Applications (BCA) Degree Programme

2021-2022 Onwards

### I SEMESTER BCA

## BLOWN UP SYLLABUS & PRACTICAL LISTS

|                         |                                                |
|-------------------------|------------------------------------------------|
| Course Code: CAC01      | Course Title: <b>Fundamentals of Computers</b> |
| Course Credits: 03      | Hours/Week: 03                                 |
| Total Contact Hours: 42 | Formative Assessment Marks: 40                 |
| Exam Marks: 60          | Exam Duration: 03                              |

| Topics                                                                                                                                                                                                                                                       | Chapter Number       | Section                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------|
| <b>Unit-1 [12 Hours]</b>                                                                                                                                                                                                                                     |                      |                                                                                         |
| <b>Computer Basics:</b> Introduction, Characteristics computers, Evolution computers, Generations of computers, Classification of computers, the computer system, Application of computers.                                                                  | Book 1<br>Chapter 1  | 1.1 to 1.6                                                                              |
| <b>Computer Architecture:</b> Introduction, Central processing unit- ALU, Registers, Control unit, system bus, main memory unit, cache memory                                                                                                                | Book 1<br>Chapter 2  | 2.1, 2.2                                                                                |
| <b>Input devices:</b> Introduction, Types of input devices, Keyboard, Mouse, Track ball, Joystick light pen, Touch screen and track pad. Speech recognition, digital camera, webcam, Scanners                                                                | Book 1<br>Chapter 4  | 4.1, 4.2.1, 4.2.2, 4.2.4, 4.2.5, 4.2.6<br>(Excluding the working of devices)            |
| <b>Output devices:</b> Types of output, Classification of output devices, Printers – Dot matrix, Ink-jet, Laser, Hydra, Plotter, Monitor – CRT, LCD, Differences between LCD and CRT                                                                         | Book 1<br>Chapter 4  | 4.3, 4.3.1, 4.3.2, 4.3.4,<br>(Excluding the working of devices and Daisy wheel Printer) |
| <b>Unit- 2 [10 Hours]</b>                                                                                                                                                                                                                                    |                      |                                                                                         |
| <b>Computer software:</b> Introduction, software definition, relationship between software and hardware, software categories                                                                                                                                 | Book 1<br>Chapter 11 | 11.1, 11.2, 11.3                                                                        |
| <b>Computer programming languages:</b> Introduction, Developing a program, Program development cycle, Types of programming languages, generation of programming languages, Features of a good programming language.                                          | Book 1<br>Chapter 10 | 10.1, 10.9, 10.10, 10.11                                                                |
| <b>Algorithm:</b> Steps involved in algorithm development, Algorithms for simple problems (To find largest of three numbers, factorial of a number, check for prime number, check for palindrome, Count number of odd, even and zeros in a list of integers) | Book 1<br>Chapter 10 | 10.2                                                                                    |
| <b>Flowcharts:</b> Definition, advantages, Symbols used in flow charts. Flowcharts for simple problems mentioned in algorithms. Psuedocode, Pseudocode Guidelines, Limitations of Pseudocode.                                                                | Book 1<br>Chapter 10 | 10.3, 10.5                                                                              |

| <b>Unit – 3 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  |                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------------|
| <b>Digital Computers and Digital System:</b> Introduction to Number System, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary arithmetic, Addition, Subtraction in the 1's and 2's complements system, Subtraction in the 9's and 10's complement system.                                                                                                                                                                                                                                                                                                                                                               | Book 2<br>Chapter 1              | 1.2, 1.3, 1.4, 1.5                             |
| <b>Boolean Algebra:</b> Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Book 2<br>Chapter 2              | 2.1, 2.2, 2.3                                  |
| <b>Unit – 4 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  |                                                |
| <b>Digital logical gate:</b> Boolean functions, Canonical and Standard forms, Minterms, Maxterms, other logic operations, Digital logic gates, Universal gates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Book 2<br>Chapter 2<br>Chapter 4 | 2.4, 2.5, 2.6, 2.7<br>(Excluding 2.7.1), 4.7.1 |
| <b>Simplification of Boolean function:</b> The map method, Two and three variable maps, Four-variable maps, Product of Sums simplification, Don't care conditions,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Book 2<br>Chapter 3              | 3.1, 3.2, 3.3, 3.5, 3.8                        |
| <b>Text Book:</b> <ol style="list-style-type: none"> <li>1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition, Pearson</li> <li>2. M. Morris Mano, Digital Logic and Computer design, PHI, 2015</li> </ol><br><b>Reference Books</b> <ol style="list-style-type: none"> <li>1. Pradeep K. Sinha and Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publication.</li> <li>2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman &amp; Hall/CRC.</li> <li>3. J. Glenn Brook shear, Computer Science: An Overview, Twelfth Edition, Addison-Wesley</li> <li>4. R.G. Dromey, How to solve it by Computer, PHI.</li> </ol> |                                  |                                                |

|                         |                                       |
|-------------------------|---------------------------------------|
| Course Code: CAC02      | Course Title: <b>Programming in C</b> |
| Course Credits: 03      | Hours/Week: 03                        |
| Total Contact Hours: 42 | Formative Assessment Marks: 40        |
| Exam Marks: 60          | Exam Duration: 03                     |

| <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>Chapter</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Unit – 1 [12 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                     |                |
| <b>Overview of C :</b> History of C , Importance of C Program, Basic structure of a C-program, Execution of C Program.                                                                                                                                                                                                                                                                                         | 1              |
| <b>C Programming Basic Concepts:</b> Character set, C token, Keywords and identifiers, Constants, Variables, data types, Declaration of variables, assigning values to variables, defining symbolic constants.                                                                                                                                                                                                 | 2              |
| <b>Input and output with C:</b> Formatted I/O functions - <i>printf</i> and <i>scanf</i> , control stings and escape sequences, output specifications with <i>printf</i> functions; Unformatted I/O functions to read and display single character and a string - <i>getchar</i> , <i>putchar</i> , <i>gets</i> and <i>puts</i> functions.                                                                     | 4              |
| <b>Unit – 2 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                     |                |
| <b>Operators &amp; Expressions:</b> Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity; Evaluation of arithmetic expressions; Type conversion.                                                                                            | 3              |
| <b>Control Structures:</b> Decision Making and Branching -Decision making with if statement, simple if statement, the if else statement, nesting of if ... else statements, the else if ladder, the switch statement, the ?: operator, the go to statement. Decision making and looping - The while statement, the do statement, for statement, nested loops, exit, break, jumps in loops.                     | 5,6            |
| <b>Unit – 3 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                     |                |
| <b>Derived data types in C:</b> Arrays - declaration, initialization and access of one-dimensional and two-dimensional arrays. programs using one- and two-dimensional arrays, sorting and searching arrays.                                                                                                                                                                                                   | 7              |
| <b>Handling of Strings:</b> Declaring and initializing string variables, reading strings from terminal, writing strings to screen, Arithmetic operations on characters, String handling functions - <i>strlen</i> , <i>strcmp</i> , <i>strcpy</i> , <i>strstr</i> and <i>strcat</i> ; Character handling functions - <i>toascii</i> , <i>toupper</i> , <i>tolower</i> , <i>isalpha</i> , <i>isnumeric</i> etc. | 8              |
| <b>Pointers:</b> Understanding pointers, accessing the address of a variable, declaring and initializing pointers, accessing a variable through its pointer, pointer expression, pointer increments and scale factor, pointers and arrays, pointer and strings.                                                                                                                                                | 11             |
| <b>Unit – 4 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                     |                |
| <b>User-defined functions:</b> Need for user-defined functions, Declaring, defining and calling C functions, return values and their types, Categories of functions: With/without arguments, with/without return values. Nesting of functions.                                                                                                                                                                 | 9              |
| <b>Recursion:</b> Definition, example programs.                                                                                                                                                                                                                                                                                                                                                                |                |
| <b>Structures and unions:</b> Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structures, arrays within structures, Structure and functions, structures within structures. Unions                                                                                                                                                       | 10             |

**Text Book:**

1. E. Balagurusamy, Programming in ANSI C, 5/6/7th Edition, Tata McGraw Hill

**Reference Books:**

1. Herbert Schildt, C: The Complete Reference, 4th Edition, (Osborne Complete Reference Series)
2. Brain W. Kernighan, C Programming Language, 2<sup>nd</sup> Edition, Prentice Hall Software
3. Kernighan & Ritchie: The C Programming Language, 2<sup>nd</sup> Edition, PHI
4. Kamthane, Programming with ANSI and TURBO C, Pearson Education
5. V. Rajaraman, Computer Programming in C, 2<sup>nd</sup> Edition, PHI
6. S. Byron Gottfried, Programming with C, 2<sup>nd</sup> Edition, TMH
7. Yashwant Kanitkar, Let us C, 15<sup>th</sup> Edition, BPB
8. P.B. Kottur, Computer Concepts and Programming in C, 23<sup>rd</sup> Edition, Sapna Book House

|                         |                                              |
|-------------------------|----------------------------------------------|
| Course Code: CAC03      | Course Title: <b>Mathematical Foundation</b> |
| Course Credits: 03      | Hours/Week: 03                               |
| Total Contact Hours: 42 | Formative Assessment Marks: 40               |
| Exam Marks: 60          | Exam Duration: 03                            |

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Book     | Section/Subsections                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------|
| <b>Unit – 1 [12 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |                                                          |
| <b>Logarithms:</b> Introduction, Laws of operations (Statements only), Illustrations 1(a), (P 193-195), 2, 3(i, ii, iii, v) Change of Base rule (statement only), Examples 2, 3, 4, 5, 7, 14 (P 195, 197-199, 204), 19(a) (P 206), Exercise(I) 1, 2, 3 5(a), 8(a(i, ii)) 11(a), (b), C(i), 17(a)(i, ii)                                                                                                                                                                           | <b>1</b> | 7.0<br>7.1<br>10.1<br>10.2                               |
| <b>Binomial Theorem:</b> Statement only (P 334), Example 1, 2(P 336), 5 Exercise (I)(i, ii) 2 (i) & (ii) (P 338) Positions of Terms Examples 5 (P 337), 7(a) & 7 (b) (P 339) Exercise (II)-6(i), 7 (P 350)                                                                                                                                                                                                                                                                        | <b>1</b> | 15.0<br>15.1<br>15.2                                     |
| <b>Analytical Geometry :</b> Introduction, Directed Line, Quadrants, Example 1 (P 555) , Coordinates of the midpoints, (statement and example) (P 556), Distance between two points (Only formula no proof), Section Formula, External Division, Coordinates of Centroid, Area of a Triangle (Only statements), Examples 2(a) & (b) (P 557), 3, 4, 7, 11(P 558, 559, 562, 565) Exercise I-1(i, ii), 3, 5, 9(i), 15 (a) and (b), 16(a) and (b) 21(a), 24 (i) & (ii)                | <b>1</b> | 15.4<br>15.5<br>15.6<br>15.7<br>15.8<br>15.9             |
| <b>Straight Line:</b> Slope or gradient of a straight line (formula Only), Different forms of equations of straight line (Statements- I, V, VII, IX), General equation of a straight Line (Statement Only), Example 18(P 579), Condition of Parallelism and perpendicularism (P 585, Only formula), Example 29(587) Exercise 2 (a, b), 3(b) (i), (ii) and (iii) (P 592), 13 (i, ii)                                                                                               | <b>1</b> | 15.13<br>15.14<br>15.15<br>15.16<br>15.22                |
| <b>Circle:</b> The equation of a Circle (only Formula, I and II), Illustration (P 597), General Equation of the Circle(Statement only), Finding centre and radius Example (37, 39) (P 601) Exercise (III): 5(i) (P 612), 6(a) Equation of tangent and normal (Statement only, P 605 and 606) Example 50                                                                                                                                                                           | <b>1</b> | 15.23<br>15.24<br>15.25<br>15.26                         |
| <b>Unit – 2 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |                                                          |
| <b>Trigonometry</b><br>Quadrants, Measurement of Angles (I, III), Circular measure, Example 2, Exercise 3 (a) i and ii, 4 (P 483), Trigonometric functions (definition only) , trigonometric Ratios, relation between trigonometric functions I II & III only formulae (P 487), Signs of Trigonometric functions, T-ratios of standard angles (Only table P 503), Example 25 (P 493), Exercise(II) 12 (a), (b), 13(d, e) (P 499) Exercise(III) 1 (i) (ii) (iii), 2 (a), 4(a), (b) | <b>1</b> | 14.1<br>14.2<br>14.3<br>14.4<br>14.5<br>14.6(Table only) |
| <b>Calculus</b><br>Limit of a function, definition (P 633), Some Important Limits(I, II III IV), Example 3, 4 (P 635) Exercise 1(a), (c) (P 645)                                                                                                                                                                                                                                                                                                                                  | <b>1</b> | 16.5<br>16.7<br>16.8                                     |
| <b>Continuity of a Function</b> Statement only, Example 16(a) (b) (c) (d) (P 641, 642), Exercise 5, 6 (P 645)                                                                                                                                                                                                                                                                                                                                                                     | <b>1</b> |                                                          |
| <b>Differentiation</b><br>Definition, Derivative of a power function, derivative of a constant with any function, derivative of sum of functions, derivative of product of two                                                                                                                                                                                                                                                                                                    | <b>1</b> | 17.1<br>17.3 to 17.7                                     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------|
| function, derivative of the quotient of the two functions (Only statements), Illustration 1, 2 and 3,4 (P 652, 653), Illustrations 1, 2 (P 656, 657)<br>Exercise (I) 1 (a) (b), 2 (a), (b)<br><b>Integration</b><br>Definition (P 724), Indefinite Integrals, Rules of Integration, Some Standard Results (Formula Only) (I II & IX) Illustration 1, 2, 3,4,5 (P 727), Exercise 1, 2(i) &(ii) (P 730)<br>Definite Integrals (Definition P 757), Illustration 1,2,3,5 (P 758, 759), Exercise (VI) 4(i)                                                                                                                                                                                                                                                                                        | 1 | 18.1 to 18.3<br>18.10                                                                                                       |
| <b>Unit – 3 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |                                                                                                                             |
| <b>Matrix Algebra</b> Introduction, definition, types of matrices, Illustration, scalar multiplication of matrices, Illustrations, equality of matrices, Illustrations 1,2,3 Exercise (I) 1,2,3 matrix operations, Addition and subtraction, Example 1(P 803), Multiplication, Example 2,3,4,12,13 Exercise(II):1(i,ii,iii),2, 13 Transpose of a matrix, Example: 15, symmetric matrix, skew symmetric and orthogonal matrix (P 822,823), Exercise (III): 1(a), 2, 3 Determinants of a square matrix, determinants of order two, Example (P 824),17 , Determinant of order three, expansion of the determinants, minors of a matrix, co-factors of a matrix, Example:23, 24,25 Exercise (VI): 1,3 Adjoint of a square matrix, Rank of a matrix. Illustrations:1,2,3 Exercise (VIII):4(i, ii) | 1 | 20.1, 20.2<br>20.3, 20.4<br>20.5, 20.6<br>20.8, 20.10<br>20.11, 20.12<br>20.14<br>20.18<br>20.19<br>20.20<br>20.21<br>20.25 |
| echelon form of a matrix (Statement and example only) , normal form of a matrix (only statement), equivalence of matrices (only statement)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3 | Page-371,373,375                                                                                                            |
| <b>Unit – 4 [10 Hours]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |                                                                                                                             |
| <b>Inverse of a matrix</b> (using adjoint matrices –cofactor method), Example:27 Exercise (VII): 1, 2,4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 | 20.22                                                                                                                       |
| <b>Characteristic equation of a matrix</b> (statement only), Cayley Hamilton theorem (Statement only), example 9.2.3- a,c,d Problem 9.1-1(a,c)(P 246)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4 | 9.2.1<br>9.2.2                                                                                                              |
| <b>System of Linear equations</b> ,Example 30, 31Method of Reduction, Example 33 Exercise 2: 16, 17(i,ii,iii,iv,vi), 18,19 (only to solve system of equations using method of reduction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2 | <b>Ch-1</b><br>1.34<br>1.52                                                                                                 |
| <b>Cramer’s rule</b> , Example 1, 3,6 Exercise 5 (P 399): 1 (a), (b), 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3 | (P 395)                                                                                                                     |
| <b>Arithmetic and Geometric Progressions:</b><br><b>Arithmetic progression:</b> Definition, formula for nth term, sum to n terms, Arithmetic mean, Example 1, 2, 3,4,7,8,10,15 Exercise 1: 2, 4, 7,9<br><b>Geometric progression:</b> Definition, formula for nth term, sum to n terms, geometric mean, Example 1,2, 7,18,26,27,30 Exercise: 2,17,19                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 | <b>Ch-3</b><br>3.1-3.4<br>3.26-3.28                                                                                         |
| <b>Text Books:</b><br>1. C Sanchethi and V K Kapoor, Business Mathematics, Sulthan Chand & Sons Educational publishers, New Delhi, Eleventh Revised Edition<br>2. P. R. Vittal, Business Mathematics and Statistics, Margham Publications, Chennai,<br>3. PUNDIR & S.K. PUNDIR, A TEXT BOOK OF BCA MATHEMATICS-I, RIMPLE, A Pragatis Edition (IV).<br>4. B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, New Delhi                                                                                                                                                                                                                                                                                                                                               |   |                                                                                                                             |



|                         |                                                 |
|-------------------------|-------------------------------------------------|
| Course Code: CAC01P     | Course Title: <b>Information Technology Lab</b> |
| Course Credits: 02      | Hours/Week: 04                                  |
| Total Contact Hours: 52 | Formative Assessment Marks: 25                  |
| Exam Marks: 25          | Exam Duration: 03                               |

### Practice Tasks

1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computer.
3. Basic Computer Hardware Trouble shooting.
4. LAN and WiFi Basics.
5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.
6. Activities using word processing, presentation and spreadsheet software
7. Tasks involving Internet Browsing

### Information Technology Lab

## Part A: Word Processing & Presentation

### I. Word Processing

1. Prepare a document using different formatting tools

## Highlights of the National Education Policy (NEP) 2020



#### Note4Students

From UPSC perspective, the following things are important :

**Prelims level :** National Education Policy

**Mains level :** Need for imbuing competitiveness in Indian education system

**N**ew Policy aims for **universalization of education** from pre-school to secondary level with 100 % Gross Enrolment Ratio (GER) in school education by 2030. NEP 2020 will bring 2 crores out of school children back into the mainstream through the open schooling system.

- ❖ The current 10+2 system to be replaced by a **new 5+3+3+4 curricular structure** corresponding to ages 3-8, 8-11, 11-14, and 14-18 years respectively. **This will bring the hitherto uncovered age group of 3-6 years under the school curriculum, which has been recognized globally as the crucial stage for the development of mental faculties of a child.**
- ❖ The new system will have 12 years of schooling with three years of Anganwadi/ pre-schooling.
  - Emphasis on Foundational Literacy and Numeracy, no rigid separation between academic streams, extracurricular, vocational streams in schools; Vocational Education to start from Class 6 with Internships
  - Teaching up to at least Grade 5 to be in mother tongue/ regional language. No language will be imposed on any student.
- Assessment reforms with **360° Holistic Progress Card**, tracking Student Progress for achieving Learning Outcomes
- A new and comprehensive National Curriculum Framework for Teacher Education, NCFTE 2021, will be formulated by the NCTE in consultation with NCERT.
- By 2030, the minimum degree qualification for teaching will be a 4-year integrated B.Ed. degree.
- Gross Enrolment Ratio in higher education to be raised to **50% by 2035; 3.5 crore seats to be added in higher education.**
- The policy envisages broad-based, multi-disciplinary, holistic Under Graduate Program with flexible curricula, creative combinations of subjects, integration of vocational education and multiple entries and exit points with appropriate certification.
- **Academic Bank of Credits to be established to facilitate Transfer of Credits**

**M**ultidisciplinary Education and Research Universities (MERUs), at par with IITs, IIMs, to be set up as models of best multidisciplinary education of global standards in the country.

Affiliation of colleges is to be **phased out in 15 years** and a stage-wise mechanism is to

be established for granting graded autonomy to colleges.

Over a period of time, it is envisaged that every college would develop into either an Autonomous degree-granting College or a constituent college of a university.

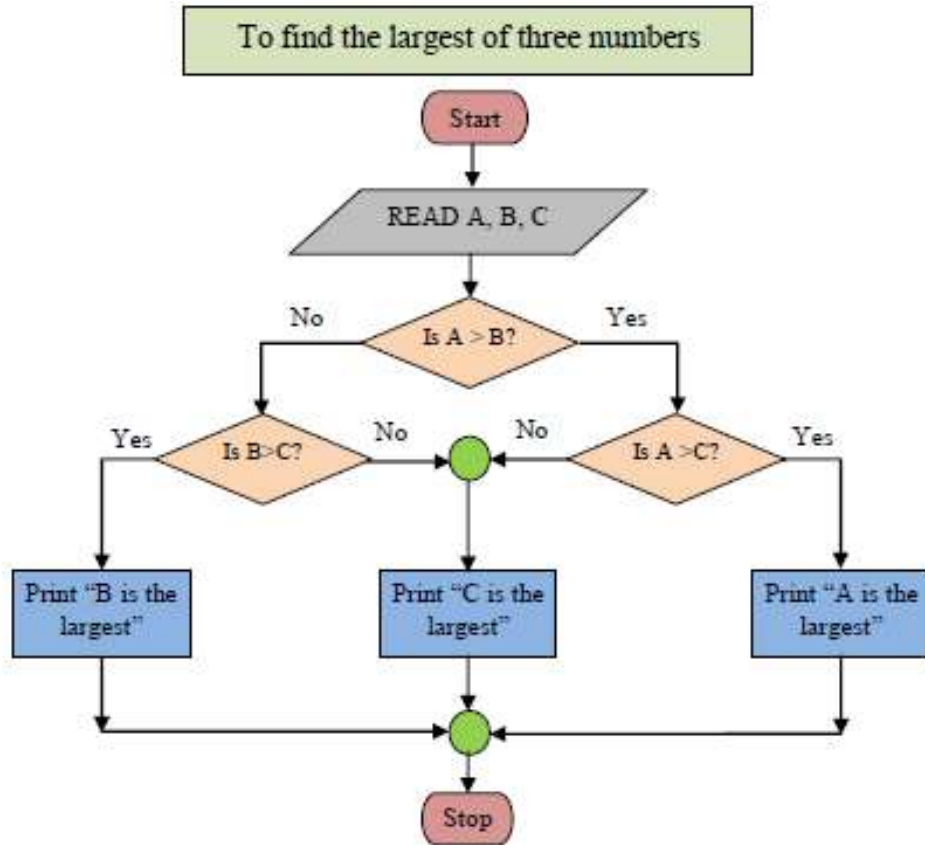
$$\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

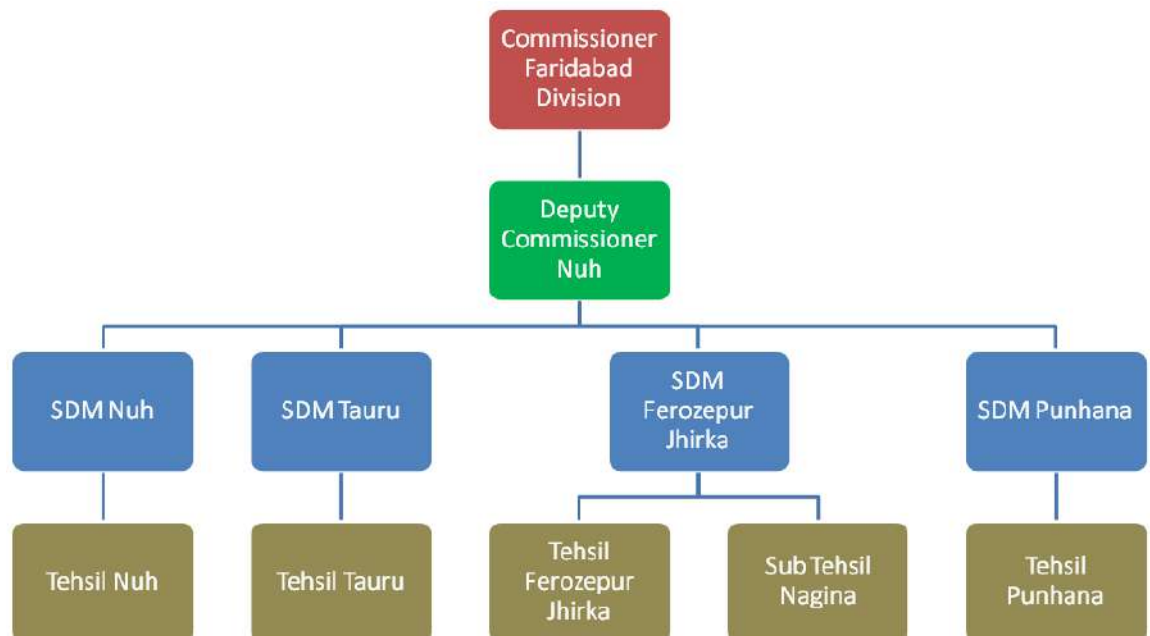
$$(a-b)^2 = (a+b)^2 - 4ab$$

$$a^2 + b^2 = (a-b)^2 + 2ab$$

2. Prepare a document using SmartArt and Shapes tools



### Organization Chart – Administration Faridabad Division





3. Prepare a document with table to store sales details of a company for different quarters and calculate total, average and find maximum, minimum sales value.

| Branch Code                     | Branch    | Sales in Quarters |        |        |        | Total | Avg |
|---------------------------------|-----------|-------------------|--------|--------|--------|-------|-----|
|                                 |           | 1                 | 2      | 3      | 4      |       |     |
| A101                            | Mangalore | 354690            | 244610 | 383290 | 413670 |       |     |
| A102                            | Udupi     |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
| Total (Across Branches)         |           |                   |        |        |        |       |     |
| Average (Across Branches)       |           |                   |        |        |        |       |     |
| Highest Sales (Across Branches) |           |                   |        |        |        |       |     |
| Lowest Sales (Across Branches)  |           |                   |        |        |        |       |     |

### TIME TABLE

| Class : I BCA |   |    |     | Room No. 206 |             |     |    |
|---------------|---|----|-----|--------------|-------------|-----|----|
| Day           | I | II | III | IV           |             | V   | VI |
| Monday        |   |    |     |              | LUNCH BREAK |     |    |
| Tuesday       |   |    |     |              |             |     |    |
| Wednesday     |   |    |     |              |             |     |    |
| Thursday      |   |    |     |              |             |     |    |
| Friday        |   |    |     |              |             |     |    |
| Saturday      |   |    |     |              |             | *** |    |

4. Prepare interview call letters for five candidates describing about the company and instructions about the interview. Use Mail merge feature

### Interview call Letter Format

Date:

[Name of the candidate]

[Address]

Dear [name of the candidate]

This is to the reference of your application for the job [name of the job] indicating interest in seeking employment in our organisation. We thank you for the same.

We would like to inform you that your profile is being shortlisted for the job role and is best suited for it. Therefore, we would like to take a face to face interview with you on [date of interview] at [venue details].

We hope that the venue is suitable for you. If not please get in touch with us, so that we can arrange the date and venue according to your availability.

The company will reimburse you all the expenses incurred by you for this interview. This letter has an attachment in which you need to fill the details and carry it along on the date of interview. Please carry your CV also along with you.

Kindly confirm your availability for the date and venue. If there are any changes to be done, please contact us at phone number: [999xxxx999] and email id: abcnd@mail.com.

We look forward to seeing you.

Regards,

Name of the Manager

Designation Name

Company name

## II. Presentation

1. Create a presentation (minimum 5 slides) about your college. It should contain images, chart, Bulleted text, .....
2. Create a presentation (minimum 5 slides) to advertise a product. The slides should be displayed automatically in a loop. Make use of Transition and Animations.
3. A simple quiz program. Use hyperlinks to move to another slide in the presentation to display the result and correct answer/wrong answer status. Use at least four questions.

## Part B: Spreadsheet

(Note: Give proper titles, column headings for the worksheet. Insert 10 records for each exercise in such a way to get the result for all the conditions. Format the numbers appropriately wherever needed).

1. Create a worksheet to maintain student information such as *RollNo, Name, Class, Marks in three subjects* of 10 students. Calculate total marks, average and grade. Find grade for Distinction, First class, Second class, Pass and Fail using normally used conditions.
  - Using custom sort, sort the data according to class: - Distinction first, FirstcClass next, and so on. Within each class, average marks should be in descending order.
  - Also draw the Column Chart showing the RollNo versus Average scored.

(Note: Worksheet creation and formatting 3 marks, calculations: 4 marks, sorting: 2 marks, chart: 3 marks)

2. Prepare a worksheet to store details of electricity consumed by customers. Details are Customer No, Customer Name, Meter No, Previous meter reading, Current meter reading of 10 customers. Calculate total number of units consumed and total amount to be paid by each consumer using following conditions:
  - If unit consumed is up to 30, charge is 100.
  - 31 to 100 units, 4.70 per unit
  - 101 to 200 units, 6.25 per unit
  - Above 200 units, 7.30 per unit.
  - Use Data validation to see that current reading is more than previous reading.
  - Arrange the records in the alphabetic order of names.
  - Filter the records whose bill amount is more than Rs.1500.

(Note: Worksheet creation and formatting 3 marks, Data validation: 2 marks, calculations: 3 marks, sorting: 2 marks, filtering: 2 marks)

3. Create Employee worksheet having EmpNo, EmpName, DOJ, Department, Ddesignation and Basic Pay of 8 employees. Calculate DA, HRA, Gross Pay, Profession Tax, Net Pay, Provident Fund as per the rule:
  - DA = 30% of basic pay
  - HRA = 10% of basic pay if basic pay is less than 25000, 15% of basic pay otherwise.
  - Gross = DA + HRA + Basic pay
  - Provident fund = 12% of Basic pay or Rs.2000, whichever is less.
  - Profession Tax = Rs.100 if Gross pay is less than 10000, Rs.200 otherwise.
  - NetPay = Gross - (Professional tax + Provident Fund)- Using Pivot table, display the number of employees in each department and represent it using Pie chart.

(Note: Worksheet creation and formatting 3 marks, calculations: 4 marks, Pivot table: 3 marks, Chart: 2 marks)

4. Create a table COMMISSION containing the percentage of commission to be given to salesmen in different zones as follows:

| Zone  | Percentage |
|-------|------------|
| South | 10         |
| North | 12.5       |
| East  | 14         |
| West  | 13         |

Create another table SALES in the same worksheet to store salesman name, zone name, place, name of the item sold, rate per unit, quantity sold. Calculate total sales amount of each salesman. Referring the COMMISSION table, write the formula to compute the commission to be given. (Hint: Use if function and absolute cell addresses)

Using advanced filtering show the result in other parts of the worksheet.

- Show the records of various zones separately.
- Show the records of only East and West zones.
- Display the details of the items sold more than 50, in South or North zones.

(Note: Worksheet creation and formatting: 3 marks, calculations: 3 marks, filtering: 6 marks)

### Evaluation Scheme for Lab Examination

| Assessment Criteria      |                                | Marks     |
|--------------------------|--------------------------------|-----------|
| Activity – 1 from Part A | Word Processing / Presentation | 08        |
| Activity - 2 from Part B | Spreadsheet                    | 12        |
| Practical Record         |                                | 05        |
| Total                    |                                | <b>25</b> |

|                         |                                        |
|-------------------------|----------------------------------------|
| Course Code: CAC02P     | Course Title: <b>C Programming Lab</b> |
| Course Credits: 02      | Hours/Week: 04                         |
| Total Contact Hours: 52 | Formative Assessment Marks: 25         |
| Exam Marks: 25          | Exam Duration: 03                      |

### Programming Lab

#### Part A:

1. Program to read marks of five subjects, calculate percentage of marks and to display appropriate grade declaration message (using else-if ladder)
2. Program to find the greatest of three numbers (using nested if statement)
3. Program to read two integer values & a operator as character and perform basic arithmetic operations on them using switch case (+, -, \*, / operations)
4. Program to reverse a number and find the sum of individual digits. Also check for palindrome.
5. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. Program to count occurrences of a character in a string.
7. Program to calculate and display the first 'n' Fibonacci numbers
8. Program to find given number is a prime or not.
9. Program to read a string and find a) length b) reverse of it c) check palindrome string d) merge original & reversed string (using built in string library functions)
10. Program to search for a number in a list of numbers using one-dimensional array.

#### Part B:

1. Program to find the largest and smallest elements with their position in a one-dimensional array
2. Program to read 'n' integer values into a single dimension array and arrange them in ascending order using bubble sort method.
3. Program to perform addition and subtraction of two Matrices
4. Program to display factorial of first 'n' integers using recursive function.
5. Program to check a number is a Armstrong by defining isArm() function
6. Program to read a string and count number of letters, digits, vowels, consonants, spaces and special characters present in it.
7. Program sort a list of strings in ascending order using Pointers
8. Program to add two distances in the inch-feet format using structures (convert inches to feet if greater than 12)
9. Program to enter the information of a student like name, register number, marks in three subjects into a structure and display total, average and grade Display details in a neat form.
10. Program to input Name of the branches, Total sales of company into an array of structures. Display branch details in a tabular format. Also display the branch name that recorded the highest sales.

#### Evaluation Scheme for Lab Examination

| Assessment Criteria     |                        | Marks     |
|-------------------------|------------------------|-----------|
| Program – 1 from Part A | Writing the Program    | 05        |
|                         | Execution & Formatting | 03        |
| Program -2 from Part B  | Writing the Program    | 08        |
|                         | Execution & Formatting | 04        |
| Practical Record        |                        | 05        |
| <b>Total</b>            |                        | <b>25</b> |



# **MANGALORE UNIVERSITY**

**NATIONAL EDUCATION POLICY - 2020 (NEP-2020)**

**Curriculum Structure**

**for**

**Bachelor of Computer Applications (BCA) Programme**

**(Basic and Honours Degree)**

**Syllabus for 1<sup>st</sup> and 2<sup>nd</sup> Semesters**

**and**

**Open Elective Courses in Computer Science**

# Preface

The BoS committee members are thankful to the Government of Karnataka for initiating the process of implementation of NEP-2020 and Authorities of the Mangalore University for implementing the concern syllabus for the academic year 2021- 22 onwards in Mangalore University. It is our privilege to be part of this process through a respected BoS committee for finalizing syllabus of the UG Four Year BCA (Honors) Programme.

The respected BoS committee members conducted offline meeting on 21.10.2021@11am and subsequently by online meetings on 23.10.2021 @ 6.00pm and 24.10.2021 @ 6pm for discussion and finalizing the course titles as per model given in Table B2 Model Programme Structure for Bachelor of Science (Basic/Hons.) Programme (Subjects with practical) C5 Model Programme Structure for Bachelor of Computer Applications (Basic/Hons.) with Computer Applications as Programme Core Subject with Practical.

These deliberations also helped in framing the syllabi for I and II Semesters and also the Programme and Course outcomes. The model draft curriculum structure and the syllabi for the first two semesters of the Programme was presented in the BoS committee meeting and the inputs are considered during further revision. The model draft document is ready for submission to the University for further action.

The BoS committee is committed to frame the remaining part of the syllabus for the BCA Programme and will be working further to fulfill all academic input requirements in implementing the curriculum in letter and spirit of NEP 2020.

## Preamble

Computer Application (CA) has been evolving as an important branch of science and technology in last two decade and it has carved out a space for itself like computer science and engineering. Computer application spans theory and more application and it requires thinking both in abstract terms and in concrete terms.

The ever -evolving discipline of computer application has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers and its applications, but finding a solution requires both computer science expertise and knowledge of the particular application domain.

Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering.

Universities and other HEIs introduced programmes of computer application. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.

In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Parallely, BCA, BSc and MSc programmes with specialization in Computer Science were introduced to train manpower in this highly demanding area.

BCA (Basic / Hons) are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS or MCA leading to research as well as R&D, can be employable at IT industries, or can pursue a teaching profession or can adopt a business management career.

BCA (Basic / Hons) aims at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of BCA, graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Program outcomes in BCA are aimed at allowing flexibility and innovation in design and



development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in BCA courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Curriculum Framework for BCA degrees is intended to facilitate the students to achieve the following.

- ☐ To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation
- ☐ To develop the ability to use this knowledge to analyse new situations in the application domain
- ☐ To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- ☐ The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- ☐ To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments
- ☐ To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate

**The objectives of the Programme are:**

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
2. It helps students analyze the requirements for system development and exposes students to business software and information systems
3. This course provides students with options to specialize in legacy application software, system software or mobile applications
4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem- solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

## Program Outcomes: **BCA (3 Years) Degree**

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
5. **Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
7. **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrity in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
10. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
11. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

## Additional Program Outcomes: **BCA Degree (Hons)**

The Bachelor of Computer Application (BCA (Hons.)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

1. Apply standard Software Engineering practices and strategies in real -time software project development
2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.
3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
5. The ability to work independently on a substantial software project and as an effective team member.

**C5. Model Programme Structure for Bachelor of Computer Applications (Basic/Hons.) with  
Computer Applications as Programme Core Subject with Practical**

| Sem.                                                                                                                                       | Discipline Core (DSC) (Credits)               | Discipline Elective (DSE) / Open Elective (OE) (Credits) | Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P) |                              | Skill Enhancement Courses (SEC)                                    |                               |                                           | Total Credits |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------|-------------------------------|-------------------------------------------|---------------|
|                                                                                                                                            |                                               |                                                          |                                                                            |                              | Skill based (Credits) (L+T+P)                                      | Value based (Credits) (L+T+P) |                                           |               |
| I                                                                                                                                          | CA C-1 (3+2)<br>CA C-2 (3+2)<br>CA C-3 (3)    | OE-1 (3)                                                 | L1-1(3), L2-1(3)<br>(4 hrs. each)                                          |                              | SEC-1: Digital Fluency<br>(2) (1+0+2)                              | Yoga (1)<br>(0+0+2)           | Health & Wellness (1)<br>(0+0+2)          | 26            |
| II                                                                                                                                         | CA C-4 (3+2)<br>CA C-5 (3+2)<br>CA C-6 (3)    | OE-2 (3)                                                 | L1-2(3), L2-2(3)<br>(4 hrs. each)                                          | Environmental<br>Studies (2) |                                                                    | Sports (1)<br>(0+0+2)         | NCC/NSS/R&R(S&G)/<br>Cultural (1) (0+0+2) | 26            |
| Exit option with Certificate in Computer Applications (with the completion of courses equivalent to a minimum of 48 credits)               |                                               |                                                          |                                                                            |                              |                                                                    |                               |                                           |               |
| III                                                                                                                                        | CA C-7 (3+2)<br>CA C-8 (3+2)<br>CA C-9 (3)    | OE-3 (3)                                                 | L1-3(3), L2-3(3)<br>(4 hrs each)                                           |                              | SEC-2: Artificial<br>Intelligence or some<br>other SEC (2) (1+0+2) | Sports (1)<br>(0+0+2)         | NCC/NSS/R&R(S&G)/C<br>ultural (1) (0+0+2) | 26            |
| IV                                                                                                                                         | CA C-10 (3+2)<br>CA C-11 (3+2)<br>CA C-12 (3) | OE-4 (3)                                                 | L1-4(3), L2-4(3)<br>(4 hrs each)                                           | Constitution<br>of India (2) |                                                                    | Sports (1)<br>(0+0+2)         | NCC/NSS/R&R(S&G)/C<br>ultural (1) (0+0+2) | 26            |
| Exit option with Diploma in Computer Applications (with the completion of courses equivalent to a minimum of 96 credits)                   |                                               |                                                          |                                                                            |                              |                                                                    |                               |                                           |               |
| V                                                                                                                                          | CA C-13 (3+2)<br>CA C-14 (3+2)<br>CA C-15 (3) | CA E-1 (3)<br>Vocational-1 (3)                           |                                                                            |                              | SEC-3: Cyber Security<br>or some other SEC<br>(2) (1+0+2)          | Sports (1)<br>(0+0+2)         | NCC/NSS/R&R(S&G)/C<br>ultural (1) (0+0+2) | 23            |
| VI                                                                                                                                         | CA C-16 (3+2)<br>CA C-17 (3+2)<br>CA C-18 (3) | CA E-2 (3)<br>Vocational-2 (3)<br>Internship (2)         |                                                                            |                              | SEC-4: Professional<br>Communication (2)                           | Sports (1)<br>(0+0+2)         | NCC/NSS/R&R(S&G)/<br>Cultural (1) (0+0+2) | 25            |
| Exit Option with Bachelor of Computer Applications Degree, BCA Degree (with completion of courses equivalent to a minimum of 140 credits)  |                                               |                                                          |                                                                            |                              |                                                                    |                               |                                           |               |
| VII                                                                                                                                        | CA C-19(3+2)<br>CA C-20(3+2)<br>CA C-21 (3)   | CA E-3 (3)<br>Vocational-3 (3)<br>Res.methodology (3)    |                                                                            |                              |                                                                    |                               |                                           | 22            |
| VIII                                                                                                                                       | CA C-22 (3)<br>CA C-23 (3)<br>CA C-24 (3)     | CA E-4 (3)<br>Vocational-4 (3)<br>Research Project(6)*   |                                                                            |                              |                                                                    |                               |                                           | 21            |
| Award of Bachelor of Computer Applications with Honours, BCA (Hons.) Degree (with completion of courses equal to a minimum of 180 credits) |                                               |                                                          |                                                                            |                              |                                                                    |                               |                                           |               |

\*In lieu of the research Project, two additional elective papers/ Internship may be offered.

## Curriculum for BCA

| Sem | Core Courses                                  | Hour / Week |     | DS Elective Courses                | Hous/<br>Week |
|-----|-----------------------------------------------|-------------|-----|------------------------------------|---------------|
|     |                                               | Theory      | Lab |                                    |               |
| 1   | i. Fundamentals of Computers                  | 3           |     |                                    |               |
|     | ii. Programming in C                          | 3           |     |                                    |               |
|     | iii. Mathematical Foundation                  | 3           |     |                                    |               |
|     | iv. LAB: Information Technology               |             | 4   |                                    |               |
|     | v. LAB: C Programming                         |             | 4   |                                    |               |
| 2   | i. Discrete Mathematical Structures           | 3           |     |                                    |               |
|     | ii. Data Structures using C                   | 3           |     |                                    |               |
|     | iii. Object Oriented Concepts using JAVA      | 3           |     |                                    |               |
|     | iv. LAB: Data Structure                       |             | 4   |                                    |               |
|     | v. LAB: JAVA Lab                              |             | 4   |                                    |               |
| 3   | i. Data Base Management Systems               | 3           |     |                                    |               |
|     | ii. C# and DOT NET Framework                  | 3           |     |                                    |               |
|     | iii. Operating Systems Concepts               | 3           |     |                                    |               |
|     | iv. LAB: DBMS                                 |             | 4   |                                    |               |
|     | v. LAB: C# and DOT NET Framework              |             | 4   |                                    |               |
| 4   | i. Python Programming                         | 3           |     |                                    |               |
|     | ii. Computer Multimedia and Animation         | 3           |     |                                    |               |
|     | iii. Computer Communication and Networks      | 3           |     |                                    |               |
|     | iv. LAB: Multimedia and Animation             |             | 4   |                                    |               |
|     | v. LAB: Python programming                    |             | 4   |                                    |               |
| 5   | i. Internet Technologies                      | 3           |     | (a) Cyber Law and Cyber Security   | 3             |
|     | ii. Statistical Computing and R Programming   | 3           |     | (b) Cloud Computing                | 3             |
|     | iii. Software Engineering                     | 3           |     | (c) Business Intelligence          | 3             |
|     | iv. LAB: R Programming                        |             | 4   |                                    |               |
|     | v. LAB: JAVA Script, HTML and CSS             |             | 4   |                                    |               |
|     | vi. Vocational 1                              | 3           |     |                                    |               |
| 6   | i. Artificial Intelligence and Applications   | 3           |     | (a) Fundamentals of Data Science   | 3             |
|     | ii. PHP and MySQL                             | 3           |     | (b) Mobile Application Development | 3             |
|     | iii. LAB: PHP and MySQL                       |             | 4   | (c) Embedded Systems               | 3             |
|     | iv. PROJECT                                   |             | 12  |                                    |               |
|     | v. Vocational 2                               | 3           |     |                                    |               |
| 7   | i. Analysis and Design of Algorithms          | 3           |     | (a) Data Compression               | 3             |
|     | ii. Data Mining and Knowledge Management      | 3           |     | (b) IoT                            | 3             |
|     | iii. LAB: Algorithms                          |             | 4   | (c) Data Analytics                 | 3             |
|     | iv. LAB: Data Mining and Knowledge Management |             | 4   |                                    |               |
|     | v. Vocational 3                               |             |     |                                    |               |
| 8   | i. Automata Theory and Compiler Design        | 3           |     | (a) Open-Source Programming        | 3             |
|     | ii. Cryptography and Network Security         | 3           |     | (b) Storage Area Networks          | 3             |
|     | iii. LAB: Compiler Lab                        |             | 4   | (c) Pattern Recognition            | 3             |
|     | vi. PROJECT                                   |             | 12  | (a) Machine Learning               | 3             |
|     | iv. Vocational 4                              | 3           |     |                                    |               |

**TABLE I: COURSE STRUCTURE FOR BCA**

| Semester | Course Code | Title of the Paper                       | Credit | Total Credit of OE, Languages, CAE, Voc, AECC, SEC | Total Credit |
|----------|-------------|------------------------------------------|--------|----------------------------------------------------|--------------|
| I        | CAC01       | Fundamentals of Computers                | 3      | 13                                                 | 26           |
|          | CAC02       | Programming in C                         | 3      |                                                    |              |
|          | CAC03       | Mathematical Foundation                  | 3      |                                                    |              |
|          | CAC01P      | LAB: Information Technology Lab          | 2      |                                                    |              |
|          | CAC02P      | LAB: C Programming Lab                   | 2      |                                                    |              |
| II       | CAC04       | Data Structures using C                  | 3      | 13                                                 | 26           |
|          | CAC05       | Object Oriented Concepts using JAVA      | 3      |                                                    |              |
|          | CAC06       | Discrete Mathematical Structures         | 3      |                                                    |              |
|          | CAC04 P     | LAB: Data Structure                      | 2      |                                                    |              |
|          | CAC05 P     | LAB: JAVA                                | 2      |                                                    |              |
| III      | CAC07       | Data Base Management Systems             | 3      | 13                                                 | 26           |
|          | CAC08       | C# and DOT NET Framework                 | 3      |                                                    |              |
|          | CAC09       | Operating System Concepts                | 3      |                                                    |              |
|          | CAC07P      | LAB: DBMS                                | 2      |                                                    |              |
|          | CAC08P      | LAB: C# and DOT NET Framework            | 2      |                                                    |              |
| IV       | CAC10       | Python Programming                       | 3      | 13                                                 | 26           |
|          | CAC11       | Computer Multimedia and Animation        | 3      |                                                    |              |
|          | CAC12       | Computer Communication and Networks      | 3      |                                                    |              |
|          | CAC10P      | LAB: Python programming                  | 2      |                                                    |              |
|          | CAC11P      | LAB: Multimedia and Animation            | 2      |                                                    |              |
| V        | CAC13       | Internet Technologies                    | 3      | 10                                                 | 23           |
|          | CAC14       | Statistical Computing and R Programming  | 3      |                                                    |              |
|          | CAC15       | Software Engineering                     | 3      |                                                    |              |
|          | CAC13P      | LAB: JAVA Script, HTML and CSS           | 2      |                                                    |              |
|          | CAC14P      | LAB: R Programming                       | 2      |                                                    |              |
| VI       | CAC16       | PHP and MySQL                            | 3      | 10                                                 | 23           |
|          | CAC17       | Artificial Intelligence and Applications | 3      |                                                    |              |
|          | CAC16P      | LAB: PHP and MySQL                       | 2      |                                                    |              |
|          | CA-P1       | Project Work                             | 5      |                                                    |              |
| VII      | CAC18       | Analysis and Design of Algorithms        | 3      | 11                                                 | 21           |
|          | CAC19       | Data Mining and Knowledge Management     | 3      |                                                    |              |
|          | CAC18P      | LAB: Algorithms                          | 2      |                                                    |              |
|          | CAC19P      | LAB: Data Mining                         | 2      |                                                    |              |
|          | CAI01       | Internship                               | 2      |                                                    |              |
| VIII     | CAC20       | Automata Theory and Compiler Design      | 3      | 6                                                  | 20           |
|          | CAC21       | Cryptography and Network Security        | 3      |                                                    |              |
|          | CAC20P      | LAB: Compiler Lab                        | 2      |                                                    |              |
|          | CAP02       | Project Work                             | 6      |                                                    |              |

**TABLE II: CS COURSE DETAILS FOR BCA**

| Course-Type | Course Code as referred above                                                                                                                                    | Compulsory/<br>Elective | List of compulsory courses and list<br>of option of elective courses.<br>(A suggestive list)                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CA          | CAC01, CAC02, CAC03, CAC04,<br>CAC05, CAC06, CAC07, CAC08,<br>CAC09, CAC10, CAC11, CAC12,<br>CAC13, CAC14, CAC15, CAC16,<br>CAC17, CAC18, CAC19, CAC20,<br>CAC21 | Compulsory              | As Mentioned in Table I                                                                                                                                                                                                       |
| CA E        | CAE-1A                                                                                                                                                           | Elective                | Cyber Law and Cyber Security<br>OR<br>Business Intelligence<br>OR<br>Fundamentals of Data Science                                                                                                                             |
|             | CAE-2A                                                                                                                                                           | Elective                | Fundamentals of Data Science<br>OR<br>Mobile Application Development<br>OR<br>Embedded Systems                                                                                                                                |
|             | CAE-3A                                                                                                                                                           | Elective                | Data Compression<br>OR<br>Internet of Things (IoT)<br>OR<br>Data Analytics                                                                                                                                                    |
|             | CAE-4A                                                                                                                                                           | Elective                | Open-source Programming<br>OR<br>Storage Area Networks<br>OR<br>Pattern Recognition<br>OR<br>Machine Learning                                                                                                                 |
| Vocational  | Vocational -1                                                                                                                                                    | Elective                | DTP, CAD and Multimedia<br>OR<br>Hardware and Server Maintenance<br>OR<br>Web Content Management Systems<br>OR<br>Computer Networking<br>OR<br>Health Care Technologies<br>OR<br>Digital Marketing<br>OR<br>Office Automation |
|             | Vocational -2                                                                                                                                                    | Elective                |                                                                                                                                                                                                                               |
|             | Vocational -3                                                                                                                                                    | Elective                |                                                                                                                                                                                                                               |
|             | Vocational -4                                                                                                                                                    | Elective                |                                                                                                                                                                                                                               |
| SEC         | SEC 1                                                                                                                                                            | Compulsory              | Health & Wellness/ Social & Emotional<br>Learning                                                                                                                                                                             |
|             | SEC 2                                                                                                                                                            | Compulsory              | Sports/NCC/NSS etc                                                                                                                                                                                                            |
|             | SEC 3                                                                                                                                                            | Compulsory              | Ethics & Self Awareness                                                                                                                                                                                                       |
|             | SEC 4                                                                                                                                                            | Compulsory              | Professional Communication                                                                                                                                                                                                    |
| AECC        | AECC1                                                                                                                                                            | Compulsory              | Environmental Studies                                                                                                                                                                                                         |
|             | AECC2                                                                                                                                                            | Compulsory              | Constitution of India                                                                                                                                                                                                         |
| Language 1  | L1-1, L1-2, L1-3, L1-4                                                                                                                                           | Compulsory              | Kannada/Functional Kannada                                                                                                                                                                                                    |
| Language 2  | L2-1, L2-2, L2-3, L4-4                                                                                                                                           | Elective                | English/Hindi/French/ Additional<br>English/ etc.                                                                                                                                                                             |



## Course Contents for BCA: Semesters I and II

### Semester: I

|                         |                                                |
|-------------------------|------------------------------------------------|
| Course Code: CAC01      | <b>Course Title: Fundamentals of Computers</b> |
| Course Credits: 03      | Hours/Week: 03                                 |
| Total Contact Hours: 42 | Formative Assessment Marks: 40                 |
| Exam Marks: 60          | Exam Duration: 03                              |

#### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the fundamentals of computer system
- Identify different components within the computer system
- Understand different types of input and output devices
- Demonstrate the working concepts of different devices connected to computer
- Explain different generations of programming languages and their significance
- Understand the use of Word processing, Spreadsheet, Presentation and DBMS applications
- Understand Digital computer and digital systems functioning

#### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Hours |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit - 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |
| <b>Computer Basics:</b> Introduction, Characteristics computers, Evolution computers, Generations of computers, Classification of computers, the computer system, Application of computers.<br><b>Computer Architecture:</b> Introduction, Central processing unit- ALU, Registers, Control unit, system bus, main memory unit, cache memory<br><b>Input devices:</b> Introduction, Types of input devices, Keyboard, Mouse, Track ball, Joystick light pen, Touch screen and track pad. Speech recognition, digital camera, webcam, flatbed scanner<br><b>Output devices:</b> Types of output, Classification of output devices, Printers – Dot matrix, Ink-jet, Laser, Hydra, Plotter, Monitor – CRT, LCD, Differences between LCD and CRT                                                                                                      | 12    |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |
| <b>Computer software:</b> Introduction, software definition, relationship between software and hardware, software categories<br><b>Computer programming languages:</b> Introduction, Developing a program, Program development cycle, Types of programming languages, generation of programming languages, Features of a good programming language.<br><b>Problem Solving techniques:</b> Introduction, Problem solving procedure.<br><b>Algorithm:</b> Steps involved in algorithm development, Algorithms for simple problems (To find largest of three numbers, factorial of a number, check for prime number, check for palindrome, Count number of odd, even and zeros in a list of integers)<br><b>Flowcharts:</b> Definition, advantages, Symbols used in flow charts. Flowcharts for simple problems mentioned in algorithms. Psuedocode. | 10    |

| Unit-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Digital Computers and Digital System:</b> Introduction to Number System, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary arithmetic, Addition, Subtraction in the 1's and 2's complements system, Subtraction in the 9's and 10's complement system.<br><b>Boolean Algebra:</b> Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram. | 10 |
| Unit-4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |
| <b>Digital logical gate:</b> Boolean functions, Canonical and Standard forms, Minterms, Maxterms, other logic operations, Digital logic gates, Universal gates.<br><b>Simplification of Boolean function:</b> The map method, Two and three variable maps, Four-variable maps, Don't care conditions, Product of sum simplification.                                                                                                                                                   | 10 |

**Text Books:**

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition, Pearson
2. M. Morris Mano, Digital Logic and Computer design, PHI, 2015

**Reference Books:**

1. Pradeep K. Sinha and Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publication.
2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC.
3. J. Glenn Brookshear, Computer Science: An Overview, Twelfth Edition, Addison-Wesley
4. R.G. Dromey, How to solve it by Computer, PHI.

|                         |                                       |
|-------------------------|---------------------------------------|
| Course Code: CAC02      | <b>Course Title: Programming in C</b> |
| Course Credits: 03      | Hours/Week: 03                        |
| Total Contact Hours: 42 | Formative Assessment Marks: 40        |
| Exam Marks: 60          | Exam Duration: 03                     |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Confidently operate Desktop Computers to carry out computational tasks
- Understand working of Hardware and Software and the importance of operating systems
- Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Hours |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit - 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |
| <b>Overview of C :</b> History of C , Importance of C Program, Basic structure of a C-program, Execution of C Program.<br><b>C Programming Basic Concepts:</b> Character set, C token, Keywords and identifiers, Constants, Variables, data types, Declaration of variables, assigning values to variables, defining symbolic constants.<br><b>Input and output with C:</b> Formatted I/O functions - <i>printf</i> and <i>scanf</i> , control stings and escape sequences, output specifications with <i>printf</i> functions; Unformatted I/O functions to read and display single character and a string - <i>getchar</i> , <i>putchar</i> , <i>gets</i> and <i>puts</i> functions.                                                                                                                                                                                           | 12    |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |
| <b>Operators &amp; Expressions:</b> Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity; Evaluation of arithmetic expressions; Type conversion.<br><b>Control Structures:</b> Decision Making and Branching -Decision making with if statement, simple if statement, the if else statement, nesting of if ... else statements, the else if ladder, the switch statement, the ?: operator, the go to statement. Decision making and looping - The while statement, the do statement, for statement, nested loops, exit, break, jumps in loops.                                                                                                                                                                | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |
| <b>Derived data types in C:</b> Arrays - declaration, initialization and access of one-dimensional and two-dimensional arrays. programs using one- and two-dimensional arrays, sorting and searching arrays.<br><b>Handling of Strings:</b> Declaring and initializing string variables, reading strings from terminal, writing strings to screen, Arithmetic operations on characters, String handling functions - <i>strlen</i> , <i>strcmp</i> , <i>strcpy</i> , <i>strstr</i> and <i>strcat</i> ; Character handling functions - <i>tolower</i> , <i>toupper</i> , <i>isalpha</i> , <i>isnumeric</i> etc.<br><b>Pointers:</b> Understanding pointers, accessing the address of a variable, declaring and initializing pointers, accessing a variable through its pointer, pointer expression, pointer increments and scale factor, pointers and arrays, pointer and strings. | 10    |

| Unit - 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p><b>User-defined functions:</b> Need for user-defined functions, Declaring, defining and calling C functions, return values and their types, Categories of functions: With/without arguments, with/without return values. Nesting of functions.</p> <p><b>Recursion:</b> Definition, example programs.</p> <p><b>Structures and unions:</b> Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structures, arrays within structures, Structure and functions, structures within structures. Unions</p> | 10 |

**Text Book:**

1. E. Balagurusamy, Programming in ANSI C, 7th Edition, Tata McGraw Hill

**Reference Books:**

1. Herbert Schildt, C: The Complete Reference, 4th Edition
2. Brain W. Kernighan, C Programming Language, 2<sup>nd</sup> Edition, Prentice Hall Software
3. Kernighan & Ritchie: The C Programming Language, 2<sup>nd</sup> Edition, PHI
4. Kamthane, Programming with ANSI and TURBO C, Pearson Education
5. V. Rajaraman, Computer Programming in C, 2<sup>nd</sup> Edition, PHI
6. S. Byron Gottfried, Programming with C, 2<sup>nd</sup> Edition, TMH
7. Yashwant Kanitkar, Let us C, 15<sup>th</sup> Edition, BPB
8. P.B. Kottur, Computer Concepts and Programming in C, 23<sup>rd</sup> Edition, Sapna Book House

|                         |                                              |
|-------------------------|----------------------------------------------|
| Course Code: CAC03      | <b>Course Title: Mathematical Foundation</b> |
| Course Credits: 03      | Hours/Week: 03                               |
| Total Contact Hours: 42 | Formative Assessment Marks: 40               |
| Exam Marks: 60          | Exam Duration: 03                            |

#### Course Outcomes (COs):

- Study and solve problems related to connectives, predicates and quantifiers under different situations.
- Develop basic knowledge of matrices and to solve equations using Cramer's rule.
- Know the concept of Eigen values.
- To develop the knowledge about derivatives and know various applications of differentiation.
- Understand the basic concepts of Mathematical reasoning, set and functions

#### Course Contents:

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit - 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |
| <b>Algebra: Logarithms-</b> Introduction, Definition, Laws of operations, change of base<br><b>Binomial theorems-</b> Introduction, Binomial theorem, Position of terms.<br><b>Analytical geometry:</b> Introduction, directed line, midpoint, distance between two points, Section formula, external division, coordinates of a centroid, Area of a triangle. <b>The straight line</b> – slope of a straight line, different forms of equations of the straight line.<br><b>Circle</b> -The equation of a circle, different forms of circles, General equation of the circle, equation of tangent and normal to the circle. | 12    |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |
| <b>Trigonometry:</b> Introduction, Measurement of angles, trigonometric functions, relation between trigonometric functions, signs of trigonometric functions, trigonometric functions of standard angles.<br><b>Calculus:</b> Limit of function, continuity of a function.<br><b>Differentiation:</b> Derivative of a function of one variable, Power function, constant with a function, sum of functions, product of two functions, quotient of two functions.<br><b>Integration-</b> Indefinite integral, rules of integration, some standard results and examples, definite integral.                                   | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |
| <b>Matrix Algebra:</b> Definition, types of matrices, algebra of matrices – addition of matrices, subtraction of matrices, multiplication of matrices, determinant of a matrix, Adjoint of a matrix, orthogonal and unitary matrix, rank of a matrix, echelon form of a matrix, normal form of a matrix, equivalence of matrices                                                                                                                                                                                                                                                                                             | 10    |
| <b>Unit - 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |
| <b>Inverse of a matrix, Characteristic equation of a matrix,</b> Cayley Hamilton theorem, Eigen values.<br><b>System of Linear equations:</b> solution of Linear homogeneous and non-homogeneous equations (matrix method), Cramer's rule<br><b>Arithmetic progression:</b> Definition, formula for nth term, sum to n terms, Arithmetic mean, problems<br><b>Geometric progression:</b> Definition, formula for nth term, sum to n terms, geometric mean, problems                                                                                                                                                          | 10    |

#### Text Books:

- 1.C Sanchethi and V K Kapoor,Business Mathematics, Sulthan Chand & Sons Educational publishers, New Delhi, Eleventh Revised Edition
- 2.P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai
- 3.Pundir & S.K. Pundir, A Text Book of BCA Mathematics - I, Rimple A, Pragatis Edition (IV)
- 4.B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, New Delhi

|                         |                                                 |
|-------------------------|-------------------------------------------------|
| Course Code: CAC01P     | <b>Course Title: Information Technology Lab</b> |
| Course Credits: 02      | Hours/Week: 04                                  |
| Total Contact Hours: 52 | Formative Assessment Marks: 20                  |
| Exam Marks: 30          | Exam Duration: 03                               |

### Practice Lab

1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computer.
3. Basic Computer Hardware Trouble shooting.
4. LAN and WiFi Basics.
5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.
6. Activities using word processing, presentation and spreadsheet software
7. Tasks involving Internet Browsing

### Information Technology Lab

## Part A: Word Processing & Presentation

### I. Word Processing

1. Prepare a document using different formatting tools

## Highlights of the National Education Policy (NEP) 2020



### Note for Students

From UPSC perspective, the following things are important :

**Prelims level :** National Education Policy

**Mains level :** Need for imbuing competitiveness in Indian education system

**N**ew Policy aims for **universalization of education** from pre-school to secondary level with 100 % Gross Enrolment Ratio (GER) in school education by 2030. NEP 2020 will bring 2 crores out of school children back into the mainstream through the open schooling system.

- ❖ The current 10+2 system to be replaced by a **new 5+3+3+4 curricular structure** corresponding to ages 3-8, 8-11, 11-14, and 14-18 years respectively. **This will bring the hitherto uncovered age group of 3-6 years under the school curriculum, which has been recognized globally as the crucial stage for the development of mental faculties of a child.**
- ❖ The new system will have 12 years of schooling with three years of Anganwadi/ pre-schooling.
  - Emphasis on Foundational Literacy and Numeracy, no rigid separation between academic streams, extracurricular, vocational streams in schools; Vocational Education to start from Class 6 with Internships
  - Teaching up to at least Grade 5 to be in mother tongue/ regional language. No language will be imposed on any student.
- Assessment reforms with **360° Holistic Progress Card**, tracking Student Progress for achieving Learning Outcomes
- A new and comprehensive National Curriculum Framework for Teacher Education, NCFTE 2021, will be formulated by the NCTE in consultation with NCERT.
- By 2030, the minimum degree qualification for teaching will be a 4-year integrated B.Ed. degree.
- Gross Enrolment Ratio in higher education to be raised to **50% by 2035; 3.5 crore seats to be added in higher education.**
- The policy envisages broad-based, multi-disciplinary, holistic Under Graduate Program with flexible curricula, creative combinations of subjects, integration of vocational education and multiple entries and exit points with appropriate certification.
- **Academic Bank of Credits to be established to facilitate Transfer of Credits**

**M**ultidisciplinary Education and Research Universities (MERUs), at par with IITs, IIMs, to be set up as models of best multidisciplinary education of global standards in the country.

Affiliation of colleges is to be **phased out in 15 years** and a stage-wise mechanism is to

be established for granting graded autonomy to colleges.

Over a period of time, it is envisaged that every college would develop into either an Autonomous degree-granting College or a constituent college of a university.

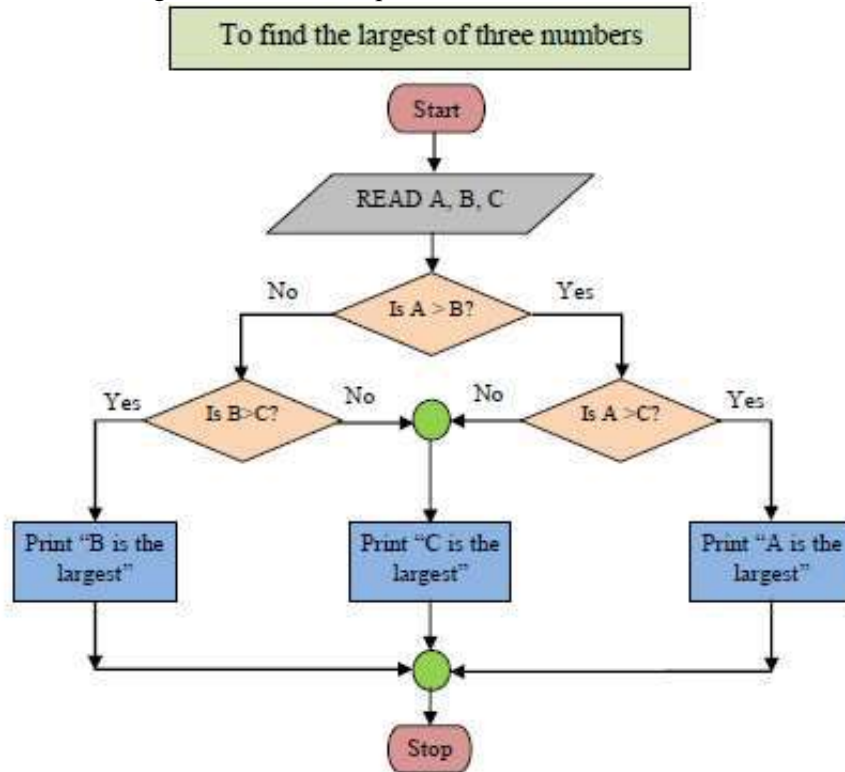
$$\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

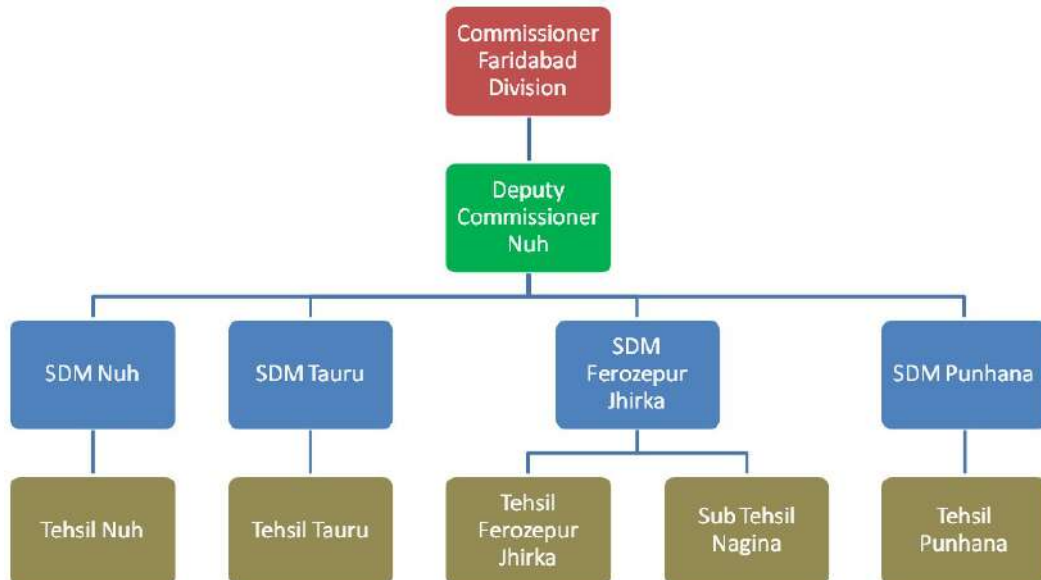
$$(a-b)^2 = (a+b)^2 - 4ab$$

$$a^2 + b^2 = (a-b)^2 + 2ab$$

2. Prepare a document using SmartArt and Shapes tools



### Organization Chart – Administration Faridabad Division



3. Prepare a document with table to store sales details of a company for different quarters and calculate total, average and find maximum, minimum sales value.

| Branch Code                     | Branch    | Sales in Quarters |        |        |        | Total | Avg |
|---------------------------------|-----------|-------------------|--------|--------|--------|-------|-----|
|                                 |           | 1                 | 2      | 3      | 4      |       |     |
| A101                            | Mangalore | 354690            | 244610 | 383290 | 413670 |       |     |
| A102                            | Udupi     |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
|                                 |           |                   |        |        |        |       |     |
| Total (Across Branches)         |           |                   |        |        |        |       |     |
| Average (Across Branches)       |           |                   |        |        |        |       |     |
| Highest Sales (Across Branches) |           |                   |        |        |        |       |     |
| Lowest Sales (Across Branches)  |           |                   |        |        |        |       |     |

### TIME TABLE

| Class : I BCA |   |    |     |    | Room No. 206 |     |    |
|---------------|---|----|-----|----|--------------|-----|----|
| Day           | I | II | III | IV |              | V   | VI |
| Monday        |   |    |     |    | LUNCH BREAK  |     |    |
| Tuesday       |   |    |     |    |              |     |    |
| Wednesday     |   |    |     |    |              |     |    |
| Thursday      |   |    |     |    |              |     |    |
| Friday        |   |    |     |    |              |     |    |
| Saturday      |   |    |     |    |              | *** |    |



4. Prepare interview call letters for five candidates describing about the company and instructions about the interview. Use Mail merge feature

#### Interview call Letter Format

Date:  
[Name of the candidate]  
[Address]

Dear [name of the candidate]

This is to the reference of your application for the job [name of the job] indicating interest in seeking employment in our organisation. We thank you for the same.

We would like to inform you that your profile is being shortlisted for the job role and is best suited for it. Therefore, we would like to take a face to face interview with you on [date of interview] at [venue details].

We hope that the venue is suitable for you. If not please get in touch with us, so that we can arrange the date and venue according to your availability.

The company will reimburse you all the expenses incurred by you for this interview. This letter has an attachment in which you need to fill the details and carry it along on the date of interview. Please carry your CV also along with you.

Kindly confirm your availability for the date and venue. If there are any changes to be done, please contact us at phone number: [999xxxx999] and email id: abcnd@mail.com.

We look forward to seeing you.

Regards,  
Name of the Manager  
Designation Name  
Company name

## II. Presentation

1. Create a presentation (minimum 5 slides) about your college. It should contain images, chart, Bulleted text, .....
2. Create a presentation (minimum 5 slides) to advertise a product. The slides should be displayed automatically in a loop. Make use of Transition and Animations.
3. A simple quiz program. Use hyperlinks to move to another slide in the presentation to display the result and correct answer/wrong answer status. Use at least four questions.

## Part B: Spreadsheet

**(Note: Give proper titles, column headings for the worksheet. Insert 10 records for each exercise in such a way to get the result for all the conditions. Format the numbers appropriately wherever needed).**

1. Create a worksheet to maintain student information such as *RollNo, Name, Class, Marks in three subjects* of 10 students. Calculate total marks, average and grade. Find grade for Distinction, First class, Second class, Pass and Fail using normally used conditions.
  - Using custom sort, sort the data according to class: - Distinction first, FirstClass next, and so on. Within each class, average marks should be in descending order.
  - Also draw the Column Chart showing the RollNo versus Average scored.

**(Note: Worksheet creation and formatting 4 marks, calculations: 5 marks, sorting: 3 marks, chart: 3 marks)**

2. Prepare a worksheet to store details of Electricity consumed by customers. Details are Customer No, Customer Name, Meter No, Previous meter reading, Current meter reading of 10 customers. Calculate total number of units consumed and total amount to be paid by each consumer using following conditions:
- If unit consumed is up to 30, charge is 100.
  - 31 to 100 units, 4.70 per unit
  - 101 to 200 units, 6.25 per unit
  - Above 200 units, 7.30 per unit.
  - Use Data validation to see that current reading is more than previous reading.
  - Arrange the records in the alphabetic order of names.
  - Filter the records whose bill amount is more than Rs.1500.

**(Note: Worksheet creation and formatting 4 marks, Data validation: 2 marks, calculations: 5 marks, sorting: 2 marks, filtering: 2 marks)**

3. Create Employee worksheet having EmpNo, EmpName, DOJ, Department, Designation and Basic Pay of 8 employees. Calculate DA, HRA, Gross Pay, Profession Tax, Net Pay, Provident Fund as per the rule :
- DA = 30% of basic pay
  - HRA = 10% of basic pay if basic pay is less than 25000, 15% of basic pay otherwise.
  - Gross =DA +HRA+ Basic pay
  - Provident fund =12% of Basic pay or Rs.2000, whichever is less.
  - Profession Tax= Rs.100 if Gross pay is less than 10000, Rs.200 otherwise.
  - NetPay = Gross - (Professional tax + Provident Fund)
  - Using Pivot table, display the number of employees in each department and represent it using Pie chart.

**(Note: Worksheet creation and formatting 4 marks, calculations: 5 marks, Pivot table: 3 marks, Chart: 3 marks)**

4. Create a table COMMISSION containing the percentage of commission to be given to salesmen in different zones as follows:

| Zone  | Percentage |
|-------|------------|
| South | 10         |
| North | 12.5       |
| East  | 14         |
| West  | 13         |

Create another table SALES in the same worksheet to store salesman name, zone name, place, name of the item sold, rate per unit, quantity sold. Calculate total sales amount of each salesman. Referring the COMMISSION table, write the formula to compute the commission to be given.(Hint: Use if function and absolute cell addresses)

Using advanced filtering show the result in other parts of the worksheet.

- Show the records of various zones separately.
- Show the records of only East and West zones.
- Display the details of the items sold more than 50, in South or North zones.

**(Note: Worksheet creation and formatting: 4 marks, calculations: 5 marks, filtering: 6 marks)**

#### Evaluation Scheme for Lab Examination :

| Assessment Criteria      |                                | Marks |
|--------------------------|--------------------------------|-------|
| Activity – 1 from Part A | Word Processing / Presentation | 10    |
| Activity - 2 from Part B | Spreadsheet                    | 15    |
| Practical Record         |                                | 05    |
| Total                    |                                | 30    |

|                         |                                 |
|-------------------------|---------------------------------|
| Course Code: CAC02P     | Course Title: C Programming Lab |
| Course Credits: 02      | Hours/Week: 04                  |
| Total Contact Hours: 52 | Formative Assessment Marks: 20  |
| Exam Marks: 30          | Exam Duration: 03               |

## Programming Lab

### Part A:

1. Program to read marks of five subjects, calculate percentage of marks and to display appropriate grade declaration message (using else-if ladder)
2. Program to find the greatest of three numbers (using nested if statement)
3. Program to read two integer values & a operator as character and perform basic arithmetic operations on them using switch case (+, -, \*, / operations)
4. Program to reverse a number and find the sum of individual digits. Also check for palindrome.
5. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. Program to count occurrences of a character in a string.
7. Program to calculate and display the first 'n' Fibonacci numbers
8. Program to find given number is a prime or not.
9. Program to read a string and find a) length b) reverse of it c) check palindrome string d) merge original & reversed string (using built in string library functions)
10. Program to search for a number in a list of numbers using one-dimensional array.

### Part B:

1. Program to find the largest and smallest elements with their position in a one-dimensional array
2. Program to read 'n' integer values into a single dimension array and arrange them in ascending order using bubble sort method.
3. Program to perform addition and subtraction of two Matrices
4. Program to display factorial of first 'n' integers using recursive function.
5. Program to check a number is a Armstrong by defining isArm( ) function
6. Program to read a string and count number of letters, digits, vowels, consonants, spaces and special characters present in it.
7. Program sort a list of strings in ascending order using Pointers
8. Program to add two distances in the inch-feet format using structures (convert inches to feet if greater than 12)
9. Program to enter the information of a student like name, register number, marks in three subjects into a structure and display total, average and grade Display details in a neat form.
10. Program to input Name of the branches, Total sales of company into an array of structures. Display branch details in a tabular format. Also display the branch name that recorded the highest sales.

## Evaluation Scheme for Lab Examination :

| Assessment Criteria     |                        | Marks |
|-------------------------|------------------------|-------|
| Program – 1 from Part A | Writing the Program    | 5     |
|                         | Execution & Formatting | 5     |
| Program -2 from Part B  | Writing the Program    | 7     |
|                         | Execution & Formatting | 8     |
| Practical Record        |                        | 05    |

|              |           |
|--------------|-----------|
| <b>Total</b> | <b>30</b> |
|--------------|-----------|

|                            |                                        |
|----------------------------|----------------------------------------|
| Course Code: CACOE1/DSCOE1 | <b>Course Title: Office Automation</b> |
| Course Credits: 03         | Hours/Week: 03                         |
| Total Contact Hours: 42    | Formative Assessment Marks: 40         |
| Exam Marks: 60             | Exam Duration: 03 Hours                |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Compare and contrast various types of operating systems
- Explain the purpose of office automation
- Describe how information is stored and retrieved in/from computer memory
- Know about various types of office automation software and their applications
- Create document using word processing software
- Design presentation using presentation software
- Create worksheets using spreadsheet software
- Store and retrieve data in/from database management application

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hours |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| <b>Computer software :</b> Introduction, Software definition, Software categories, Installing and uninstalling software, Software piracy, Software terminologies<br><b>Introduction to windows Operating System,</b> operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, finding folders and files, System utilities.<br><b>MS-Office :</b> Introduction, Office user interface, Microsoft office Components<br><b>MS-Word:</b> Introduction, Starting MS-Word, Microsoft word Environment working with word documents, working with text, working with tables checking spelling and grammar, adding graphs to the document, mail merge, header and footers, page numbers, protect the document, working with formatting tools. | 12    |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| <b>MS-Excel:</b> Introduction, starting MS Excel, Microsoft Excel environment, Working with Excel workbook, Working with worksheet – Entering data, Excel formatting tips and Techniques, Generating graphs, Formulas and Functions, Inserting charts, Sorting , Pivot Tables, data extraction, adding clip art, add an image from a file, Printing in Excel .                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| <b>MS-Power point-</b> Starting MS–Power Point , Working with power point -, Creating, Saving and Printing a presentation, Working with Animation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show, Editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound).<br><b>The Internet :</b> Basic internet terms, Internet applications, Internet tools, Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, Advantages and disadvantages of email.                                                                                                                                                                                                                                       | 10    |

| Unit - 4                                                                                                                                                                                                                                                                                                                                                        |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Database fundamentals-</b> Basic database terms, Database Management System<br><b>MS-Access:</b> Introduction to Access, Creating Tables and Database, Data Type and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms | 10 |

**Text Book:**

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition., Pearson

**Reference Books:**

1. Peter Norton, Introduction to Computers, 7th edition, Tata McGraw Hill Publication, 2011 2)
2. Anita Goel, Computer Fundamentals, Pearson Education, 2011.
3. Linda Foulkes, Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook, Packt Publishing Limited, 2020
4. Bittu Kumar, Mastering MS Office: Concise Handbook With Screenshots, V&S Publishers, 2017

## Semester: II

|                         |                                              |
|-------------------------|----------------------------------------------|
| Course Code: CAC04      | <b>Course Title: Data Structures using C</b> |
| Course Credits: 03      | Hours/Week: 03                               |
| Total Contact Hours: 42 | Formative Assessment Marks: 40               |
| Exam Marks: 60          | Exam Duration: 03 Hours                      |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
- Write programs that use arrays, linked structures, stacks, queues, trees, and graphs
- Demonstrate different methods for traversing trees
- Compare alternative implementations of data structures with respect to performance
- Describe the concept of recursion, give examples of its use
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Hours |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit - 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |
| <b>Introduction to data structures:</b> Introduction, Basic terminology; Elementary Data Organization, Data Structures, Data Structure Operations<br><b>Introduction to Algorithms, Preliminaries:</b> Introduction, Algorithmic notations, Control structure.<br><b>Recursion:</b> Definition; Recursion Technique Examples –Factorial, Fibonacci sequence, Towers of Hanoi.<br><b>Arrays:</b> Basic Concepts – Definition, Declaration, Initialisation, Operations on arrays, Types of arrays, Representation of Linear Arrays in memory, Traversing linear arrays, Inserting and deleting elements, Multidimensional arrays- Two Dimensional Arrays Representation of two- dimensional arrays, Sparse matrices.<br><b>Sorting:</b> Selection sort, Bubble sort, Quick sort, Insertion sort, Merge sort | 12    |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |
| <b>Searching :</b> Definition, Sequential Search, Binary search<br><b>Dynamic memory management:</b> Memory allocation and de-allocation functions - <i>malloc</i> , <i>calloc</i> , <i>realloc</i> and <i>free</i> .<br><b>Linked list:</b> Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly linked list, Header linked list, Circular linked list, Representation of Linked list in Memory; Operations on Singly linked lists– Traversing, Searching, Insertion, Deletion, Memory allocation, Garbage collection                                                                                                                                                                                                                       | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |
| <b>Stacks:</b> Basic Concepts –Definition and Representation of stacks- Array representation of stacks, Linked representation of stacks, Operations on stacks, Applications of stacks, Infix, postfix and prefix notations, Conversion from infix to postfix using stack, Evaluation of postfix expression using stack, Application of stack in function calls.<br><b>Queues:</b> Basic Concepts – Definition and Representation of queues- Array representation of Queues, Linked representation of Queues, Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues, Operations on queues                                                                                                                                                                                 | 10    |

| Unit - 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p><b>Trees:</b> Definition, Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal &amp; non-terminal nodes, degree of a node, level, edge, path, depth</p> <p><b>Binary tree:</b> Type of binary trees - strict binary tree, complete binary tree, binary search tree,; Array representation of binary tree, Traversal of binary tree- preorder, inorder and postorder traversal</p> <p><b>Graphs:</b> Terminologies, Matrix representation of graphs; Traversal: Breadth First Search and Depth first search.</p> | 10 |

**Text Books :**

1. Seymour Lipschutz, Data Structures with C, Schaum's Outlines Series, Tata McGraw Hill, 2011
2. R. Venkatesan and S. Lovelyn Rose, Data Structures, First Edition: 2015, Wiley India Pvt. Ltd. Publications

**Reference Books:**

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures, Computer Science Press, 1982.
2. Aaron M. Tenenbaum , Data structures using C, First Edition, Pearson Education
3. Kamathane, Introduction to Data structures, Pearson Education , 2004
4. Y. Kanitkar, Data Structures Using C, Third Edition, BPB
5. Padma Reddy: Data Structure Using C, Revised Edition 2003, Sai Ram Publications.
6. Sudipa Mukherjee, Data Structures using C – 1000 Problems and Solutions, McGraw Hill Education, 2007

|                         |                                                            |
|-------------------------|------------------------------------------------------------|
| Course Code: CAC05      | <b>Course Title: Object Oriented Programming with JAVA</b> |
| Course Credits: 03      | Hours/Week: 03                                             |
| Total Contact Hours: 42 | Formative Assessment Marks: 40                             |
| Exam Marks: 60          | Exam Duration: 03 Hours                                    |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the features of Java and the architecture of JVM
- Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
- Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
- Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Hours |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |
| <b>Fundamentals of Object Oriented Programming:</b> Introduction, Object Oriented Paradigm, Basic Concepts of OOP, Benefits and Applications of OOP.<br><b>Introduction to Java:</b> Java Features, Java Environment, Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Java Virtual Machine.<br><b>Java Programming Basics:</b> Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of variables, Symbolic constants, Type casting.<br><b>Operators and Expressions:</b> Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions.<br><b>Using I/O:</b> Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output.<br><b>Decision Making &amp; Branching:</b> Simple if statement, if..else statement, nesting of if..else statement, the else..if ladder, the Switch statement. | 12    |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |
| <b>Decision making &amp; Looping</b> -The <b>while</b> statement, the <b>do</b> statement, the <b>for</b> statement . Jumps in loops, Labelled loops.<br><b>Class &amp; Objects</b> - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final', Using Command-Line Arguments, Varargs : Variable-Length Arguments<br><b>Arrays and Strings:</b> One dimensional arrays, Creating an arrays, Two dimensional arrays , Strings, Vectors, Wrapper classes.                                                                                                                                                                                                                                                                                                                                                                                                 | 10    |



| Unit - 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Inheritance</b> - Inheritance Basics, Using ‘super’, Creating Multilevel hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance.<br><b>Packages &amp; Interfaces</b> - Packages, Access protection in packages, Importing Packages, Interfaces.<br><b>Exception Handling</b> - Exception Handling Fundamentals – Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java’s built-in Exceptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10 |
| Unit - 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |
| <b>Multithreaded Programming</b> - Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface.<br><b>Event and GUI programming:</b> The Applet Class, Types of Applets, Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repaint, The HTML APPLET tag. Event Handling - The delegation event model, Event Classes –ActionEvent, KeyEvent & MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window.<br><b>Introducing swing</b> – two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- JLabel, JTextField, JButton, Checkboxes , Radio buttons , Jlist , JComboBox. | 10 |

**Text Books :**

1. E Balagurusamy, Programming with Java – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Herbert Schildt, Java : The Complete Reference, Seventh Edition, McGraw Hill Publication.

**Reference Books:**

1. Herbert Schildt, Java 2 - The Complete Reference, Fifth Edition, McGraw Hill publication.
2. Cay S. Horstmann, Core Java Volume I –Fundamentals, Prentice Hall.
3. Somashekara, M.T., Guru, D.S., Manjunatha, K.S, Object Oriented Programming with Java, EEE Edition, PHI.

|                         |                                                       |
|-------------------------|-------------------------------------------------------|
| Course Code: CAC06      | <b>Course Title: Discrete Mathematical Structures</b> |
| Course Credits: 03      | Hours/Week: 03                                        |
| Total Contact Hours: 42 | Formative Assessment Marks: 40                        |
| Exam Marks: 60          | Exam Duration: 03 Hours                               |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- To understand the basic concepts of Mathematical reasoning, set and functions.
- To understand various counting techniques.
- Understand the concepts of various types of relations, partial ordering and equivalence relations.
- To understand the concept of probability and mathematical induction.
- Familiarize the fundamental concepts of graph theory and shortest path algorithm.
- To understand the concept of binary tree representation.

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Hours |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit - 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |
| <b>Mathematical logic:</b> Introduction, statements, Connectives, negation, conjunction, disjunction, statement formulas and truth tables, conditional and bi Conditional statements, tautology, contradiction, equivalence of formulas, duality law, Predicates and Quantifiers, arguments, joint Daniel<br><b>Sets:</b> Definition, notation, inclusion and equality of sets, the power set, Operations on sets, Venn diagram, ordered pairs, and n-tuples, Cartesian product,<br><b>Relations:</b> Introduction, properties of a binary relation in a set, Relation matrix and graph of a relation, equivalence relations, compatibility relations, composition of Binary relation | 12    |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |
| <b>Partial Ordering:</b> Definition, lexicographic ordering, Partially ordered set, Hasse diagram, well-ordered set<br><b>Functions:</b> Definition and introduction, types of functions, composition of functions, inverse functions<br><b>Counting:</b> Basics of counting, Pigeonhole principle, Permutation and combination, Generalized Permutations and Combinations, generating permutation and combination, inclusion and exclusion                                                                                                                                                                                                                                           | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |
| <b>Discrete Probability:</b> Introduction, finite probability, probabilities of complements and unions of events, probability theory, conditional probability, independence, random variables, Bayes' theorem, expected value and variance, independent random variable.<br><b>Mathematical Induction:</b> Mathematical Induction, principle of mathematical induction, proving inequalities, strong induction and well ordering<br><b>Number Theory:</b> Division algorithm, Modular arithmetic, primes and greatest common divisors, least common multiple, the Euclidean algorithm                                                                                                 | 10    |
| <b>Unit - 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |
| <b>Graphs:</b> Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.<br><b>Trees:</b> Directed tree, leaf node, branch node, ordered tree, degree of a node, forest, descendent, m-ary tree, conversion of directed tree into a binary tree.                                                                                                                                                                                                                                                                              | 10    |

**Text Books:**

1. J.P. Trembley and R. Manobar, Discrete Mathematical Structures, McGraw Hill Education Private Limited, New Delhi,
2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, Seventh Edition, 2012.
3. Bernard Kolman, Robert C, Busby, Sharon Ross, Discrete Mathematical Structure, 2003.

**Reference Books:**

1. D C Sanchethi and V K Kapoor, Business Mathematics, Eleventh Revised Edition, Sulthan Chand & Sons Educational publishers, New Delhi,
2. Narsingh Deo, Graph Theory with Applications to Engg and Comp. Sci, PHI, 1986.
3. Ralph P. Grimaldi, B. V. Ramatta, Discrete and Combinatorial Mathematics, 5<sup>th</sup> Edition, Pearson, Education
4. K Chandrashekhara Rao, Discrete Mathematics, Narosa Publishing House, New Delhi

|                         |                                          |
|-------------------------|------------------------------------------|
| Course Code: CAC04P     | <b>Course Title: Data Structures Lab</b> |
| Course Credits: 02      | Hours/Week: 04                           |
| Total Contact Hours: 52 | Formative Assessment Marks: 20           |
| Exam Marks: 30          | Exam Duration: 03 Hours                  |

### Programming Lab

#### Part A:

1. Program to sort the given list using selection sort technique.
2. Program to sort the given list using insertion sort technique.
3. Program to sort the given list using bubble sort technique.
4. Program to search an element using linear search technique.
5. Program to search an element using binary search technique.
6. Program to implement Stack operations using arrays.
7. Program to implement Queue operations using arrays
8. Program to implement dynamic array. Find smallest and largest element.

#### Part B:

1. Program to sort the given list using merge sort technique.
2. Program to implement circular queue using array
3. Program to search an element using recursive binary search technique
4. Program to implement Stack operations using linked list.
5. Program to implement Queue operations using linked list.
6. Program to evaluate postfix expression.
7. Program to perform insert node at the end, delete a given node and display contents of singly linked list.
8. Menu driven program for the following operations on Binary Search Tree (BST) of Integers
  - (a) Create a BST of N Integers
  - (b) Traverse the BST in Inorder, Preorder and Post Order

### Evaluation Scheme for Lab Examination

| Assessment Criteria     |                          | Marks     |
|-------------------------|--------------------------|-----------|
| Program – 1 from Part A | Writing the Program      | 05        |
|                         | Execution and Formatting | 05        |
| Program -2 from Part B  | Writing the Program      | 07        |
|                         | Execution and Formatting | 08        |
| Practical Record        |                          | 05        |
| Total                   |                          | <b>30</b> |

|                         |                                |
|-------------------------|--------------------------------|
| Course Code: CAC05P     | <b>Course Title:</b> JAVA Lab  |
| Course Credits: 02      | Hours/Week: 04                 |
| Total Contact Hours: 52 | Formative Assessment Marks: 20 |
| Exam Marks: 30          | Exam Duration: 04 Hours        |

## Programming Lab

### PART A

1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
2. A menu driven program to input two integers & an operator to perform basic arithmetic operations (+, -, \*, and /) using switch case structure.
3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits. (Hint Input 327 and 539 output  $3 \times 5 + 2 \times 3 + 7 \times 9 = 84$ )
4. Program to input Start and End limits and print all Fibonacci numbers between the ranges. (Use for loop)
5. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.  
 Dearness Allowance = 15% of salary  
 House Rent Allowance = 10% of salary  
 Provident Fund = 12% of salary  
 Gross Salary = Salary + Dearness Allowance + House Rent Allowance  
 Net Salary = Gross Salary - Provident Fund  
 Write a main method to create object of the class and call the methods to compute and display the salary details.
6. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum ( ) to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.)
7. Program to check whether the given array is Mirror Inverse or not.
8. Program to create a class "Matrix" that would contain integer values having varied numbers of columns for each row. Print row-wise sum.
9. Program to extract portion of character string and print extracted string. Assume that 'n' characters extracted starting from mth character position.
10. Program to add, remove and display elements of a Vector

### PART-B

1. Create a class named 'Member' having data members: *Name, Age, PhoneNumber, Place and Salary*. It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherit the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same.
2. Program to implement the following class hierarchy:  
 Student: id, name  
 StudentExam (derived from Student): Marks of 3 subjects, total marks  
 StudentResult (derived from StudentExam) : percentage, grade  
 Define appropriate methods to accept and calculate grade based on existing criteria and display details of N students
3. Program to calculate marks of a student using multiple inheritance implemented through interface. Class **Student** with data members rollNo, name, String **cls** and methods to set and put data. Create another class **test** extended by class Student with data members mark1, mark2, mark3 and methods to set and put data. Create interface sports

with members sportsWt = 5 and putWt(). Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.

4. Program to create an abstract class named shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method print Area() that print the area of the given shape.
5. Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application.
6. Program that implements a multi-threaded program has three threads. First thread generates a random integer every second, and if the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.
7. Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night.
8. Program that creates a user interface to perform basic integer operations. The user enters two numbers in the TextFields - Num1 and Num2. The result of operations must be displayed in the Result TextField when the “=” button is clicked. Appropriate Exception handling message to be displayed in the Result TextField when Num1 or Num2 is not an integer or Num2 is Zero when division operation is applied.
9. Program to accept the employee name, employee number and basic salary as inputs and find the gross and net salaries on the following conditions.  
 if Salary <= 20000    D.A is 40% Salary;    H.R.A is 10% Salary.  
 P.F 12% of Gross;    PT is Rs .100  
 if Salary > 20000    D.A is 50% of salary ;    H.R.A    15% of salary  
 P.F 12% of Gross ;    PT is Rs.150  
 Gross = basic salary +D.A +HRA and                      Net = Gross -PT –PF
10. Using the swing components, design the frame for shopping a book that accepts book code, book name, and Price. Calculate the discount on code as follows.

| <u>Code</u> | <u>Discount rate</u> |
|-------------|----------------------|
| 101         | 15%                  |
| 102         | 20%                  |
| 103         | 25%                  |
| Any other   | 5%                   |

Find the discount amount and Net bill amount. Display the bill.

#### Evaluation Scheme for Lab Examination

| Assessment Criteria     |                          | Marks     |
|-------------------------|--------------------------|-----------|
| Program – 1 from Part A | Writing the Program      | 05        |
|                         | Execution and Formatting | 05        |
| Program -2 from Part B  | Writing the Program      | 07        |
|                         | Execution and Formatting | 08        |
| Practical Record        |                          | 05        |
| <b>Total</b>            |                          | <b>30</b> |

|                            |                                    |
|----------------------------|------------------------------------|
| Course Code: CACOE2/DSCOE2 | <b>Course Title: Web Designing</b> |
| Course Credits: 03         | Hours/Week: 03                     |
| Total Contact Hours: 42    | Formative Assessment Marks: 40     |
| Exam Marks: 60             | Exam Duration: 03 Hours            |

### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand various Internet related terminologies
- Explain features and evolution of Internet
- Explain the use of search engines
- Know the use of different tags available in HTML
- Design web pages using HTML5, CSS3, XML and XHTML
- Implement websites using linked web pages.

### Course Contents

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |
| <b>The Internet:</b> Introduction, Evolution, basic internet terms, Getting connect to internet, Internet applications, Data over the internet.<br><b>Internet tools:</b> Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, checking email, sending email, email attachment, How email works, advantages and disadvantages of email.<br><b>Search Engines:</b> Searching an internet, refining the search, Instant messaging, Features of messengers.                                                                                                                          | 12    |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |
| <b>Overview of HTML5</b> -Exploring new features of HTML5, Structuring an HTML Document, Creating an saving HTML document, Viewing an HTML document.<br><b>Fundamentals of HTML</b> -Understanding Elements, Root elements, Metadata elements, Style element, Section element, Header and Footer element, Address element, Basic HTML data types, Data types defined by RFC and IANA Documentation.<br><b>Working with Text:</b> Formatting Text with HTML Elements, Defining MARK element, Defining STRONG element, Defining CODE element, Defining SMALL element.<br><b>Organizing Text in HTML:</b> Arranging text, Displaying Lists. | 10    |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |
| <b>Working with Links and URLs</b> - Exploring the Hyperlinks, Exploring the URL, Exploring Link Relations.<br><b>Creating Tables</b> -Understanding Tables, Describing the table element.<br><b>Working with Images, Colors and Canvas</b> - Inserting images in a web page, Exploring Colors, Introducing Canvas<br><b>Working with Forms:</b> Exploring Form element, Exploring types of the INPUT element, Exploring the BUTTON element, Exploring the Multiple-Choice elements, Exploring TEXTAREA and LABEL elements.<br><b>Working with Frames:</b> <FRAMESET>, <FRAME> tag with attributes.                                      | 10    |

| Unit - 4                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p><b>Overview of CSS3-</b> Understanding the syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML document.</p> <p><b>Background and Color Gradients in CSS:</b> Exploring Background of a Web Page, Exploring Color Properties, Exploring Gradient Properties, Exploring Font properties.</p> <p><b>Working with Basics of XML-</b>Exploring XML, Comparing XML with HTML, Describing the Structure of an XML document.</p> | 10 |

#### Text Books

1. ITL Education Solution Limited, Introduction to Information Technology, Pearson Education, 2012
2. DT Editorial Services, HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Second Edition, Dreamtech Publisher, 2016

#### Reference Books

1. Laura Lemay & Rafe Colburn, Mastering Html, CSS & Javascript, Web Publishing, 2016
2. Firuza Aibara, HTML 5 for Beginners, 2012
3. Glenn Johnson, Training Guide – Programming in HTML5 with JavaScript and CSS3 (Microsoft Press Training Guide), 2013



## Scheme of Assessment for Theory Examination

**Duration: 3 Hrs**

**Max Marks: 60**

| Question Pattern                                                                                                        |      | Marks |
|-------------------------------------------------------------------------------------------------------------------------|------|-------|
| Part – A                                                                                                                |      |       |
| 1. Answer any <b>SIX</b> sub-questions (6×2=12)                                                                         |      | 12    |
| Sub-question                                                                                                            | Unit |       |
| a, b                                                                                                                    | 1    |       |
| c, d                                                                                                                    | 2    |       |
| e, f                                                                                                                    | 3    |       |
| g, h                                                                                                                    | 4    |       |
| Part – B                                                                                                                |      |       |
| (Answer any <b>ONE</b> full question from each unit – 12 marks each)<br>(Combinations of sub-questions of 3 to 6 marks) |      |       |
| Unit-1                                                                                                                  |      | 12    |
| 2.                                                                                                                      |      |       |
| 3.                                                                                                                      |      |       |
| Unit-2                                                                                                                  |      | 12    |
| 4.                                                                                                                      |      |       |
| 5.                                                                                                                      |      |       |
| Unit-3                                                                                                                  |      | 12    |
| 6.                                                                                                                      |      |       |
| 7.                                                                                                                      |      |       |
| Unit-4                                                                                                                  |      | 12    |
| 8.                                                                                                                      |      |       |
| 9.                                                                                                                      |      |       |
| Total                                                                                                                   |      | 60    |

### **Computer Application Core Courses (CAC) for BCA (Hons)**

| <b>Sl. No</b> | <b>Course Code</b> | <b>Title of the Paper</b>                |
|---------------|--------------------|------------------------------------------|
| 1             | CAC01              | Fundamentals of Computers                |
| 2             | CAC02              | Programming in C                         |
| 3             | CAC03              | Mathematical Foundation                  |
| 4             | CAC04              | Discrete Mathematical Structures         |
| 5             | CAC05              | Object Oriented Concepts using JAVA      |
| 6             | CAC06              | Data Structures using C                  |
| 7             | CAC07              | Data Base Management Systems             |
| 8             | CAC08              | C# and DOT NET Framework                 |
| 9             | CAC09              | Operating System Concepts                |
| 10            | CAC10              | Python Programming                       |
| 11            | CAC11              | Computer Multimedia and Animation        |
| 12            | CAC12              | Computer Communication and Networks      |
| 13            | CAC13              | Internet Technologies                    |
| 14            | CAC14              | Statistical Computing and R Programming  |
| 15            | CAC15              | Software Engineering                     |
| 16            | CAC16              | PHP and MySQL                            |
| 17            | CAC17              | Artificial Intelligence and Applications |
| 18            | CAC18              | Analysis and Design of Algorithms        |
| 19            | CAC19              | Data Mining and Knowledge Management     |
| 20            | CAC20              | Automata Theory and Compiler Design      |
| 21            | CAC21              | Cryptography and Network Security        |

### **Computer Application Electives (CAE) for BCA (Hons)**

| <b>Sl. No</b> | <b>Computer Application Electives (CAE)</b> |
|---------------|---------------------------------------------|
| 1             | Business Intelligence                       |
| 2             | Cyber Law and Cyber Security                |
| 3             | Data Analytics                              |
| 4             | Data Compression                            |
| 5             | Embedded Systems                            |
| 6             | Fundamentals of Data Science                |
| 7             | Internet of Things (IoT)                    |
| 8             | Machine Learning                            |
| 9             | Mobile Application Development              |
| 10            | Open-source Programming                     |
| 11            | Pattern Recognition                         |
| 12            | Storage Area Networks                       |

### **Vocational Electives**

| <b>Sl. No</b> | <b>Vocational Electives</b>     |
|---------------|---------------------------------|
| 1             | DTP, CAD and Multimedia         |
| 2             | Hardware and Server Maintenance |
| 3             | Web Content Management Systems  |
| 4             | Computer Networking             |
| 5             | Health Care Technologies        |
| 6             | Digital Marketing               |
| 7             | Office Automation               |

### **Open Electives in Computer Science**

(For Students studying Core Courses other than Computer Science/ Computer Applications)

| <b>Sl. No</b> | <b>Open Electives in Computer Science</b> |
|---------------|-------------------------------------------|
| 1             | C Programming Concepts                    |
| 2             | Office Automation                         |
| 3             | Multimedia Processing                     |
| 4             | Python Programming Concepts               |
| 5             | R Programming                             |
| 6             | E-Content Development                     |
| 7             | E-Commerce                                |
| 8             | Web Designing                             |
| 9             | Computer Animation                        |
| 10            | Accounting Package                        |

# MANGALORE UNIVERSITY

## Scheme and Syllabus for B.Sc. (Basic / Hons.) Biotechnology

### Preamble:

In keeping with the Govt of India's NEP-2020 vision of a holistic and multidisciplinary Under-Graduate education that equips employable graduates with the required skills in domain as well as personality that are required in the 21<sup>st</sup> century, the Govt. of Karnataka constituted Subject-wise Committees to work towards envisaging, designing and drafting a common syllabus with hallmarks being multiple entry and exit points enabling horizontal and vertical mobility. This has now been adopted in Mangalore University with minor changes and shall be effective from the academic year 2021-22.

Salient features are as follows:

1. Discipline Core (DSC) or Domain-specific Core Courses in Biotechnology as Major.
  2. Discipline Electives (DSE) or Elective Courses in the Core Subject or Discipline.
  3. Open Electives (OE) are Elective Courses offered to students from non-core Subjects across disciplines.
  4. Skill Enhancement Courses (SEC) that are domain-specific or generic.
  5. 1 hour of Lecture or 2 hours of practical per week in a semester is assigned one credit.
- Core discipline theory courses are of 3/4 credits, while practicals are of 2 credits

Competencies need to be acquired by a candidate securing B.Sc. (Basic) or B.Sc. (Hons) degree in Biotechnology.

### Program Outcomes:

By the end of the program the students will be able to:

- PO 1. Understand concepts of Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology.
- PO 2. Demonstrate the Laboratory skills in cell biology, basic and applied microbiology with emphasis on technological aspects
- PO 3. Be competent to apply the knowledge and skills gained in the fields of plant biotechnology, animal biotechnology and microbial technology in pharma, food, agriculture, beverages, herbal and nutraceutical industries.
- PO 4. Critically analyze environmental issues and apply the biotechnology knowledge gained for conserving the environment and resolving environmental problems.
- PO 5. Demonstrate comprehensive innovations and skills in the fields of biomolecules, cell and organelles, molecular biology, bioprocess engineering and genetic engineering of plants, microbes, and animals with respect to applications for human welfare.
- PO 6. Apply the knowledge and skills of immunology, bioinformatics, computational modelling of proteins, drug design and simulations to test models and aid in drug discovery.

- PO 7. Critically analyze, interpret data, and apply tools of bioinformatics and multiomics in various sectors of biotechnology including health and food.
- PO 8. Demonstrate communication skills, scientific writing, data collection and interpretation abilities in all the fields of biotechnology.
- PO 9. Learn and practice professional skills in handling microbes, animals and plants and demonstrate the ability to identify ethical issues related to recombinant DNA technology, genetic engineering, animals handling, intellectual property rights, biosafety, and biohazards.
- PO 10. Explore the biotechnological practices and demonstrate innovative thinking in addressing the current day and future challenges with respect to food, health, and environment.
- PO 11. Demonstrate thorough knowledge and application of good laboratory and good manufacturing practices in biotech industries
- PO 12. Understand and apply molecular biology techniques and principles in forensic and clinical biotechnology.
- PO 13. Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up of small-scale enterprises or CROs

## Programme Structure for BSc (Basic/Hons.) Biotechnology

| Seme<br>ster                                                                                                                             | Discipline Core Courses<br>(Credits) (T+P=4+2; T=4)                                                                                                                      | Open Elective Courses<br>OE (3)                             | Ability<br>Enhancement<br>compulsory Courses<br>4hrs |                                        | Skill Enhancement Courses                                                           |                                |                                           | Total<br>credits |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------|------------------|
|                                                                                                                                          |                                                                                                                                                                          |                                                             |                                                      |                                        | Skill based                                                                         | Value Based (Credits)<br>L+T+P |                                           |                  |
| I                                                                                                                                        | BTC 101 Cell biology and Genetics (4)<br>BTC 101 Cell biology and Genetics (2)<br>(4)<br>(2)                                                                             | BTC 301 Biotechnology for<br>human welfare (3)              | Languages<br>(3+3)                                   |                                        | SEC-1 BTC<br>701<br>Biotechnologica<br>l Skills and<br>Analytical<br>Techniques (2) | Phy. Ed.<br>Yoga (1)           | Health &<br>Wellness<br>(1)               | 25               |
| II                                                                                                                                       | BTC 102 Microbiological methods and techniques (4)<br>BTC 102 Microbiological methods and techniques (2)<br>(4)<br>(2)                                                   | BTC 302 Applications of<br>Biotechnology in agriculture (3) | Languages<br>(3+3)                                   | EVS<br>(2)                             |                                                                                     | Phy. Ed.<br>Sports<br>(1)      | NCC/NSS/R&<br>R<br>(S&G)/Cultur<br>al (1) | 25               |
| Exit option with Certificate in Biotechnology (with completion of courses equal to a minimum of 48 credits)                              |                                                                                                                                                                          |                                                             |                                                      |                                        |                                                                                     |                                |                                           |                  |
| III                                                                                                                                      | BTC 103 Biomolecules (4)<br>BTC 103 Biomolecules (2)<br>(4)<br>(2)                                                                                                       | OE 3                                                        | Languages<br>(3+3)                                   |                                        | SEC-2 (2)                                                                           | Phy. Ed.<br>Sports<br>(1)      | NCC/NSS/R&<br>R<br>(S&G)/Cultur<br>al (1) | 25               |
| IV                                                                                                                                       | BTC 104 Molecular biology (4)<br>BTC 104 Molecular biology (2)<br>(4)<br>(2)                                                                                             | OE 4                                                        | Languages<br>(3+3)                                   | Constit<br>ution<br>of<br>India<br>(2) |                                                                                     | Phy. Ed.<br>Sports<br>(1)      | NCC/NSS/R&<br>R<br>(S&G)/Cultur<br>al (1) | 25               |
| Exit option with Diploma in Biotechnology (with completion of courses equal to a minimum of 96 credits OR continue with Major and Minor) |                                                                                                                                                                          |                                                             |                                                      |                                        |                                                                                     |                                |                                           |                  |
| V                                                                                                                                        | BTC 105 Genetic Engineering (3)<br>BTC 106 Plant Biotechnology (3)<br>BTC 105 Genetic Engineering (2)<br>BTC 106 Plant Biotechnology (2)<br>(3)<br>(2)                   | Biotechnology Vocational – 1<br>(3)                         |                                                      |                                        | SEC-3 (2)                                                                           | Phy. Ed.<br>Sports<br>(1)      | NCC/NSS/R&<br>R<br>(S&G)/Cultur<br>al (1) | 22               |
| VI                                                                                                                                       | BTC 107 Immunology and Medical Technology (3)<br>BTC 108 Bioprocess Technology (3)<br>BTC 107 Immunology and Medical Technology (2)<br>BTC 108 Bioprocess Technology (2) | Biotechnology Vocational-2 (3)<br>Internship (2)            |                                                      |                                        | SEC-4 (2)                                                                           | Phy. Ed.<br>Sports<br>(1)      | NCC/NSS/R&<br>R<br>(S&G)/Cultur<br>al (1) | 24               |

|                                                                                                                                  |                                                                                                                                                                                              |                                                                                 |  |  |  |  |  |     |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--|--|--|--|--|-----|
|                                                                                                                                  | (3)                                                                                                                                                                                          |                                                                                 |  |  |  |  |  |     |
|                                                                                                                                  | (2)                                                                                                                                                                                          |                                                                                 |  |  |  |  |  |     |
| <b>Exit option with BSc in Biotechnology (with completion of courses equal to a minimum of 140 credits OR continue for Hons)</b> |                                                                                                                                                                                              |                                                                                 |  |  |  |  |  |     |
| VII                                                                                                                              | BTC 109 Environmental Biotechnology (3)<br>BTC 110 Enzyme Biotechnology (3)<br>BTC 111 Food Biotechnology (3)<br>BTC 110 Environmental Biotechnology (2)<br>BTC 110 Enzyme Biotechnology (2) | Biotechnology E-1 (3)<br>Biotechnology -E 2 (3)<br><br>Research Methodology (3) |  |  |  |  |  | 22  |
| VIII                                                                                                                             | BTC 112 Animal Biotechnology (3)<br>BTC 113 Genomics and proteomics (3)<br>BTC 114 Biosafety, bioethics and IPR (3)                                                                          | Biotechnology E-3 (3)<br>Biotechnology E-4 (3)<br>Research Project* (6)         |  |  |  |  |  | 21  |
|                                                                                                                                  |                                                                                                                                                                                              |                                                                                 |  |  |  |  |  | 189 |
| <b>Award of BSc (Hons.) Degree in Biotechnology (with completion of courses equal to a minimum of 180 credits)</b>               |                                                                                                                                                                                              |                                                                                 |  |  |  |  |  |     |

\*In lieu of Research Project, two additional elective papers/ internship may be offered

**MANGALORE UNIVERSITY**  
**Scheme and Syllabus for B.Sc. (Basic / Hons.) Biotechnology**

| <b>SEMESTER - I</b>           |             |                                     |                      |                        |       |      |       |         |
|-------------------------------|-------------|-------------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses                    | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                                     |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 101     | Cell Biology and Genetics           | 4                    | 3                      | 40    | 60   | 100   | 4       |
|                               | BTP 101     | Cell Biology and Genetics Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Open Elective (OE) Courses    | BTC 301     | Biotechnology for human welfare     | 3                    | 3                      | 40    | 60   | 100   | 3       |

| <b>SEMESTER - II</b>          |             |                                                  |                      |                        |       |      |       |         |
|-------------------------------|-------------|--------------------------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses                                 | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                                                  |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 102     | Microbiological methods and techniques           | 4                    | 3                      | 40    | 60   | 100   | 4       |
|                               | BTP 102     | Microbiological methods and techniques Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Open Elective (OE) Courses    | BTC 302     | Applications of Biotechnology in agriculture     | 3                    | 3                      | 40    | 60   | 100   | 3       |



| <b>SEMESTER - III</b>         |             |                        |                      |                        |       |      |       |         |
|-------------------------------|-------------|------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses       | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                        |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 103     | Biomolecules           | 4                    | 3                      | 40    | 60   | 100   | 4       |
|                               | BTP 103     | Biomolecules Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Open Elective (OE) Courses    | BTC 303     |                        | 3                    | 3                      | 40    | 60   | 100   | 3       |

| <b>SEMESTER - IV</b>          |             |                             |                      |                        |       |      |       |         |
|-------------------------------|-------------|-----------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses            | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                             |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 104     | Molecular Biology           | 4                    | 3                      | 40    | 60   | 100   | 4       |
|                               | BTP 104     | Molecular Biology Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Open Elective (OE) Courses    | BTC 304     |                             | 3                    | 3                      | 40    | 60   | 100   | 3       |

| <b>SEMESTER - V</b>           |             |                               |                      |                        |       |      |       |         |
|-------------------------------|-------------|-------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses              | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                               |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 105     | Genetic Engineering           | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                               | BTC 106     | Plant Biotechnology           | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                               | BTP 105     | Genetic Engineering Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
|                               | BTP 106     | Plant Biotechnology Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Vocational                    |             |                               | 3                    | 3                      | 40    | 60   | 100   | 3       |

| <b>SEMESTER - VI</b>          |             |                                                |                      |                        |       |      |       |         |
|-------------------------------|-------------|------------------------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                         | Course Code | Title of Courses                               | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                               |             |                                                |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses | BTC 107     | Immunology and Medical Biotechnology           | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                               | BTC 108     | Bioprocess Technology                          | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                               | BTP 107     | Immunology and Medical Biotechnology Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
|                               | BTP 108     | Bioprocess Technology Practical                | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Vocational                    |             |                                                | 3                    | 3                      | 40    | 60   | 100   | 3       |
| Internship                    |             |                                                |                      |                        |       |      |       | 2       |

| <b>SEMESTER - VII</b>           |             |                                       |                      |                        |       |      |       |         |
|---------------------------------|-------------|---------------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                           | Course Code | Title of Courses                      | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                                 |             |                                       |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses   | BTC 109     | Environmental Biotechnology           | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 | BTC 110     | Enzyme Biotechnology                  | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 | BTC 111     | Food Biotechnology                    | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 | BTP 109     | Environmental Biotechnology Practical | 3                    | 3                      | 25    | 25   | 50    | 2       |
|                                 | BTP 110     | Enzyme Biotechnology Practical        | 3                    | 3                      | 25    | 25   | 50    | 2       |
| Discipline Elective (E) Courses |             |                                       | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 |             |                                       | 3                    | 3                      | 40    | 60   | 100   | 3       |
| Research Methodology            |             |                                       | 3                    | 3                      | 40    | 60   | 100   | 3       |

| SEMESTER - VIII                 |             |                              |                      |                        |       |      |       |         |
|---------------------------------|-------------|------------------------------|----------------------|------------------------|-------|------|-------|---------|
| Group                           | Course Code | Title of Courses             | Instruction hrs/week | Duration of Exam (hrs) | Marks |      |       | Credits |
|                                 |             |                              |                      |                        | IA*   | Exam | Total |         |
| Discipline Core (DSC) Courses   | BTC 112     | Animal Biotechnology         | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 | BTC 113     | Genomics and Proteomics      | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 | BTC 114     | Biosafety, bioethics and IPR | 3                    | 3                      | 40    | 60   | 100   | 3       |
| Discipline Elective (E) Courses |             |                              | 3                    | 3                      | 40    | 60   | 100   | 3       |
|                                 |             |                              | 3                    | 3                      | 40    | 60   | 100   | 3       |
| Research Project                |             |                              | 3                    |                        | 40*   | 60   | 100   | 6       |
| Credits                         |             |                              |                      |                        |       |      |       | 111     |

**Pedagogy** for student engagement is predominantly lectures. However, other pedagogies that enhance better student engagement may be adopted for each course. The list includes active/ experiential learning /course projects/ problem or project-based learning (PBL)/ case studies/ self-study like seminar, term paper or MOOC/ field visits / industrial visits / group activity / simulations / hackathons etc.

**Assessment:** Every course needs to include assessment for higher order thinking skills (applying/ analyzing/evaluating/creating). These shall necessarily be reflected also in the Question Papers, such that questions of all levels of difficulty are framed. Alternate assessment methods that help formative assessment (i.e. assessment for learning) may also be adopted.

\*Based on internal test or tests

\*\*Continuous assessment during project

**Syllabus for B.Sc. (Basic / Hons.) Biotechnology**  
**Discipline Core Courses**

## SEMESTER – I

## BTC 101

## CELL BIOLOGY AND GENETICS

**56 hours**

**Course Outcomes:**

After successful completion of this Course, students will be able to:

- CO 1. Understand concepts of Biotechnology and demonstrate knowledge acquired in interdisciplinary skills in cell biology, genetics, biochemistry, microbiology, and molecular biology
- CO 2. Describe the ultrastructure of cells, structure and function of organelles, cytosol and cytoskeleton
- CO 3. Understand phases of cell cycle, cell division, reductional division in gametes, molecular mechanisms that regulate life and death of a cell including programmed cell death or apoptosis and differentiation in plants
- CO 4. Comprehend organization and structure of chromosomes, banding techniques and Mendelian laws of inheritance, deviations and exceptions to these laws.
- CO 5. Describe mutations at the molecular level, types of mutations, genetic or hereditary disorders and concepts in population genetics

## Unit I

**(14 hours)**

**Cell as a basic unit of living systems and cellular organelles:** Concept, Development and Scope of Biotechnology. Historical perspectives. Discovery of cell, the cell Theory, Ultra structure of a eukaryotic cell- (Both plant and animal cells), Surface Architecture: Structural organization and functions of plasma membrane and cell wall of eukaryotes. Cellular Organelles: Structure and functions of cell organelles – Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast, Ribosomes, Lysosomes, Peroxisomes, Nucleus (Nuclear envelope with nuclear pore complex, Nucleolus, Nucleoplasm and Chromatin). Vacuole, Cytosol and Cytoskeleton structures (Microtubules, Microfilaments and Intermediate filaments).

## Unit II

**(14 hours)**

**Chromosomes and cell division:** General Introduction, Discovery, Morphology and structural organization – Centromere, Secondary constriction, Telomere, Chromonema, Euchromatin and Heterochromatin, Chemical composition and Karyotype. Single-stranded and multistranded hypothesis, folded-fibre and nucleosome models. Special type of chromosomes: Salivary gland and Lamp brush chromosomes.

**Cell Division:** Cell cycle, phases cell division. Mitosis and meiosis, regulation of cell cycles cell cycle checkpoints, and enzymes involved in regulation, Significance of cell cycle, mitosis and meiosis interphase nucleus, achromatic apparatus, synaptonemal complex Cell Cycle and regulation, mitosis and meiosis. Cell Senescence and programmed cell death.

## Unit III

**(14 hours)**

**Genetics:** History of genetics: Introduction and brief history of genetics. Mendelian theory: Laws of inheritance- dominance, segregation, incomplete dominance, codominance with an example. Law of independent assortment, test cross, back cross. Deviations to Mendelian inheritance, complementary, supplementary and interaction of genes (13:3 ratio), epistasis.

**Maternal Inheritance:** Plastid inheritance in *Mirabilis*, Petite characters in yeast and Kappa particles in paramecium, Sex-linked inheritance, Chromosome theory of inheritance.

**Gene interaction:** Supplementary factors: comb pattern in fowls, Complementary genes-

Flower colour in sweet peas, Multiple factors–Skin colour in human beings, Epistasis– Plumage colour in poultry, Multiple allelism: Blood groups in Human beings.

#### **Unit IV**

**(14 hours)**

**Linkage and crossing over:** Introduction, Coupling and repulsion hypothesis, Linkage in maize and *Drosophila*, Mechanism of crossing over and its importance, chromosome mapping-linkage map in maize.

**Mutations:** Types of mutations, Spontaneous and induced, Mutagens: Physical and chemical, Mutation at the molecular level, Mutations in plants, animals and microbes for economic benefit of man.

**Chromosomal variations:** A general account of structural and numerical aberrations, chromosomal evolution of wheat and cotton.

**Sex Determination in Plants and animals:** Concept of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ, ZO-ZZ types.

**Human Genetics:** An overview of human genetics, karyotype in human, inherited disorders – Allosomal (Klinefelter syndrome and Turner's syndrome), Autosomal (Down's syndrome and Cri-Du-Chat Syndrome).

#### **Pedagogical Note:**

The general pedagogy to be followed for theory and practical are as follows: Lecturing, Tutorials, Group/Individual Discussions, Seminars, Assignments, Counseling, Remedial Coaching, Field/Institution/Industrial visits, Hands-on training, Case observations, Models/charts preparations, Problem solving mechanisms, Demonstrations, Project presentations, Experiential documentation, and Innovative methods, Active learning as per LSSSDC (NSDC) LFS/Q0509 (Lab Technician/Assistant-Life Sciences) guidelines, at skill training Level 3, Case studies.

#### **BTC 101**

#### **CELL BIOLOGY AND GENETICS PRACTICAL**

- Study and maintenance of simple and compound microscope
- Use of Micrometer and calibration, measurement of onion epidermal cells and yeast
- Study of divisional stages in mitosis from onion root tips
- Study of divisional stages in meiosis in grasshopper testes/onion or Rheo flower buds.
- Mounting of polytene chromosomes
- Buccal smear – Barr bodies
- Karyotype analysis – Human and Onion Human – Normal and Abnormal – Down and Turner's syndromes
- Isolation and staining of Mitochondria
- Isolation and staining of Chloroplast
- RBC cell count by Haemocytometer
- Simple genetic problems based on theory

Each student is required to submit 5 permanent slides of mitosis & meiosis

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- Lewin B., *Genes II*, Wiley & Sons Publications
- Lewin B., *Genes III*, Wiley & Sons Publications
- Lewin B., *Genes V*, Oxford University Press
- Old & Primrose, *Principles of Gene Manipulations*, Black Well Scientific Publications
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- Smith C., *Molecular Biology*, Faber & Faber Publications
- Strickberger M.W., *Genetics*, Macmillan Publishers, New York
- Taylor DJ. Green NPO and Stout GW. 1998. *Biological Science* 3<sup>rd</sup> Ed., Cambridge University Press, UK.
- White MJD. *Animal cytology and evolution*, Cambridge University Publications
- Willson & Marrison, *Cytology*, Reinform Publications

## SEMESTER – II

**BTC 102**

**MICROBIOLOGICAL METHODS**

**56 hours**

### **Course Outcomes:**

After successful completion of this Course, students will be able to:

- CO 1. Apply the principles of microscopy to study microorganisms
- CO 2. Use analytical techniques for work using microorganisms
- CO 3. Comprehend the importance and methods of sterilization in microbiological work
- CO 4. Analyse the different types of media, culture methods and staining techniques for isolation, characterization of microbes
- CO 5. Classify the types and applications of antimicrobial agents and how to perform anti-microbial assays

### **Unit I**

**(14 hours)**

**Microscopy:** Principles of Microscopy- resolving power, numerical aperture, working principle and applications of Compound microscope, Dark field microscope, Phase contrast microscope, Fluorescence Microscope, confocal microscope, Electron Microscopes- TEM and SEM.

**Analytical techniques:** Working principles and applications: Centrifuge, Ultracentrifuge, Spectrophotometer, Chromatography: Paper and TLC

### **Unit II**

**(14 hours)**

**Sterilization techniques:** Definition of terms-sterilization, disinfectant, antiseptic, sanitizer, germicide, microbicidal agents, microbiostatic agent and antimicrobial agent. Physical methods of control: Principle, construction and applications of moist heat sterilization Boiling, Pasteurization, Fractional sterilization-Tyndallization and autoclave. Dry heat sterilization-Incineration and hot air oven. Filtration – Diatomaceous earth filter, seitz filter, membrane filter and HEPA; Radiation: Ionizing radiation- $\gamma$  rays and non-ionizing radiation-UV rays Chemical methods: Alcohol, aldehydes, phenols, halogen, metallic salts, Quaternary ammonium compounds and sterilizing gases as antimicrobial agents.

### **Unit III**

**(14 hours)**

**Culture Media:** Components of media, natural and synthetic media, chemically defined media, complex media, selective, differential, indicator, enriched and enrichment media

**Pure culture methods:** Serial dilution and plating methods (pour, spread, streak); cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria

**Stains and staining techniques:** Principles of staining, Types of stains-simple stains, structural stains and differential stains.

### **Unit IV**

**(14 hours)**

**Antimicrobial agents:** Five modes of action with one example each: Inhibitor of nucleic acid synthesis; Inhibitor of cell wall synthesis; Inhibitor of cell membrane function; Inhibitor of protein synthesis; Inhibitor of metabolism Antifungal agents: Mechanism of action of Amphotericin B, Griseofulvin Antiviral agents: Mechanism of action of Amantadine, Acyclovir, Azidothymidine Antibiotic resistance, MDR, XDR, MRSA, NDM-1 Antibiotic sensitivity testing methods: Disc and Agar well diffusion techniques

**Course Outcomes:**

After successful completion of this Course, students will be able to:

- CO 1. Handle and use instruments used in Microbiology and Biotechnology laboratories
- CO 2. Use analytical techniques for work using microorganisms
- CO 3. Experiment with various methods of sterilization in microbiological work
- CO 4. Prepare different types of media, perform culture methods and staining techniques for isolation, characterization of microbes
- CO 5. Handle and use antimicrobial agents and perform anti-microbial assays
- CO 6. Demonstrate the Laboratory skills in basic and applied microbiology with reference to technological aspects.
- CO 7. Demonstrate knowledge and application of good laboratory and good manufacturing practices in biotech industries

- To study the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the microbiology and Biotechnology laboratory.
- Sterilization techniques – dry heat sterilization with hot air oven, wet heat sterilization with autoclave, membrane filtration and assessment for sterility
- Preparation of culture media for bacteria, fungi and their cultivation.
- Plating techniques:
- Enumeration techniques – direct microscopic, serial dilution and standard plate count technique (Spread plate, pour plate) and study of colony characters of isolated microbes
- Purification of bacterial and fungal cultures using streak plate technique/mycelial bit transfer
- Isolation of bacteria and fungi from soil, water and air
- Culture preservation techniques – slant and stab culture
- Study of Rhizopus, Penicillium, Aspergillus using temporary mounts
- Study of colony characteristics bacteria from air exposure plate
- Staining techniques: Bacteria– Gram, Negative, Capsule, Endospore staining. Fungi – Lactophenol, cotton blue staining
- Water analysis – MPN test
- Biochemical Tests – IMViC, Starch hydrolysis, Catalase test, Gelatin hydrolysis
- Bacterial cell motility – hanging drop technique
- Antibiotic sensitivity test

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**Open Elective Courses**  
**SEMESTER – I**

**BTC 301      BIOTECHNOLOGY FOR HUMAN WELFARE      42 hours**

**Course Outcomes:**

After successful completion of this Course, students will be able to:

- CO 1. Understand the biotechnological applications in the industry
- CO 2. Appreciate application of biotechnology in environmental management
- CO 3. Describe application of biotechnology to forensic science
- CO 4. Comprehend contributions of biotechnology to biomedical fields, such as diagnostics, genomics and therapeutics

**Unit I      (14 hours)**

**Environment:** Application of biotechnology in environmental aspects: Degradation organic pollutants – chlorinated and non-chlorinated compounds; degradation of hydrocarbons and agricultural wastes, PHB –production and its futuristic applications.

**Unit II      (14 hours)**

**Industry:** Application of biotechnology in industry: Industrial production of alcoholic beverages (wine), antibiotics (Penicillin), enzymes (lipase). Applications in food, detergent and pharmaceutical industry.

**Unit III      (14 hours)**

**Forensic science:** Application of biotechnology in forensic science: Solving crimes of murder and rape; solving claims of paternity and theft by using DNA finger printing techniques

**Health:** Application of biotechnology in health: Genetically engineered insulin, recombinant vaccines, gene therapy, molecular diagnostics using ELISA, PCR; monoclonal antibodies and their use in cancer; human genome project.

**References:**

- Bhasin M.K. and Nath, S. (2002). Role of Forensic Science in the New Millennium, University of Delhi, Delhi
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- Eckert W.G. (1997) Introduction to Forensic Sciences, 2<sup>nd</sup> Ed., CRC Press, Boca Raton
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**Open Elective Courses  
SEMESTER – II**

**BTC 302      APPLICATIONS OF BIOTECHNOLOGY IN AGRICULTURE**

**42 hours**

**Course Outcomes:**

After successful completion of this Course, students will be able to:

- CO 1. Understand the biotechnological applications in agriculture
- CO 2. Understand the importance of biotechnological methods such as plant tissue culture
- CO 3. Comprehend the pros and cons of GM crops and their plant products
- CO 4. Appreciate the biotechnological applications for effective pest control and crop improvements

**Unit I** **(14 hours)**

**Agricultural Biotechnology:** Concepts and scope of biotechnology in Agriculture. Plant tissue culture, micro propagation, entrepreneurship in commercial plant tissue culture. Banana tissue culture – primary and secondary commercial setups, Small scale bioenterprises: Mushroom cultivation

**Unit II** **(14 hours)**

**Transgenic plants:** The GM crop debate – safety, ethics, perception and acceptance of GM crops GM crops case study: Bt cotton, Bt brinjal. Plants as biofactories for molecular pharming; edible vaccines, plantibodies, nutraceuticals.

**Unit III** **(14 hours)**

**BT based pesticides:** Baculovirus pesticides, Mycopesticides, Post-harvest Protection: Antisense RNA technology for extending shelf life of fruits and shelf life of flowers. Genetic engineering for quality improvement: Seed storage proteins, Flavours–capsaicin, vanillin

**References:**

- Chrispeels M.J. and Sadava D.E. (1994) Plants, Genes and Crop Biotechnology, 2<sup>nd</sup> Ed., Jones and Bartlett Publishers, Boston.
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- Murray D.R. (1996) Advanced methods in plant breeding and biotechnology. Panima Publishing Corporation.
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**Skill Enhancement Course  
SEMESTER – I**

**BTC 701: BIOTECHNOLOGICAL SKILLS AND ANALYTICAL TECHNIQUES**  
**14 hours**

**Course Outcomes:**

After successful completion of this Course, students will demonstrate the:

- CO 1. Skill enhancement as per National Occupational Standards (NOS) of “Lab Technician/ Assistant” Qualification Pack issued by Life Sciences Sector Skill Development Council – LFS/Q0509, Level 3.
- CO 2. Knowledge about major activities of biotech industry, regulations, and compliance, environment, health, and safety (EHS), good laboratory practices (GLP), standard operating procedures (SOP) and GMP as per the industry standards.
- CO 3. Soft skills, such as decision making, planning, organizing, problem solving, analytical thinking, critical thinking, and documentation.

**1. Insights into biotechnology industry:** Biotechnology Industry in Indian and Global context – organization in context of large /medium/ small enterprises, their structure and benefits.

**2. Industry professional skills to be acquired:** Planning and organizing skills, decision-making, problem-solving skills, analytical thinking, critical thinking, team management, risk assessment.

**3. Interpersonal skills:** Writing skills, reading skills, oral communication, conflict-resolution techniques, interpretation of research data, trouble shooting in work place

**4. Digital skills:** Basic Computer Skills (MS Office, Excel, Power point, Internet) for Workplace. Professional Email drafting skills and Powerpoint presentation skills

**Analytical Skills in laboratory:**

**Solutions:** Molarity, Molality, Normality, Mass percent % (w/w), Percent by volume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions. Standard solutions, stock solution, solution of acids. Reagent bottle label reading and precautions

**1. Methods and practices of cleaning and management of lab:** Learning and Practice of Integrated clean-in-place (CIP) and sterilize-in-place (SIP) as per industry standards, material requirements for cleaning specific area, equipment, ventilation area, personal protective requirements

**2. Procedure of cleaning and storage of Labware:**

Methodology for storage area, Cleaning procedure and materials to be used for various surfaces. Sign boards, labelling do's & don'ts

Knowledge about standard procedures of cleaning of glass ware, plastic ware. Maintenance of inventory

**3. Principles and practices of lab safety:**

Knowledge about safety symbols and hazard signs. Personal safety gears, utility, and disposal. Equipment safety protocols, chemical safety protocols. Documentation of chemical and equipment usage records. Handling hazardous chemicals.

**4. Best practices of usage and storage of chemicals:**

Knowledge and practice in handling of chemicals, labelling and stock maintenance. SOP and material handling. Procedures to maintain chemicals, labelling, storage, and disposal.

**5. Record maintenance as per SOP's**

Labelling of samples and reagents as per SOP's. Recording detail of work done for research experiments. Importance of study of manuals, health, and safety instructions.

6. **Usage and maintenance of basic equipment of biotechnology lab:** Principles, calibrations, and SOPs of weighing balances, pH meters, autoclaves, laminar flows and biosafety cabinets, basic microscopes, homogenizers, stirrers, colorimeters, UV, and Visible spectrophotometers.
7. **Preparation of solutions and standards:** Properties and uses of chemicals commonly used in life sciences laboratories. Maintaining safety standards for handling various solutions and chemicals. Preparation of test reagents and buffers, Protocols for proper mixing of chemicals. Safety precautions while preparation and storage of incompatible chemicals and reagents.
8. **Preparation of media:** Maintenance and storage of purified water for media (Plant Tissue culture media, Microbiological media, and Animal cell culture media) preparation. Preparation and storage of concentrated stock solutions. Documentation and disposal of expired stocks. Collection of indents of media requirement, preparation, and storage. Media coding, documentation, and purpose of usage.
9. **Practical methods for decontamination and disposal:** Decontamination methods, Safe disposal practices of decontaminated media or materials.
10. **Laboratory record writing:** Method of record writing, data collection and recording, reporting of result, discussion of result, summary writing, effective powerpoint presentation taking any experiment as example
11. Industry visit or Analytical laboratory visit

## Pattern for question setting (Theory- Discipline Core Courses)

| <b>Unit 1</b>           | <b>Marks</b> | <b>Total Marks</b> |
|-------------------------|--------------|--------------------|
| Short answer question   | 4            |                    |
| Critical notes question | 4            |                    |
| Essay type question     | 7            | 15                 |
| <b>OR</b>               |              |                    |

|                         |   |    |
|-------------------------|---|----|
| Short answer question   | 4 |    |
| Critical notes question | 4 |    |
| Essay type question     | 7 | 15 |

| <b>Unit 2</b>           | <b>Marks</b> | <b>Total Marks</b> |
|-------------------------|--------------|--------------------|
| Short answer question   | 4            |                    |
| Critical notes question | 4            |                    |
| Essay type question     | 7            | 15                 |
| <b>OR</b>               |              |                    |

|                         |   |    |
|-------------------------|---|----|
| Short answer question   | 4 |    |
| Critical notes question | 4 |    |
| Essay type question     | 7 | 15 |

| <b>Unit 3</b>           | <b>Marks</b> | <b>Total Marks</b> |
|-------------------------|--------------|--------------------|
| Short answer question   | 4            |                    |
| Critical notes question | 4            |                    |
| Essay type question     | 7            | 15                 |
| <b>OR</b>               |              |                    |

|                         |   |    |
|-------------------------|---|----|
| Short answer question   | 4 |    |
| Critical notes question | 4 |    |
| Essay type question     | 7 | 15 |

| <b>Unit 4</b>           | <b>Marks</b> | <b>Total Marks</b> |
|-------------------------|--------------|--------------------|
| Short answer question   | 4            |                    |
| Critical notes question | 4            |                    |
| Essay type question     | 7            | 15                 |
| <b>OR</b>               |              |                    |

|                         |   |    |
|-------------------------|---|----|
| Short answer question   | 4 |    |
| Critical notes question | 4 |    |
| Essay type question     | 7 | 15 |

Short answer questions shall be based on basic conceptual understanding etc.

Critical notes questions shall be based on deeper understanding, analytical, problem solving skills etc.

Essay type questions shall be on critical thinking, higher order thinking skills etc.

**Model Question paper (Discipline Core Course)**

**CBCS \_\_\_\_ Semester B.Sc. Examination**

**BIOTECHNOLOGY**

**Course code – Title**

Time: 3 Hours

Max. Marks: 60

**Note:** A single answer booklet containing 40 pages will be issued and no additional sheets will be issues

**Instruction:** Draw labelled diagrams wherever necessary

**Write any four full questions choosing one from each unit:**

**Unit 1**

- |    |    |   |
|----|----|---|
| 1. | a) | 4 |
|    | b) | 4 |
|    | c) | 7 |

OR

- |    |    |   |
|----|----|---|
| 2. | a) | 3 |
|    | b) | 5 |
|    | c) | 7 |

**Unit 2**

- |    |    |   |
|----|----|---|
| 3. | a) | 4 |
|    | b) | 4 |
|    | c) | 7 |

OR

- |    |    |   |
|----|----|---|
| 4. | a) | 3 |
|    | b) | 5 |
|    | c) | 7 |

**Unit 3**

- |    |    |   |
|----|----|---|
| 5. | a) | 4 |
|    | b) | 4 |
|    | c) | 7 |

OR

- |    |    |   |
|----|----|---|
| 6. | a) | 3 |
|    | b) | 5 |
|    | c) | 7 |

**Unit 4**

- |    |    |   |
|----|----|---|
| 7. | a) | 4 |
|    | b) | 4 |
|    | c) | 7 |

OR

- |    |    |   |
|----|----|---|
| 8. | a) | 3 |
|    | b) | 5 |
|    | c) | 7 |

# Mangalore University

## **SCHEME AND SYLLABUS**

**For the course**

**B.Sc BIOCHEMISTRY (HONOURS)**

**NEP 2021 Scheme**

**Revised w.e.f.**

**Academic Year 2021-22 and onwards**

**Department of Biochemistry  
Jnana Kaveri Mangalore University  
PG Centre, Chikka Aluvara**



## **B.Sc. BIOCHEMISTRY (Honors)**

### **Preamble**

The learning outcomes are designed to help learners understand the objectives of studying B.Sc (Honors) Biochemistry that is, to analyze, appreciate, understand the basic concepts of biomolecular processes and chemical reactions occurring in the living system. This course is fundamental to tackle many of the health – related challenges facing society. Considering the rapid and far-reaching advances in biological sciences in 21<sup>st</sup> century, it is imperative to have curriculum incorporating these updated emerging concepts of biochemistry. The current pattern is designed to impart concept based learning with emphasis on hands-on training, skill development and research. Aimed at multi-faceted development of a student, the curriculum includes courses encompassing core courses, intra and inter discipline specific courses, skill and ability enhancement courses to impart in-depth knowledge in biochemistry complemented with varied subjects and skills. The course seeks to discover and nurture typical attributes of a competent science graduate such as; spirit of inquiry, critical thinking, problem solving, analytical reasoning, aptitude to research/industry and entrepreneurial instincts.

### **Programme Learning Outcome**

The learning outcome-based curriculum is specific in terms of changes in cognitive and psychomotor behavior of students. Biochemistry Honors course is intended to provide a broad framework enabling students to acquire a skill set that helps them understand and appreciate the field of biochemistry. The structure or design of this framework shall ensure a high standard of the Honors degree in Biochemistry at national level. The programme specification are intended as a reference point for prospective students, current students, academic in delivering the programme and realizing its objectives.

Keeping in pace with the developmental trends in Biochemistry and allied areas, it is expected that the students undertaking Biochemistry (Honours) course become conversant with the essence of Biochemistry and exhibit certain levels of learning outcomes as proposed below;

## **PROGRAMME OUTCOME (PO)**

**PO1-** To create interest in Biochemistry and appreciation for chemical basis of biological processes.

**PO2-** To inculcate the spirit of inquiry and value of systematic study of a discipline. Provide a general understanding of the related disciplines with a holistic knowledge generation in biological sciences.

**PO3-** To provide an in-depth understanding of chemical reaction mechanisms in biological processes.

**PO4-** To provide a flavor of historical developments of enzymes and their applications in research, diagnostics and various industries.

**PO5-** Gain proficiency in basic laboratory techniques and be able to apply the scientific method to the processes of experimentation, hypothesis testing, data interpretation and logical conclusions.

**PO6-** Develop problem solving and analytical skills through case studies, research papers and hands-on-experience

**PO7-** To appreciate biochemical mechanistic basis of physiological processes, metabolism under normal and pathological conditions importance and levels of metabolic regulations.

**PO8-** to apply and effectively communicate scientific reasoning and data analysis in both written and oral forms. They will be able to communicate effectively with well-designed posters and slides in talks aimed at scientific audiences as well as the general public.

**PO9-** To bridge the knowledge and skill gap between academic out and industry requirements.

**PO10-** To give students experience in conducting independent, hypothesis-driven, biological research, project planning and management

**PO11-** To provide skills to publish research findings, and awareness of IP rights, and scientific publication ethics and problems of plagiarism.

**PO12-** To prepare competent human resource with better knowledge, hands-on-experience and scientific attitude, at national and global levels for careers in research and development, academia and Pharma-, biotech- and agro-, and food processing industries.

## **B.Sc. BIOCHEMISTRY (Honors)**

- **Graduate Attributes:**

Graduates with strong academic knowledge, discipline-specific and generic skills complemented with social responsibility are greatest asset of the country. The curriculum frame work under NEP for Biochemistry graduates aims to build the following attributes;

- **Disciplinary Knowledge:**

- a) Ability to comprehend fundamental concepts of biology, chemistry and apply basic principles of chemistry to biological systems.
- b) Ability to relate various interrelated physiological and metabolic events.
- c) Ability to critically evaluate a problem and resolve to challenge blindly accepted concepts
- d) Ability to think laterally and in an integrating manner and develop interdisciplinary
- e) Good experimental and quantitative skills and awareness of laboratory safety
- f) A general awareness of current developments at the forefront in biochemistry and allied subjects.
- g) Awareness of resources, and their conservation.

- **Communication Skills:**

- a) Ability to speak and write clearly in English and local language
- b) Ability to listen to and follow scientific viewpoints and engage with them.
- c) Ability to understand and articulate with clarity and critical thinking one's position.

- **Critical Thinking:**

- a) Ability to conceptualize critical readings of scientific texts in order to comprehend.
- b) Ability to place scientific statements and themes in contexts and also evaluate them in terms of generic conventions.

- **Problem Solving:**

Ability to make careful observation of the situation and apply lateral thinking and analytical skills.

- **Analytical Reasoning:**

- a) Ability to evaluate the strengths and weaknesses in scholarly texts spotting flaws in their arguments.
- b) Ability to use scientific evidences and experimental approach to substantiate one's argument in one's reading of scientific texts.

- **Research Skills:**

- a) Ability to formulate hypothesis and research questions, and to identify and consult relevant sources to find answers.
- b) Ability to plan and write a research paper.

- **Teamwork and Time Management:**

- a) Willingness to participate constructively in class room discussions and contribute to group work.
- a) Ability to meet a deadline.

- **Scientific Reasoning:**

- a) Ability to analyze theories and beliefs, evaluate ideas and scientific strategies.
- b) Ability to formulate logical and convincing arguments.

- **Reflective Thinking:**

Ability to locate oneself and see the influence of location—regional, national, global— on critical thinking.

- **Self-Directing Learning:**

- a) Ability to work independently in terms of organizing laboratory, and critically analyzing scientific literature.
- b) Ability to postulate hypothesis, questions and search for answers.

- **Digital Literacy:**

Ability to use digital resources, and apply various platforms to convey and explain concepts of biochemistry.

- **Multicultural Competence:**

Ability to engage with and understand cultures of various nations and respect and transcend differences.

- **Moral and Ethical Values:**

- a) Ability to interrogate one's own ethical values, and to be aware of ethical and environmental issues.
- b) Ability to read values inherited in society and criticism vis-a-vis, the environment, religion, spirituality and structures of power.

**Leadership qualities:**

- Ability to lead group discussions, to formulate questions related to scientific and social issues.

- **Life-long Learning:**

Ability to retain and build on critical thinking skills, and use them to update scientific knowledge and apply them in day to day business.

## Job opportunities in Biochemistry Core Course

Exit After **ONE** Year: **CERTIFICATE COURSE**

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Skill Acquired                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Employability                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Fundamental properties of elements, atoms, acids and bases, metals, non-metals, alloys and composites. Biological significance of elements. Understanding of chemical bonding, Physical properties of molecules, chemistry of toxic chemicals. Colligative properties, Properties of matter and electro chemistry, fundamentals and applications of nuclear and radio chemistry.</p> <p>Classification, structure, reactivity and biological significance of major organic compounds.</p> <p>A general scientific spirit of inquiry</p> | <p>Numerical calculations, data generation and analysis, including the application of data transformations. laboratory, safety and precautions, proficiency in preparation of laboratory reagents, use of glassware, Demonstration of basic oxidation and reduction reactions, primary and secondary standards. Handling basic instruments.</p> <p>Communication interpersonal and leadership skills, and ability enhancements complementing the core Biochemistry, Entrepreneurship</p> | <p>Small and medium size chemistry/ pharma based laboratories; as Jr. laboratory assistant assisting chemists/scientists. QC assistants in Laboratories dealing with QC service. Toiletries, chemicals, perfumery, oil industries, distilleries/textiles/ pollution control units Entrepreneurship</p> |

Exit After **two** Year: **Diploma COURSE**

| Knowledge                                                                                                                                                                                                                                                                                                                                                                            | Skill Acquired                                                                                                                                                                                                                                                                                                      | Employability                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Basic chemistry of natural compounds, alkaloids, terpenes, heterocyclic compounds, drugs, stereochemistry, biological relevance of these compounds, outlines of Photochemistry and environmental chemistry. History of Biochemistry,</p> <p>Comprehensive knowledge and hand-on training in laboratory techniques of biochemistry. Analytical instrumentation and methodology</p> | <p>Acquaintance with analytical techniques that will permit them to study the biological system. Demonstrating skills of fractionating organic compounds. Hands on experience of handling instruments and analysis of data. Improving personality traits, team work, organizing abilities. Communication skills</p> | <p>Assistants in Health care/ paramedical laboratories. Supervision and maintenance of laboratories QC assistants in analytical laboratories dealing with biochemical/clinical/Food processing/pharma industrial settings. Marketing Entrepreneurial opportunities, Material safety data sheet maintenance, curation of chemical/drug stores, chemical storekeeping</p> |

Exit After **three** Years: **B.Sc. degree**

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                              | Skill Acquired                                                                                                                                                                                                                                                                                                                                                                                        | Employability                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comprehensive knowledge of biomolecules: higher order structure s of proteins, nucleic acids and their functions. Bioenergetics, metabolism, enzyme kinetics, basic molecular biology, industrial microbiology, Immunology recombinant DNA technology. Understanding interrelated physiological and metabolic events. Overall knowledge of the avenues for research and higher academic achievements in the field of biochemistry and allied subjects. | Basic skills in clinical laboratory techniques, Immunology and molecular biological experimental skills. Demonstrate the overall ability to independently design experiment and analyse data. Basic statistical handling of data.<br><br>Oral and written skills to convey scientific experimental results. Ability to understand research findings and disseminate to common public. Teaching skills | Scientific assistants in biotech based industries. Chemical /pharma/animal feeds/ scientific data mining, / Forensic science labs. Blood Banks, Public health support staff, Clinical research, Drug discovery R&D, Medical coding, medical transcription, Medical content writing Teaching at secondary school level |

After Four Years: **B.Sc. (Hons.)**

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Skill Acquired                                                                                                                                                                                                                                                                                                                                                       | Employability                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction to advanced concepts in Biochemistry; Molecular Biology, Recombinant DNA technology, Clinical Biochemistry/ Plant Biochemistry, Immunology, Nutrition and Dietetics, Biochemical Pharmacology, Research methodology, Intellectual property rights, Bioinformatics skills, data analysis, Pharmacogenomics, Introduction to Intellectual property rights. A strong theoretical and practical knowledge of clinical and molecular setting, core research exposure. | Skills to isolate, identify and assay the biomolecules. Conducting independent research as part of project work. Hand on training in modern techniques in molecular biology. R-DNA techniques Computation skills, Prism, graph pad, Excel, Scientific writing skills: general articles, research reviews, Debating on scientific inventions and social implications. | Research staff, Clinical Biochemist, Forensic science technician, Biomedical scientist, Nutrition Dept. Pharma industry, Clinical research industries, R&D divisions of Pharma industries, Vaccine industry. Medical coding, Bioinformatics, Medical content writing, Patent examiner, Toxicological asst. Medical Science Liaison officer, Environmental science |

## CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE PROGRAM

*(Inputs to this document: Program Outcomes of a program, List of core courses of the same program)*

**A) Name of the Degree: B.Sc.**

**B) Specialization: Biochemistry**

**B) Program Articulation Matrix:**

This matrix lists only the core courses. Core courses list the courses that are essential for every student to earn his degree.

It includes all types of courses (Theory, Lab, Tutorial, Project, Internships ... that every student of the course). Electives are not part of this list.

| Semester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Name of the Core course | What all program outcomes of the course addresses (not exceeding three per course) | Pre-requisite course(s) | Concurrent course#     | Pedagogy##                                                                         | Assessment\$                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------|-------------------------|------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A1                  | PO1 AND PO2                                                                        | CHEMISTRY/BIOLOGY       | CORE COURSE PRACTICALS | MOOC, Desk work, Problem solving, Book Chapter Seminar, Project based              | Class work Seminar Assignment Class Tests Open discussion                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B1                  |                                                                                    |                         |                        |                                                                                    |                                                                                        |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A2                  | PO2 AND PO3                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B2                  |                                                                                    |                         |                        |                                                                                    |                                                                                        |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A3                  | PO3 AND PO4                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B3                  |                                                                                    |                         |                        |                                                                                    |                                                                                        |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A4                  | PO5 AND PO6                                                                        | BIOA1 , BIOA2           |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B4                  |                                                                                    |                         |                        |                                                                                    |                                                                                        |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A5                  | PO6 AND PO7                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A6                  | PO4 AND PO5                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B5                  |                                                                                    |                         | CORE COURSE PRACTICALS | learning, Term paper Assignment, Group Discussion Research Project Instrumentation | Articles writing, Interpretation of results Articles writing, Project proposal writing |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A7                  | PO8 AND PO9                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A8                  | PO4 AND PO8,PO9                                                                    |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO B6                  |                                                                                    |                         |                        |                                                                                    |                                                                                        |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A9                  | PO7 AND PO8                                                                        |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A10                 | PO10 AND PO9                                                                       |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A11                 | PO9 AND PO10                                                                       |                         |                        |                                                                                    |                                                                                        |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BIO A12                 | PO9 AND PO10                                                                       |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A13                 | PO10,PO11 AND PO12                                                                 |                         |                        |                                                                                    |                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | BIO A14                 | PO11 AND PO12                                                                      |                         |                        |                                                                                    |                                                                                        |
| <p>#Concurrent course is a core (lab / tutorial / project) course that a student has to take along with this course in the same semester for effective learning. Course design of concurrent courses is preferred to be done by the same team.</p> <p>##Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. This list includes active learning / course projects / Problem Based or Project Based Learning / Case studies /Self-study like seminar, term paper or MOOC)</p> <p>\$Every course needs to include assessment for higher order thinking skills (Applying / Analysing / Evaluating / Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e.assessment for learning)</p> |                         |                                                                                    |                         |                        |                                                                                    |                                                                                        |

**II A model programme structure for the under-graduate programs in universities and colleges [subjects with practicals]  
[with major Biochemistry and one minor]**

| Sem                                                                                                                                                 | Discipline Core (DSC) (Credits) (L+T+P)                | Discipline Elective(DSE) / Open Elective (OE) (Credits) (L+T+P) | Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P) |                           | Skill Enhancement Courses (SEC)           |                                          |                                        | Total Credits |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------|-------------------------------------------|------------------------------------------|----------------------------------------|---------------|
|                                                                                                                                                     |                                                        |                                                                 |                                                                            |                           | Skill based (Credits) (L+T+P)             | Value based (Credits) (L+T+P)            |                                        |               |
| I                                                                                                                                                   | Biochem A1(4+2)<br>Minor B1(4+2)                       | OE-1 (3)                                                        | L1-1(3), L2-1(3)<br>(4 hrs. each)                                          |                           | SEC-1: Digital Fluency (2)<br>(1+0+2)     | Physical Education for fitness(1)(0+0+2) | Health &Wellness (1)<br>(0+0+2)        | 25            |
| II                                                                                                                                                  | Biochem A2(4+2)<br>Minor B2(4+2)                       | OE-2 (3)                                                        | L1-2(3), L2-2(3) (4 hrs. each)                                             | Environmental Studies (2) |                                           | Physical Education - Yoga(1) (0+0+2)     | NCC/NSS/R&R(S&G)/ Cultural (1)(0+0+2)  | 25            |
| Exit option with Certificate (50 credits)                                                                                                           |                                                        |                                                                 |                                                                            |                           |                                           |                                          |                                        |               |
| III                                                                                                                                                 | Biochem A3(4+2)<br>Minor B3(4+2)                       | OE-3 (3)                                                        | L1-3(3), L2-3(3) (4 hrs. each)                                             |                           | SEC-2: Artificial Intelligence (2)(1+0+2) | Physical Education- Sports (1) (0+0+2)   | NCC/NSS/R&R(S&G)/ Cultural (1)(0+0+2)  | 25            |
| IV                                                                                                                                                  | Biochem A4(4+2)<br>Minor B4(4+2)                       | OE-4 (3)                                                        | L1-4(3), L2-4(3) (4 hrs. each)                                             | Constitution of India (2) |                                           | Physical Education - Games (1) (0+0+2)   | NCC/NSS/R&R(S&G)/\ Cultural (1)(0+0+2) | 25            |
| Exit option with Diploma in Science (100 credits) OR Choose any one of the core subjects as Major and the other as Minor                            |                                                        |                                                                 |                                                                            |                           |                                           |                                          |                                        |               |
| V                                                                                                                                                   | Biochem A5(3+2)<br>Biochem A6(3+2)<br>Minor B5(3+2)    | Vocational-1 (3)                                                |                                                                            |                           | SEC-3: SEC Cyber Security (2)<br>(1+0+2)  |                                          |                                        | 20            |
| VI                                                                                                                                                  | Biochem A7(3+2)<br>Biochem A8(3+2)<br>Minor B6(3+2)    | Vocational-2 (3)<br>Internship (2)                              |                                                                            |                           | SEC-4: Professional Communication (2)     |                                          |                                        | 22            |
| Exit option with Bachelor of Science Degree, B. Sc. Degree in Biological science (142 credits) or continue studies with the Major in the third year |                                                        |                                                                 |                                                                            |                           |                                           |                                          |                                        |               |
| VII                                                                                                                                                 | Biochem e 9(3+2)<br>BiochemA10(3+2)<br>Biochem e 11(3) | Biochem E-1 3)<br>Biochem E-2 3)<br>Res. Methodology(3)         |                                                                            |                           |                                           |                                          |                                        | 22            |
| VIII                                                                                                                                                | Biochem e12(3+2)<br>Biochem A13(3)<br>Biochem A14(3)   | Biochem E-33)<br>Research Project (6)*                          |                                                                            |                           |                                           |                                          |                                        | 20            |
| Award of Bachelor of Science Honours Degree, B.Sc.(Hons.) Degree in Biochemistry (184 credits)                                                      |                                                        |                                                                 |                                                                            |                           |                                           |                                          |                                        |               |

\*In lieu of the research Project, two additional elective papers/ Internship may be offer



Programme structure for the under-graduate programs in universities and colleges [subjects with practicals] [with major Biochemistry]

| Sem.                                                       | Discipline Core (DSC) (L+T+P)                                                                                                              | Discipline Elective(DSE) / Open Elective (OE)     | Ability Enhancement Compulsory Courses (AECC), Languages (L+T+P) |                           | Skill Enhancement Courses (SEC)              |                                          |                                        | Total Credits |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------|---------------------------|----------------------------------------------|------------------------------------------|----------------------------------------|---------------|
|                                                            |                                                                                                                                            |                                                   |                                                                  |                           | Skill based (L+T+P)                          | Value based (L+T+P)                      |                                        |               |
| I                                                          | BIOCHEM A1 ( 4 + 2 )<br>CHEMICAL FOUNDATION OF BIOCHEMISTRY -1<br>DISCIPLINE B1 CHEMICAL FOUNDATION OF BIOCHEMISTRY -1<br>PRACTICALS – 1   | OE – 1 (3)<br>BIOCHEMISTRY IN HEALTH AND DISEASES | L1-1 (3),<br>L2-1 (3)                                            |                           | SEC-1:<br>Digital Fluency (2)                | Physical Education for fitness(1)(0+0+2) | Health & Wellness (1) (0+0+2)          | 25            |
| II                                                         | DISCIPLINE A2( 4 + 2 )<br>CHEMICAL FOUNDATION OF BIOCHEMISTRY -2<br>DISCIPLINE B2 CHEMICAL FOUNDATION OF BIOCHEMISTRY -2<br>PRACTICALS – 2 | OE – 2 (3 )<br>NUTRITION AND DIETETICS            | L1-2(3), L2-2 (3)<br>(3+1+0 each)                                | Environmental Studies (2) |                                              | Physical Education – Yoga (1) (0+0+2)    | NCC/NSS/R&R(S&G) / Cultural (1)(0+0+2) | 25            |
| Exit option with Certificate (50 credits)                  |                                                                                                                                            |                                                   |                                                                  |                           |                                              |                                          |                                        |               |
| III                                                        | DISCIPLINE A3( 4 + 2 )<br>BIOORGANIC CHEMISTRY<br>DISCIPLINE B3 BIOORGANIC CHEMISTRY<br><br>PRACTICALS – 3                                 | OE – 3 (3) BIOCHEMICAL TECHNIQUES                 | L1-3 (3),<br>L2-3(3)<br>(3+1+0 each)                             |                           | SEC-2:<br>Artificial Intelligence (2)(1+0+2) | Physical Education- Sports (1) (0+0+2)   | NCC/NSS/R&R(S&G) /Cultural (1)(0+0+2)  | 25            |
| IV                                                         | DISCIPLINE A4( 4 + 2 )<br>ANALYTICAL BIOCHEMISTRY<br>DISCIPLINE B4 ANALYTICAL BIOCHEMISTRY                                                 | OE – 4 (3) BIOCHEMICAL TOXICOLOGY                 | L1-4 (3),<br>L2-4(3) (3+1+0 each)                                | Constitution of India (2) |                                              | Physical Education - Games (1) (0+0+2)   | NCC/NSS/R&R(S&G) /Cultural (1)(0+0+2)  | 25            |
| Exit option with Diploma (100 credits)                     |                                                                                                                                            |                                                   |                                                                  |                           |                                              |                                          |                                        |               |
| Choose any one Discipline as Major, the other as the Minor |                                                                                                                                            |                                                   |                                                                  |                           |                                              |                                          |                                        |               |
| V                                                          | DISCIPLINE A6 ( 3 + 2 )<br>HUMAN PHYSIOLOGY AND CELL BIOLOGY<br>DISCIPLINE B5 ( 3 + 2 )<br>BIOCHEMISTRY OF                                 | Vocational I (3)<br>BASIC MOLECULAR BIOLOGY       |                                                                  |                           | SEC-3:<br>Cyber Security (2) (1+0+2)         | Ethics & Self Awareness (2) (1+0+2)      |                                        | 20            |

|                                                                                                  |                                                                                                                                                                                   |                                                                                |  |  |                                                         |  |  |    |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--|--|---------------------------------------------------------|--|--|----|
|                                                                                                  | MACROMOLECULES<br>PRACTICALS – 5 & 6                                                                                                                                              |                                                                                |  |  |                                                         |  |  |    |
| VI                                                                                               | DISCIPLINE A7 ( 3 + 2 )<br>ENZYMOLGY<br>DISCIPLINE A8 ( 3 + 2 )<br>INTERMEDIARY<br>METABOLISM<br>DISCIPLINE B6 ( 3 + 2 )<br>BIOENERGETICS AND<br>METABOLISM<br>PRACTICALS – 7 & 8 | Vocational-2 (3)<br>Internship (2)                                             |  |  | SEC-4:<br>Professional/<br>Societal<br>Communication(2) |  |  | 22 |
| Exit option with Bachelor of Arts, B.A. / Bachelor of Science, B. Sc. Basic Degree (142 credits) |                                                                                                                                                                                   |                                                                                |  |  |                                                         |  |  |    |
| VII                                                                                              | DISCIPLINE A9 (3 + 2 )<br>MOLECULAR BIOLOGY<br>DISCIPLINE A10 ( 3 + 2 )<br>BIOCHEMISTRY OF<br>HORMONES<br>PRACTICALS – 9 & 10<br>DISCIPLINE A11 ( 4 )<br>MEMBRANE<br>BIOCHEMISTRY | DSE A3<br>(3) BASIC<br>IMMUNOLOGY<br><br>RESEARCH<br>METHODOLOGY<br>(3 )       |  |  |                                                         |  |  |    |
| VIII                                                                                             | DISCIPLINE A12 ( 4 )<br>MOLECULAR<br>IMMUNOLOGY<br>DISCIPLINE A13 ( 4 )<br>GENETIC ENGINEERING<br>DISCIPLINE A14 ( 3 )<br>PLANT BIOCHEMISTRY                                      | DSE A4 (3)<br>BIOSTATISTICS<br>AND<br>BIOINFORMATICS<br>RESEARCH<br>PROJECT(6) |  |  |                                                         |  |  |    |
| Award of Bachelor of Science/ B.Sc. BIOCHEMISTRY (Hons) degree in a discipline (176 credits)     |                                                                                                                                                                                   |                                                                                |  |  |                                                         |  |  |    |

\*In lieu of the research Project, two additional elective papers/ Internship may be offer

### Scheme for Theory and Practicals

#### Biochemistry as Major

| Sem  | Code  | Title of the paper | Lecture/<br>practical<br>per<br>week | Duration<br>of exam | IA<br>marks | Max<br>Marks | Total | Credits |
|------|-------|--------------------|--------------------------------------|---------------------|-------------|--------------|-------|---------|
| I    | BC101 | Biochemistry-I     | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|      | BC102 | Practical-I        | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| II   | BC201 | Biochemistry -II   | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|      | BC202 | Practical -II      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| III  | BC301 | Biochemistry -III  | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|      | BC302 | Practical -III     | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| IV   | BC401 | Biochemistry -IV   | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|      | BC402 | Practical -IV      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| V    | BC501 | Biochemistry -V    | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC502 | Biochemistry -VI   | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC503 | Practical -V       | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC504 | Practical -VI      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC505 | VOC-1              | 03                                   | 03                  | 40          | 60           | 100   | 3       |
| VI   | BC601 | Biochemistry -VII  | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC602 | Biochemistry -VIII | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC603 | Practical -VII     | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC604 | Practical -VIII    | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC605 | VOC-2              | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC606 | Internship         | 02                                   | -                   | 20          | 30           | 50    | 2       |
| VII  | BC701 | Biochemistry -IX   | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC702 | Biochemistry -X    | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC703 | Practical -IX      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC704 | Practical -X       | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC705 | Biochemistry -XI   | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC706 | Biochemistry -E1   | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC707 | Biochemistry E2    | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC708 | Res Methodology    | 03                                   | 03                  | 40          | 60           | 100   | 3       |
| VIII | BC801 | Biochemistry -XII  | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC802 | Practical -XI      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
|      | BC803 | Biochemistry -XIII | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC804 | Biochemistry -XIV  | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC805 | Biochem-E3         | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|      | BC806 | Research Project   | 06                                   |                     |             |              |       | 6       |

### Scheme for Theory and Practicals

#### Biochemistry as Minor

| Sem | Code  | Title of the paper | Lecture/<br>practical<br>per<br>week | Duration<br>of exam | IA<br>marks | Max<br>Marks | Total | Credits |
|-----|-------|--------------------|--------------------------------------|---------------------|-------------|--------------|-------|---------|
| I   | BC101 | Biochemistry -I    | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|     | BC102 | Practical-I        | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| II  | BC201 | Biochemistry -II   | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|     | BC202 | Practical -II      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| III | BC301 | Biochemistry -III  | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|     | BC302 | Practical -III     | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| IV  | BC401 | Biochemistry -IV   | 04                                   | 03                  | 40          | 60           | 100   | 4       |
|     | BC402 | Practical -IV      | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| V   | BC501 | Biochemistry -V    | 03                                   | 03                  | 40          | 60           | 100   | 3       |
|     | BC503 | Practical -V       | 04                                   | 03                  | 20          | 30           | 50    | 2       |
| VI  | BC601 | Biochemistry -VII  | 04                                   | 03                  | 40          | 60           | 100   | 3       |
|     | BC602 | Practical -VII     | 04                                   | 03                  | 20          | 30           | 50    | 2       |

## SEMESTER -1

|                                                              |                                        |
|--------------------------------------------------------------|----------------------------------------|
| <b>COURSE TITLE : CHEMICAL FOUNDATION OF BIOCHEMISTRY -1</b> | <b>COURSE CREDITS: 4</b>               |
| <b>TOTAL CONTACT HOURS: 56</b>                               | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 40</b>                       | <b>SUMMATIVE ASSESSMENT MARKS : 60</b> |

### Course Outcome:

This will inculcate confidence and clarity of mind in students to understand the chemistry of Biomolecules and Biological reactions.

### UNIT -1: Scope of Biochemistry and units of measurement

Origin of life, types of organisms, prokaryotes, eukaryotes, unicellular, multicellular, compartmentation of functions in lower and higher organisms, and common physiological events of organisms, chemical composition of living organisms, subcellular organelles, SI units, mass, volume, temperature, amount, length and time. An overview on the metric system, atomic weight, molecular weight, equivalent weight, basicity of acids, acidity of bases, Avogadro's number, molarity, normality, molality, Dalton concept, mole concept, concentration, mole to molar conversion, oxidation number and its significance, density and specific gravity their significances. 14hrs

### UNIT -2: Atomic structure and chemical bonds

Structure of an atom, electrons and Quantum numbers, orbitals, shapes of orbitals, s, p, d, and f subshells, K, L, M, N, O, P, and Q shells. Illustration of Pauli's exclusion principle, Aufbau principle, and Hund's rule, electron configuration, octet rule. Formation and properties of non- covalent and covalent bonds, hydrogen bonds, ionic bonds, Van der Waals interactions, London forces, dipole-dipole interactions, electrostatic interactions and hydrophobic interactions. Sigma, pi and co-ordinate bonds, back bonding. Corresponding energy associated, outline of theories of bonding. 14 hrs

### UNIT-3: Buffers and colligative properties

Acids, bases, Arrhenius concept, proton transfer theory, Lewis concept, Lowry and Bronsted concepts. Buffers, composition, pH, pH scale, Henderson-Hasselbalch equation, titration curve of  $\text{H}_3\text{PO}_4$ , pK value, isoelectric pH, ionization of  $\text{HCl}$ ,  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ . Colligative properties and anomalous colligative properties of solutions, structure of water, phase diagram of pure water, ionic product of water, special properties of water, buffers in animal system. Solutions and types, ionizable solutes, non- ionizable solutes, vapor pressure and its application in distillation, Vant Hoff law, Roults law, boiling point, freezing point, de-icing, osmosis and osmotic pressure determination, reverse osmosis, surface tension. 14 hrs

### UNIT-4: Electrochemistry and redox reactions

Scope of electrochemistry, electrochemical cells, Daniel cell, galvanic cell, electrode potential and its measurement, electrolysis, types of electrolytes, primary and secondary batteries, electrodes, half cell reaction, standard electrodes. Laws of thermodynamics, entropy and enthalpy, their relation, Gibbs' energy, free energy change, Lewis concept, ions, redox reactions, redox potential, application of redox potential, energy linked to redox reactions, reduction of oxygen, oxidation and reduction of iron in hemoglobin, biological active forms of zinc, calcium, nickel, molybdenum, selenium and cobalt,  $\text{NAD}^+/\text{NADH}$ ,  $\text{NADP}^+/\text{NADPH}$ ,  $\text{FAD}/\text{FADH}_2$ ,  $\text{FMN}/\text{FMNH}_2$ . Molecularity and order of areaction. 14 hrs

## REFERENCES :

1. Advanced Inorganic Chemistry: A comprehensive Text, 1999, Cotton A and Geoffrey Wilkinson, 6<sup>th</sup> edition , Wiley publication
2. Inorganic Chemistry, 2014, Miessler GL , Paul Fischer PJ, and Tarr DA, 5<sup>th</sup> edition, Pearson Publication
3. Inorganic Chemistry, 2004, Catherine E and Sharpe AG, ACS publication
4. Inorganic Chemistry , 2015, Overton, Rourke , Weller , Armstrong and Hagerman, Oxford Press
5. Physical Chemistry: A molecular approach , 2019, Donald A, McQuarrie and Simon JD, Viva Books Publication
6. Physical chemistry 2019, Atkins P, Paula JD, Keeler J , 11<sup>th</sup> edition , Oxford press

## PEDAGOGY : MOOK/DESK WORK/BOOK CHAPTER/PROBLEM SOLVING/ASSIGNMENT

| Formative Assessment         |                    |
|------------------------------|--------------------|
| ASSESSMENT OCCASION          | WEIGHTAGE IN MARKS |
| CLASS TEST ( 2 CLASS TESTS ) | 20                 |
| SEMINARS / CLASS WORK        | 10                 |
| ASSIGNMENT/ OPEN DISCUSSION  | 10                 |
| TOTAL                        | 40                 |

## SEMESTER-1

### PRACTICALS - 1

|                                                         |                                        |
|---------------------------------------------------------|----------------------------------------|
| <b>COURSE TITLE: VOLUMETRIC ANALYSIS – PRACTICALS-1</b> | <b>COURSE CREDITS: 2</b>               |
| <b>TOTAL CONTACT HOURS: 4 Hours/ Week</b>               | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 20</b>                  | <b>SUMMATIVE ASSESSMENT MARKS : 30</b> |

### Course Outcome:

This course aims to familiarize students with the principles of analytical chemistry and basic analytical techniques such as volumetric analysis. Course objective is to provide experimental practice of quantitative volumetric analysis. Upon successful completion students should be able to make solutions of various molar, normal concentrations and determine the amount of a substance in a given sample.

### Experiments:

1. Concept of molarity, molality and normality. Calculation and preparation of molar solutions. (Problems to be given in exams). Calculation and preparation of normal solutions and percent solutions and dilute solutions.
2. Calibration of volumetric glassware's (Burette, pipette).
3. Preparation of standard sodium carbonate solution, standardization of HCl (Methyl orange) and estimation of NaOH in the given solution. (Methyl orange or phenolphthalein).
4. Preparation of standard Oxalic acid. Standardization of NaOH and estimation of H<sub>2</sub>SO<sub>4</sub> in the given solution (phenolphthalein).
5. Preparation of standard Oxalic acid. Standardization of KMnO<sub>4</sub> and estimation of H<sub>2</sub>O<sub>2</sub> in the given solution.

6. Preparation of standard  $K_2Cr_2O_7$ . Standardization of  $Na_2S_2O_3$  and estimation of  $CuSO_4$  in the given solution.
7. Preparation of  $ZnSO_4$ . Standardization of EDTA and estimation of total hardness of water using Eriochrome black-T indicator.
8. Preparation of standard potassium biphthalate. Standardization of NaOH and estimation of HCl in the given solution. (Phenolphthalein).
9. Estimation of sulphuric acid and oxalic acid in a mixture using standard sodium hydroxide solution and standard potassium permanganate solution.
10. Preparation of standard Potassium dichromate and estimation of ferrous/ferric mixture using diphenylamine indicator (Demonstration).
11. Preparation of standard oxalic acid solution. Standardization of NaOH solution and estimation of acidity in vinegar.
12. Preparation of standard potassium biphthalate solution, standardization of sodium hydroxide solution and estimation of alkalinity of antacids.
13. Preparation of standard Oxalic acid solution. Standardization of  $KMnO_4$  solution and estimation of calcium in milk.

#### REFERENCES:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.
3. Dr. O. P. Pandey, D. N. Bajpai, dr. S. Giri, Practical Chemistry S. Chand and Co. Ltd.,
4. Principles of Practical Chemistry- M. Viswanathan
5. Instrumental Methods of chemical Analysis B.K Sharma.
6. Experiments in Physical Chemistry R.C. Das and B. Behra, Tata Mc Graw Hill
7. Advanced Practical Physical Chemistry J.B. Yadav, Goel Publishing House
8. Advanced Experimental Chemistry. Vol-I J.N. Gurtu and R Kapoor, S. Chand and Co.
9. Practical Chemistry K.K. Sharma, D. S. Sharma (Vikas Publication).
10. General Chemistry experiment – Anil J Elias (University press).
11. Vogel textbook of quantitative chemical analysis G.H. Jeffery, J. Basset.
12. Quantitative chemical analysis S. Sahay (S. Chand & Co.).
13. Practical Chemistry Dr O P Pandey, D N Bajpai, Dr S Giri. S. Chand Publication
14. College Practical Chemistry. V K Ahluwalia, Sunitha Dingra, Adarsh Gulati
15. Practical Physical Chemistry- B. Viswanathan, P S Raghavan. MV Learning Publication

PADAGOGY : PADAGOGY : MOOK/DESK WORK/BOOK CHAPTER/PROBLEM SOLVING /ASSIGNMENT

| Formative Assessment                 |                    |
|--------------------------------------|--------------------|
| ASSESSMENT OCCASION                  | WEIGHTAGE IN MARKS |
| CONTINUOUS EVALUATION AND CLASS TEST | 10                 |
| RECORD                               | 10                 |
| TOTAL                                | 20                 |

| Summative Assessment       |                    |
|----------------------------|--------------------|
| ASSESSMENT OCCASION        | WEIGHTAGE IN MARKS |
| PERFORMANCE OF EXPERIMENTS | 20                 |
| VIVA-VOCE                  | 10                 |
| TOTAL                      | 30                 |

## SEMESTER - II

|                                                              |                                        |
|--------------------------------------------------------------|----------------------------------------|
| <b>COURSE TITLE : CHEMICAL FOUNDATION OF BIOCHEMISTRY -2</b> | <b>COURSE CREDITS: 4</b>               |
| <b>TOTAL CONTACT HOURS: 56</b>                               | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 40</b>                       | <b>SUMMATIVE ASSESSMENT MARKS : 60</b> |

Course Outcome: These topics will enable students to understand the fundamentals of chemical processes in biological systems

**UNIT-1. Chemical Kinetics and Colloids:** Introduction, Rate of reactions, rate law or Rate equation, Molecularity and order of a reaction with examples, velocity constant or rate constant and half-life period expressions for zero, first and second order reactions with derivations ( $a=b$  and  $a \neq b$ ), Numerical problems. Effect of temperature, Pressure and catalyst on rate of reaction, Arrhenius equation and Arrhenius interpretation of energy of activation, Transition state theory with brief explanation. Colloids: True solutions, classification, Brownian movements, electric properties, coagulation, mutual lyophilic sols, peptisation, purification, ultrafiltration, dialysis, electro and persistent dialysis, addition of electrolytes, colloids in daily life and applications. Emulsion, types, micelles with biomolecules and its Biological applications. 14 hrs

**UNIT-2: Nomenclature of Organic Compounds:** Classification, naming, IUPAC nomenclature, compounds containing one, two functional groups with chains, homologous series. Stereochemistry, geometrical and structural Isomerism, conformation and free rotation. Optical isomerism, symmetry of elements, plane polarized light and optical purity. Nomenclature of enantiomers, epimers, racemic mixture, resolution. Fischer and Newmann projection formulae, molecule with one and two chiral and achiral centers. Priority rules; E and Z (CIP rules), R and S, D and L notations, absolute (r and s) and relative (d and l) configuration. Role of stereochemistry in biological systems. 14 hrs

**UNIT-3: Organometallic Compounds:** Metal atom linked organic compounds. Preparation of Grignard reagents and structure, limitations, protonolysis and reactions. Organolithium compounds, preparation and reactions. Organozinc compounds. Organoboranes its mechanisms. Ferrocenes. Introduction to mineral and ores, classification, concentration, extraction, refining, uses of minerals and metals and its importance.

Porphyryns and Metalions: Role of metal ions in biological systems, Fe, Cu, Zn, structure and functions of porphyryns, metalloporphyryns and iron-sulphur clusters with suitable examples and their role in biological systems. 14 hrs

**UNIT-4: Inorganic Chemistry:** Nomenclature of inorganic molecules and coordination compounds, formula. IUPAC nomenclature. Central metal ion, ligand, coordination number, sphere, complex ion, oxidation number of central atom, homoleptic and heteroleptic complexes. Isomerism in complexes, structural, ionisation, solvate, linkage and coordination Stereoisomerism, geometrical, optical isomerism with simple inorganic complexes. Applications of qualitative, quantitative analysis, photographic, metallurgy, medicine, catalysis and biosystems.

Heavy Metal Poisons: Introduction, poisons, lead, mercury, aluminium, arsenic, corrosives, cyanide, irritants, phosphorus,  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{SO}_3$ ,  $\text{NO}_2$ , halides and acid fumes, poisoning, sources, signs and symptoms. Free radicals: introduction, definition, generation and scavenger systems. Redox reactions, types, stock notations, change in oxidation number and combination. Endergonic and exergonic reactions with examples. The Importance in biological systems. 14 hrs



## REFERENCES

1. Physical Chemistry 2006, Peter Atkins. 8<sup>th</sup> edition, W.H. Freeman and Company
2. Inorganic Chemistry: Principles of structure and Reactivity, 2006, Huheey JE, Keiter EA, Keiter RL, Pearson Education India
3. Stereochemistry: Conformation and Mechanism, 2009, Kalsi PS, New Age International Publications
4. Introduction to Stereochemistry 2012, Kurt Mislow, Dover Publications
5. A text book of Organic Chemistry 2016, Raj K Bansal, 6<sup>th</sup> edition, New Age International Publications
6. Advanced Inorganic Chemistry 1999, Cotton et al, 6<sup>th</sup> edition, A Wiley - International

## TEXT BOOKS

1. Principles of physical Chemistry by Puri, Sharma and Pathania.
2. Physical Chemistry by R. L. Madan, G. D. Tuli. S. Chand and Co.
3. A Text Book of Physical Chemistry by K. L. Kapoor. Vol. 2. Mc. Millan Publisher, India Ltd.
4. Advanced Organic Chemistry by Bahl and Bahl.

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PEDAGOGY: MOOK/DESK WORK/BOOK CHAPTER/PROBLEM SOLVING/ASSIGNMENT

| Formative Assessment         |                    |
|------------------------------|--------------------|
| ASSESSMENT OCCASION          | WEIGHTAGE IN MARKS |
| CLASS TEST ( 2 CLASS TESTS ) | 20                 |
| SEMINARS / CLASS WORK        | 10                 |
| ASSIGNMENT/ OPEN DISCUSSION  | 10                 |
| TOTAL                        | 40                 |

SEMESTER - II

PRACTICALS - 2

|                                                                             |                                        |
|-----------------------------------------------------------------------------|----------------------------------------|
| <b>COURSE TITLE: QUALITATIVE AND QUANTITATIVE ANALYSIS – PRACTICALS – 2</b> | <b>COURSE CREDITS: 2</b>               |
| <b>TOTAL CONTACT HOURS: 4 Hours/ Week</b>                                   | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 20</b>                                      | <b>SUMMATIVE ASSESSMENT MARKS : 30</b> |

**Course Outcome:** The Course Objective is to provide experimental practice of quantitative and qualitative analysis. Also it provides training in physical chemistry laboratory techniques. Upon successful completion, students should develop skills in handling instruments and understand its application in research work.

## Experiments:

1. Semi micro Qualitative Analysis of Inorganic salt Mixtures  
Systematic semi micro qualitative analysis of two acid and two basic radicals in the given inorganic salt mixture. The constituent ions in the mixture to be restricted to the following. (Any four binary mixtures shall be given)

**Anions:**  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{NO}_3^-$ ,  $\text{BO}_4^{3-}$ ,  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$ .

**Cations:**  $\text{Pb}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Na}^+$  and  $\text{NH}_4^+$ .

- Determination of density and viscosity of the given liquid using specific gravity bottle and Ostwald's viscometer.
- Determination of density and surface tension of the given liquid using specific gravity bottle and stalagmometer.
- Determination of molecular weight of non-volatile solute by Walker-Lumsden method.
- Determination of rate constant of decomposition of  $\text{H}_2\text{O}_2$  using  $\text{KMnO}_4$  by volumetric analysis method using ferric chloride as catalyst.
- Determination of distribution coefficient of benzoic acid between water and benzene or iodine between water and carbon tetrachloride.
- Separation of Two Components from given Binary Mixture of Organic Compounds Qualitatively. (Types of binary mixtures- Solid – Solid, Solid – Liquid, Liquid – Liquid)
- Verification of Beer's Law. Estimation of unknown concentration of a biomolecule by using colorimeter
- Calibration of pH meter and determination of pH of aerated soft drinks.

#### REFERENCES:

- Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
- Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.
- Dr. O. P. Pandey, D. N. Bajpai, dr. S. Giri, Practical Chemistry S. Chand and Co. Ltd.,
- Principles of Practical Chemistry- M. Viswanathan
- Instrumental Methods of chemical Analysis B.K Sharma.
- Experiments in Physical Chemistry R.C. Das and B. Behra, Tata Mc Graw Hill
- Advanced Practical Physical Chemistry J.B. Yadav, Goel Publishing House
- Advanced Experimental Chemistry. Vol-I J.N. Gurtu and R Kapoor, S.Chand and Co.
- Practical Chemistry K.K. Sharma, D. S. Sharma (Vikas Publication).
- General Chemistry experiment – Anil J Elias (University press)
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- Quantitative chemical analysis S. Sahay (S. Chand & Co.)
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- College Practical Chemistry. V K Ahluwalia, Sunitha Dingra, Adarsh Gulati
- Practical Physical Chemistry- B. Viswanathan, P S Raghavan. MV Learning Publication

PEDAGOGY: PEDAGOGY:MOOK/DESKWORK/BOOKCHAPTER/PROBLEMSOLVING /ASSIGNMENT

| Formative Assessment                 |                    |
|--------------------------------------|--------------------|
| ASSESSMENT OCCASION                  | WEIGHTAGE IN MARKS |
| CONTINUOUS EVALUATION AND CLASS TEST | 10                 |
| RECORD                               | 10                 |
| TOTAL                                | 20                 |

| Summative Assessment       |                    |
|----------------------------|--------------------|
| ASSESSMENT OCCASION        | WEIGHTAGE IN MARKS |
| PERFORMANCE OF EXPERIMENTS | 20                 |
| VIVA - VOCE                | 10                 |
| TOTAL                      | 30                 |

**SEMESTER - I**  
**OPEN ELECTIVE - 1**

|                                                          |                                        |
|----------------------------------------------------------|----------------------------------------|
| <b>COURSE TITLE : BIOCHEMISTRY IN HEALTH AND DISEASE</b> | <b>COURSE CREDITS: 3</b>               |
| <b>TOTAL CONTACT HOURS: 42</b>                           | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 40</b>                   | <b>SUMMATIVE ASSESSMENT MARKS : 60</b> |

Course Outcome: This open elective course offering to students of various streams gives knowledge about health and various terminologies used in health and disease conditions; Difference between communicable & non-communicable diseases; Health promotion & treatments for various diseases & disorders.

**UNIT -1: Introduction**

WHO definition of health, Health and hygiene, General health care, Factors affecting health, Indices and evaluation of health, Disease patterns in developed and developing world; Classification of diseases - Endemic, Epidemic, Pandemic; Professional health hazards.

Disease conditions: Acute disease, Chronic disease, Incurable disease, Terminal disease, Illness, disorders, Syndrome, Pre-disease.

Treatment: Psychotherapy, Medications, Surgery, Medical devices, and Self-care. Dimensions of Health: Physical, Mental, Spiritual, Emotional, Environmental, And Philosophical. 14 hrs

**UNIT -2: Communicable diseases**

Tuberculosis, Cholera, Typhoid, Conjunctivitis.

Sexually transmitted diseases (*STD*): Information, statistics, and treatment guidelines for *STD*, Prevention: Syphilis, Gonorrhea, AIDS, etc.,

Non-communicable diseases: Malnutrition- Under nutrition, Over nutrition, Nutritional deficiencies; Anemia, Stroke, Rheumatic heart disease, Coronary heart disease, Cancer, blindness, accidents, mental illness, Iodine deficiency, Fluorosis, Epilepsy, Asthma.

Genetic disorders: Down's syndrome, Klinefelter's syndrome, Turner's syndrome, Thalassemia, Sickle cell anemia.

Lifestyle disorders: Obesity, Liver cirrhosis, Diabetes mellitus, Hypertension (Causative agents, symptoms, diagnosis, treatment, prognosis, prevention). 14 hrs

**UNIT -3: Health promotion**

: Preventing drug abuse, Oral health promotion by tobacco control.

Mental hygiene and mental health: Concepts of mental hygiene and mental health, Characteristics of mentally healthy person, Warning signs of poor mental health, Promotive mental health, strategies and services, Ego defense mechanisms and implications, Personal and social adjustments, Guidance and Counseling.

Infection control: Nature of infection, Chain of infection transmission, Defenses against infection transmission. 14 hrs

**REFERENCES**

1. Modern Nutrition in Health and Disease 2006 10<sup>th</sup> Edition by Maurice E. Shils, Moshe Shike, A Catharine Ross.
2. Clinical Biochemistry and Metabolic Medicine , 2012 Eighth Edition by Martin Andrew Crook, CRC Press,
3. Nutrition & Health in Developing Countries, 2000, Editors: R. Semba and M.W. Bloem, Humana Press

PEDAGOGY: MOOK/DESK WORK/BOOK CHAPTER/PROBLEM SOLVING  
/ASSIGNMENT

| <b>Formative Assessment</b>  |                           |
|------------------------------|---------------------------|
| <b>ASSESSMENT OCCASION</b>   | <b>WEIGHTAGE IN MARKS</b> |
| CLASS TEST ( 2 CLASS TESTS ) | 20                        |
| SEMINARS / CLASS WORK        | 10                        |
| ASSIGNMENT/ OPEN DISCUSSION  | 10                        |
| <b>TOTAL</b>                 | <b>40</b>                 |

**SEMESTER - II**  
**OPEN ELECTIVE- 2**

|                                               |                                        |
|-----------------------------------------------|----------------------------------------|
| <b>COURSE TITLE : NUTRITION AND DIETETICS</b> | <b>COURSE CREDITS: 3</b>               |
| <b>TOTAL CONTACT HOURS: 42</b>                | <b>DURATION OF ESA : 03</b>            |
| <b>FORMATIVE ASSESSMENT MARKS : 40</b>        | <b>SUMMATIVE ASSESSMENT MARKS : 60</b> |

**Course outcomes:**

1. The student will gain knowledge about energy requirements and the Recommended Dietary Allowances.
2. The student will understand the functions and role of macronutrients, their requirements and the effect of deficiency and excess
3. The student learns the impact of various functional foods on our health
4. The student will be able to apply basic nutrition knowledge in making foods choices and obtaining an adequate diet.
5. The student gains competence in connecting the role of various nutrients in maintaining health and learn to enhance traditional recipes.

**UNIT-1: Basic concepts of Nutrition:**

Introduction, Basic principles of a balanced diet to provide energy and nutrients. Composition of foods and proximate analysis of foods. Calorific value of foods, and Basal metabolism. Basal Metabolic Rate (BMR), Factors affecting BMR, Energy requirements for different physical activities, Specific dynamic action of food, Nutritive value of proteins. Energy requirements and recommended dietary allowance (RDA) for infants, children and pregnant women. Protein calorie malnutrition. 14 hrs

**UNIT-2: Macronutrients and Micronutrients:**

Carbohydrates- Digestible and non-digestible, Dietary fibres, Essential fatty acids, lipoproteins and Cholesterol. Essential amino acids, Fortification of foods, Protein requirement for different categories. **Vitamins**-Sources, requirements, functions and deficiency symptoms of Vitamin-C, Thiamine, Riboflavin, Pyridoxine, Folic acid, Vitamin B12. Absorption of fatsoluble vitamins- A, D, E and K. **Micronutrients**: Source, Daily requirement, functions and deficiency disease symptoms of Macro minerals (Ca, P and Cl) and micro minerals/trace elements (I, Fe, Zn and Se). 14 hrs

**UNIT-3: Dietetics and Diet Therapy:**

Introduction to nutrition. Food pyramid. Diet planning and introduction to diet therapy. Nutritional requirements for different age groups, anemic child, expectant women, and lactating women. Diet planning for prevention and cure of nutritional deficiency disorders. **Diet therapy**: Functional foods, Anthropometric measurements, dietary considerations during fever, malaria, and tuberculosis. Prevention and correction of obesity, underweight, and metabolic diseases by diet therapy. Dietary interventions to correct and or manage the gastrointestinal diseases (indigestion, peptic ulcer, constipation, diarrhoea, steatorrhoea, irritable bowel syndrome. Functional foods based diet therapy for diabetes, cardiovascular disease and cancer. 14 hrs

## REFERENCES:

1. Clinical Dietetics and Nutrition, 2002, Antia FP and Abraham P. Oxford University Press; 4<sup>th</sup> Edition. ISBN-10: 9780195664157.
2. Oxford Handbook of Nutrition and Dietetics, 2011, Webster-Gandy J, Madden A and Holdsworth M. Oxford University Press, Print ISBN-13: 9780199585823.
3. Krause's Food, Nutrition and Diet therapy, 2003, Mahan KL and Escott-Stump S. Elsevier, ISBN: 9780721697840.
4. Human Nutrition and Dietetics. 1986, Passmore R. and Davidson S. Churchill Livingstone Publications, ISBN-10: 0443024863.
5. Rosemary Stanton's Complete Book of Food & Nutrition, 2007, Simon & Schuster Publishers, Australia, ISBN 10: 0731812999
6. Food Science and Nutrition, 2018, Roday S. Oxford University Press Publishers, ISBN: 9780199489084/0199489084.
7. Food Science, 2007, Srilakshmi S. New Age International (P) Limited Publishers, ISBN: 9788122420227/ 8122420222.

PEDAGOGY : PEDAGOGY : MOOK/DESK WORK/BOOK CHAPTER/PROBLEM SOLVING /ASSIGNMENT

| Formative Assessment         |                    |
|------------------------------|--------------------|
| ASSESSMENT OCCASION          | WEIGHTAGE IN MARKS |
| CLASS TEST ( 2 CLASS TESTS ) | 20                 |
| SEMINARS / CLASS WORK        | 10                 |
| ASSIGNMENT/ OPEN DISCUSSION  | 10                 |
| TOTAL                        | <b>40</b>          |

UNDER GRADUATE B.Sc., SEMESTER I & II  
MODEL QUESTION PAPER  
BIOCHEMISTRY

TIME: 3 hrs

MAX. MARKS: 60

NOTE: ALL SECTIONS ARE COMPULSORY

SECTION – A

1. Answer **any FIVE of the following** questions

5 x 2 = 10

- a.
- b.
- c.
- d.
- e.
- f.
- g.

SECTION – B

Answer **any FOUR of the following** questions

5 x 4 = 20

- 2.
- 3.
- 4.
- 5.
- 6.

SECTION – C

Answer **any three of the following** questions

3 x 10 = 30

- 7. (6+4)
- 8. (6+4)
- 9. (6+4)
- 10. (5+5)
- 11. (5+5)

UNDER GRADUATE B.Sc SEMESTER I & II  
MODEL QUESTION PAPER  
BIOCHEMISTRY OPEN ELECTIVE

TIME: 3 hrs

MAX. MARKS: 60

NOTE : ALL SECTIONS ARE COMPULSORY

SECTION – A

1. Answer any **FIVE** of the following

5 x 2 = 10

- a.
- b.
- c.
- d.
- e.
- f.
- g.

SECTION – B

Answer any **Four** of the following

4 x 5 = 20

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

SECTION – C

Answer **any Three of the following** questions

3 x 10 = 30

- 8.
- 9.
- 10.
- 11.

(6+4)

(6+4)

(5+5)

(5+5)



# Four Years Graduate Programme in BOTANY (NEP – 2020)

## DISCIPLINE CORE PAPERS (DSC)

| Sl. No. | Semester Details | Subject                                            | Paper No    |
|---------|------------------|----------------------------------------------------|-------------|
| 1       | Semester I       | Microbial Diversity and Technology                 | <b>A-1</b>  |
| 2       | Semester II      | Diversity and Conservation of Non Flowering Plants | <b>A-2</b>  |
| 3       | Semester III     | Plant Anatomy and Development Biology              | <b>A-3</b>  |
| 4       | Semester IV      | Ecology and Conservation Biology                   | <b>A-4</b>  |
| 5       | Semester V       | Plant taxonomy and Resource Botany                 | <b>A-5</b>  |
|         |                  | Genetics and Cell Biology                          | <b>A-6</b>  |
| 6       | Semester VI      | Plant Physiology and Biochemistry                  | <b>A-7</b>  |
|         |                  | Plant Biotechnology                                | <b>A-8</b>  |
| 7       | Semester VII     | Molecular Biology                                  | <b>A-9</b>  |
|         |                  | Seed Biology and Seed Technology                   | <b>A-10</b> |
|         |                  | Plant Health Technology                            | <b>A-11</b> |
| 8       | Semester VIII    | Medicinal Plants and Phytochemistry                | <b>A-12</b> |
|         |                  | Bioinformatics and Computational Biology           | <b>A-13</b> |
|         |                  | Research Methodology                               | <b>A-14</b> |

## CORE SPECIFIC ELECTIVE PAPERS (DSE)

| Sl No. | Semester Details | Subject: Botany                                                 | Credits | Paper No |
|--------|------------------|-----------------------------------------------------------------|---------|----------|
| 1      | Semester V       | <b>DSE 1:</b> Algal and Fungal Biotechnology                    | 03      | E-1      |
| 2      | Semester VI      | <b>DSE 2:</b> Herbal Technology                                 | 03      | E-2      |
| 3      | Semester VII     | <b>DSE 3:</b> Plant Propagation and Tissue Culture              | 03      | E-3      |
| 4      | Semester VIII    | <b>DSE 4:</b> Landscaping, Gardening and Green House Technology | 03      | E-4      |

## B.Sc. BOTANY: Semester - 1

**Title of the Course: Microbial Diversity and Technology**

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                     | Number of lecture hours/semester | Number of practical Credits | Number of practical hours / semester |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|
| 4                                                                                                                                                                                                                                                                                                                                            | 56                               | 2                           | 56                                   |
| Content of Theory Course 1                                                                                                                                                                                                                                                                                                                   |                                  |                             | 56 Hrs                               |
| Unit –1                                                                                                                                                                                                                                                                                                                                      |                                  |                             | 15                                   |
| <b>Chapter No. 1: Microbial diversity</b> -Introduction to microbial diversity; Hierarchical organization and positions of microbes in the living world: Whittaker's five-kingdom system and Carl Richard Woese's three-domain system. Distribution of microbes in soil, air, food and water. Significance of microbial diversity in nature. |                                  |                             | 5                                    |
| <b>Chapter No. 2 History and development of microbiology</b> -Microbiologists and contributions of - Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Dmitri Iwanowski, Sergius Winogradsky and M W Beijerinck and Paul Ehrlich. Contributions of any two Indian microbiologists.                                                     |                                  |                             | 5                                    |
| <b>Chapter No. 3 Microscopy</b> -Working principle and applications of light, dark field, phase contrast and electron microscopes (SEM and TEM). Microbiological stains (acidic, basic and special) and Principles of staining. Simple, Gram's and differential staining.                                                                    |                                  |                             | 5                                    |

|                                                                                                                                                                                                                                                                                                        |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                        | 15 |
| <b>Chapter No. 4. Culture media for Microbes-</b> Natural and synthetic media, Routine media -basal media, enriched media, selective media, indicator media, transport media, and storage media.                                                                                                       | 5  |
| <b>Chapter No. 5. Sterilization methods</b> -Methods of disinfection: antiseptic, tyndallisation and Pasteurization. <b>Sterilization</b> -Physical methods: dry heat, moist heat, UV light, ionization radiation, filtration. Chemical methods - phenolic compounds, anionic and cationic detergents. | 5  |
| <b>Chapter No. 6. Microbial Growth</b> -Microbial growth and measurement. Nutritional types of Microbes- autotrophs and heterotrophs, phototrophs and chemotrophs; lithotrophs and organotrophs.                                                                                                       | 5  |
| <b>Unit – 3</b>                                                                                                                                                                                                                                                                                        | 11 |
| <b>Chapter No. 7 Microbial cultures and preservation</b> -Microbial cultures. Pure culture and axenic cultures, subculturing. Preservation methods-overlaying cultures with mineral oils, lyophilisation. Microbial culture collections and their importance. A brief account on ITCC, MTCC and ATCC.  | 5  |
| <b>Chapter No. 8. Viruses-</b> General structure and classification of Viruses; ICTV system of classification. Structure and multiplication of TMV, SARS-COV-2, and Bacteriophage (T2). Cultivation of viruses. Vaccines and types.                                                                    | 4  |
| <b>Chapter No. 9. Viroids-</b> general characteristics and structure of Potato Spindle                                                                                                                                                                                                                 | 2  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Tuber Viroid (PSTVd); Prions - general characters and Prion diseases. Economic importance of viruses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
| <b>Unit – 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 15 |
| <b>Chapter No. 10. Bacteria-</b> General characteristics and classification.(Bergey's classification) Archaeobacteria and Eubacteria. Ultrastructure of Bacteria; Bacterial growth and nutrition. Reproduction in bacteria- asexual and sexual methods. Study of <i>Rhizobium</i> and its applications. A brief account of Actinomycetes. Mycoplasmas and Phytoplasmas- General characteristics and diseases.                                                                                                                                                                                                                                                                                                                     | 5  |
| <b>Chapter No. 11. Fungi-</b> General characteristics and classification (Alexopoulos classification). Thallus organization and nutrition in fungi. Reproduction in fungi (asexual and sexual). Heterothallism and parasexuality. Type study: Morphology of <i>Phytophthora</i> , <i>Rhizopus</i> , <i>Neurospora</i> , <i>Puccinia</i> , <i>Penicillium</i> and <i>Trichoderma</i> . Morphology and reproduction of <i>Phytophthora</i> and <i>Puccinia</i> . VAM <b>Fungi</b> and their significance. <b>Microbial plant diseases</b> -Late Blight of Potato, Black stem rust of wheat; Downy Mildew of Bajra, Grain smut of Sorghum, Sandal Spike, Citrus Canker, Root Knot Disease of Mulberry. Economic importance of Fungi. | 7  |
| <b>Chapter No. 12. Lichens</b> – Structure and reproduction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3  |

## References

1. Ananthnarayan R and Panikar JCK. 1986. Text book of Microbiology. Orient Longman Ltd. New Delhi.
2. Arora DR. 2004. Textbook of Microbiology, CBS, New Delhi.
3. William CG. 1989. Understanding microbes. A laboratory text book for Microbiology. W.H. Freeman and Company. New York.
4. Dubey RC and Maheshwari DK. 2007. A textbook of Microbiology, S. Chand and Company, New Delhi.
5. Dubey RC and Maheshwari DK. 2002. A Text book of Microbiology, S.C.Chand and

- Company, Ltd. Ramnagar, New Delhi.
6. Sharma R. 2006. Text book of Microbiology. Mittal Publications. New Delhi. 305pp.
  7. Sharma PD. 1999. Microbiology and Plant Pathology. Rastogi publications. Meerut, India.
  8. Vasanthkumari R. 2007. A textbook of Microbiology, BI Publications Pvt. Ltd., New Delhi.
  9. Alexopoulos CJ and Mims CW. 1989. Introductory Mycology, Wiley Eastern Ltd., New Delhi.
  10. Allas RM. 1988. Microbiology: Fundamentals and Applications, Macmillan publishing co. New York.
  11. Brook TD, Smith DW and Madigan MT. 1984. Biology of Microorganisms, 4<sup>th</sup>ed. Eaglewood Cliffts. N.J. Prentice- Hall. New Delhi.
  12. Burnell JH and Trinci APJ. 1979. Fungal walls and hyphal growth, Cambridge University Press. Cambridge.
  13. Jayaraman J. 1985. Laboratory Manual of Biochemistry, Wiley Eastern Limited. New Delhi.
  14. Ketchum PA. 1988. Microbiology, concepts and applications. John Wiley and Sons. New York.
  15. Michel J, Pelczar Jr. EC and Krieg CR. 2005. Microbiology, Mc.Graw-Hill, New Delhi.
  16. Powar CB and Dagainawala. 1991. General Microbiology, Vol – I and Vol – II Himalaya publishing house, Bombay.
  17. Reddy S and Ram. 2007. Microbial Physiology. Scientific Publishers, Jodhpur, 385pp.
  18. Sullia SB and Shantharam S. 1998. General Microbiology. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.
  19. Schlegel HG. 1986. General Microbiology. Cambridge. University Press. London, 587pp.
  20. Roger S, Ingraham Y, Wheelis JL, Mark L and Page PR. 1990. Microbial World 5<sup>th</sup> edition. Prentice-Hall India, Pvt. Ltd. New Delhi.
  21. Sullia SB. and Shantharam S. 2005. General Microbiology, Oxford and IBH, New Delhi.

## **Content of Practical Course 1: List of Experiments to be conducted**

**Practical 1:** Safety measures in microbiology laboratory and study of equipment/appliances used for microbiological studies (Microscopes, Hot air oven, Autoclave/Pressure Cooker, Inoculation needles/loop, Petri plates, Incubator, Laminar flow hood, Colony counter, Haemocytometer, Micrometer).

**Practical 2:** Preparation of culture media (NA/PDA) sterilization, inoculation, incubation of *E coli* / *B. subtilis*/ Fungi and study of cultural characteristics.

**Practical 3:** Enumeration of soil/food /seed microorganisms by serial dilution technique.

**Practical 4:** Preparation of agar slants, inoculation, incubation, pure culturing and preservation of microbes by oil overlaying.

**Practical 5:** Determination of cell count by using Haemocytometer and determination of microbial cell dimension by using Micrometer.

**Practical 6:** Simple staining of bacteria (Crystal violet /Nigrosine blue) / Gram's staining of bacteria.

**Practical 7:** Isolation and study of morphology of *Rhizobium* from root nodules of legumes

**Practical 8:** Preparation of spawn and cultivation of paddy straw (Oyster) mushroom.

**Practical 9:** Study of vegetative structures and reproductive structures of any six of the following: *Albugo*, *Phytophthora*, *Rhizopus*/*Mucor*, *Saccharomyces*, *Neurospora*/*Sordaria*, *Puccinia*, *Agaricus*, *Lycoperdon*, *Aspergillus*/*Penicillium*, *Trichoderma*.(Depending on local availability)

**Practical 10:** Study of late blight of Potato, Downy mildew of Bajra, Citrus canker, Tobacco mosaic disease, Sandal spike disease.

**Practical 11:** Study of well-known microbiologists and their contributions through charts and photographs.

**Practical-12:** Visit to water purification units/Composting/ microbiology labs/dairy and farms to understand role of microbes in day today life. Field study report is to be documented in the practical record only.

## **Scheme of Formative Assessment : Semester - 1**

### **Pedagogy:**

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

| <b>Formative Assessment</b>      |                           |
|----------------------------------|---------------------------|
| <b>Assessment Occasion/ type</b> | <b>Weightage in Marks</b> |
| I TEST                           | 10                        |
| II TEST                          | 10                        |
| ASSIGNMENT                       | 10                        |
| SEMINAR                          | 10                        |
| <b>Total</b>                     | 40                        |

## **B.Sc. BOTANY: Open Elective Course (OE-1)**

### **I Semester**

#### **Title of the Course: Plants and Human Welfare**

#### **Course Outcome:**

On completion of this course, the students will be able to

1. To make the students familiar with economic importance of diverse plants that offer resources to human life.
2. To make the students known about the plants used as-food, medicinal value and also plant source of different economic value .
3. To generate interest amongst the students on plants importance in day today life, conservation, ecosystem and sustainability.
- 4.

| <b>Number of Theory Credits</b>                                                                                                                                                                                                                                                                        | <b>Number of lecture hours/semester</b> | <b>Number of practical Credits</b> | <b>Number of practical hours / semester</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------|---------------------------------------------|
| <b>3</b>                                                                                                                                                                                                                                                                                               | <b>30</b>                               | <b>0</b>                           | <b>00</b>                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                      |                                         |                                    | <b>30 Hrs</b>                               |
| <b>Unit I</b>                                                                                                                                                                                                                                                                                          |                                         |                                    |                                             |
| Origin of Cultivated Plants. Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions. Crop domestication and loss of genetic diversity (Only conventional plant breeding methods). Importance of plant bio- diversity and conservation. |                                         |                                    | 2                                           |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                         |                                         |                                    |                                             |
| <b>Cereals:</b> Wheat and Rice (origin, evolution, morphology, post-harvest processing & uses).Green revolution. Brief account of millets and their nutritional importance.                                                                                                                            |                                         |                                    | 3                                           |



|                                                                                                                                                                                                                                                                            |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Unit III</b>                                                                                                                                                                                                                                                            |     |
| <b>Legumes:</b> General account (including chief pulses grown in Karnataka- red gram, green gram, chick pea, soybean). Importance to man and ecosystem.                                                                                                                    | 2   |
| <b>Unit IV</b>                                                                                                                                                                                                                                                             |     |
| <b>Fruits:</b> Mango, grapes and Citrus (Origin, morphology, cultivation, processing and uses)                                                                                                                                                                             | 02  |
| <b>Unit V</b>                                                                                                                                                                                                                                                              |     |
| <b>Cash crops:</b> Morphology, new varieties and processing of sugarcane, products and by-products of sugarcane industry. Natural Rubber –cultivation, tapping and processing.                                                                                             | 03. |
| <b>Unit VI</b>                                                                                                                                                                                                                                                             |     |
| <b>Spices:</b> Listing of important spices, their family and parts used, economic importance with special reference to Karnataka. Study of fennel, clove, black pepper and cardamom.                                                                                       | 03  |
| <b>Unit VII</b>                                                                                                                                                                                                                                                            |     |
| <b>Beverages:</b> Tea, Coffee (morphology, processing & uses)                                                                                                                                                                                                              | 02  |
| <b>Unit VIII</b>                                                                                                                                                                                                                                                           |     |
| <b>Oils and fats:</b> General description, classification, extraction, their uses and health implications; groundnut, coconut, sunflower and mustered (Botanical name, family & uses). Non edible oil yielding trees and importance as biofuel. Neem oil and applications. | 02  |
| <b>Unit IX</b>                                                                                                                                                                                                                                                             |     |
| <b>Essential Oils:</b> General account. Extraction methods of sandal wood oil, rose oil and eucalyptus oil. Economic importance as medicine, perfumes and insect repellents.                                                                                               | 02  |

|                                                                                                                                                                                            |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Unit X</b>                                                                                                                                                                              |    |
| <b>Drug-yielding plants:</b> Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Aloe vera and Cannabis.                                                    | 03 |
| <b>Unit XI</b>                                                                                                                                                                             |    |
| <b>Fibers:</b> Classification based on the origin of fibers; Cotton and jute (origin morphology, processing and uses).                                                                     | 03 |
| <b>Unit XII</b>                                                                                                                                                                            |    |
| <b>Forests:</b> Forest and forest products. Community forestry. Concepts of reserve forests, sanctuaries and national parks with reference to India. Endangered species and red data book. | 03 |

### Text Books and References

1. Kochhar, S.L. (2012). Economic Botany in Tropics. New Delhi, India: MacMillan & Co.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. The Netherlands: Kluwer Academic Publishers.
3. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett - Publishers.

## **Scheme of Formative Assessment : (OE-1)**

### **Semester - 1**

#### **Pedagogy:**

**Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc**

| <b>Formative Assessment</b>      |                           |
|----------------------------------|---------------------------|
| <b>Assessment Occasion/ type</b> | <b>Weightage in Marks</b> |
| I TEST                           | 10                        |
| II TEST                          | 10                        |
| ASSIGNMENT                       | 10                        |
| SEMINAR                          | 10                        |
| <b>Total</b>                     | 40                        |

## B.Sc. BOTANY: Semester – 2

**Title of the Course: Diversity of Non- Flowering Plants**

| Number of Theory Credits                                                                                                                                                                                                                                                                                                       | Number of lecture hours/semester | Number of practical Credits | Number of practical hours/semester |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|------------------------------------|
| <b>4</b>                                                                                                                                                                                                                                                                                                                       | <b>56</b>                        | <b>2</b>                    | <b>56</b>                          |
| <b>Content of Theory Course 2</b>                                                                                                                                                                                                                                                                                              |                                  |                             | <b>56Hrs</b>                       |
| <b>Unit –1</b>                                                                                                                                                                                                                                                                                                                 |                                  |                             | <b>15</b>                          |
| <b>Chapter No. 1</b> Algae –Introduction and historical development in algology. Distribution of Algae. General characteristics, classification of algae by Fritsch. Diversity- habitat, thallus organization, pigments, reserve food, flagella types, life-cycle and alternation of generation in Algae.                      |                                  |                             | 5                                  |
| <b>Chapter No. 2</b> Morphology and reproduction and life-cycles of Nostoc, Scytonema, <i>Oedogonium</i> , <i>Chara</i> , <i>Sargassum</i> and <i>Polysiphonia</i> . Diatoms and their importance.                                                                                                                             |                                  |                             | 5                                  |
| <b>Chapter No. 3</b> Algal cultivation- a general account. Cultivation of microalgae- <i>Spirulina</i> and <i>Dunaliella</i> ; Algal products- Food and Nutraceuticals, Feed stocks, food colorants; fertilizers, aquaculture feed; therapeutics and cosmetics; medicines; dietary fibres from algae. Algal blooms and toxins. |                                  |                             | 5                                  |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                |                                  |                             | <b>15</b>                          |

|                                                                                                                                                                                                                                           |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Chapter No. 4.</b> Bryophytes – General characteristics and classification (Rothmaler) of Bryophytes.                                                                                                                                  | 3  |
| <b>Chapter No. 5</b> Distribution, morphology, anatomy, reproduction and life-cycles of <i>Riccia</i> , <i>Anthoceros</i> , and <i>Funaria</i> . Ecological and economic importance of Bryophytes.                                        | 7  |
| <b>Chapter No. 6. . Pteridophytes-</b> General characteristics and classification (Smith); Distribution, morphology, anatomy, reproduction and life-cycle in <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> and <i>Marselia</i> .  | 5  |
| <b>Unit – 3</b>                                                                                                                                                                                                                           | 15 |
| <b>Chapter No. 7</b> A brief account of heterospory and seed habit. Stelar evolution in Pterodophytes. Affinities and evolutionary significance of Pteridophytes. Ecological and economic importance.                                     | 5  |
| <b>Chapter No. 8. Gymnosperms-</b> General characteristics. Distribution and classification of Gymnosperms (Sporne). Study of the habitat, habit, anatomy, reproduction and life-cycle in <i>Cycas</i> , <i>Pinus</i> and <i>Gnetum</i> . | 5  |
| <b>Chapter No. 9.</b> Affinities and evolutionary significance of Gymnosperms. Economic importance of Gymnosperms - food, timber, industrial uses and medicines.                                                                          | 5  |
| <b>Unit – 4</b>                                                                                                                                                                                                                           | 11 |

|                                                                                                                                                                                                                                        |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <b>Chapter No. 10. Origin and evolution of Plants:</b> Origin and evolution of plants through Geological Time scale.                                                                                                                   | 2 |
| <b>Chapter No. 11. Paleobotany-</b> Paleobotanical records, plant fossils, Types of plant fossils - impressions, compressions, incrustation, actual remains petrification. Radiocarbon dating. A general account of fossil Bryophytes. | 5 |
| <b>Chapter No. 12. Fossil taxa-</b> <i>Rhynia</i> , <i>Lepidodendron</i> , <i>Cycadeoidea</i> . Contributions of Birbal Sahni. Birbal Sahni Institute of Paleosciences.                                                                | 4 |

### References:

- 1) Chopra, G.L. A text book of Algae. Rastogi & Co., Meerut, Co., New Delhi, Depot. Allahabad.
- 2) Johri, Lata and Tyagi, 2012, A Text Book of, Vedam e Books, New Delhi.
- 3) Sharma, O.P. 1990. Text Book of Pteridophyta. McMillan India Ltd. New Delhi.
- 4) Sharma, O.P. 1992. Text Book of Thallophytes. McGraw Hill Publishing Co. New Delhi.
- 5) Sharma, O.P., 2017, Algae Singh-Pande-Jain 2004-05. A Text Book of Botany. Rastogi Publication, Meerut.
- 6) Sambamurty, A.V.S.S.. A Text Book of Algae. I.K. International Private Ltd., New Delhi.
- 7) Agashe, S.N. 1995. Paleobotany. Plants of the past, their evolution, paleoenvironment and Allied plants. Hutchinson & Co., Ltd., London.
- 8) Anderson R.A. 2005, Algal cultural Techniques, Elsevier, London.
- 9) Publication, Application in exploration of fossil fuels. Oxford & IBH., New Delhi.
- 10) Eams, A.J., (1974) Morphology of vascular plants - Lower groups. Tata Mc Grew-Hill Publishing Co. New Delhi, Freeman & Co., New York.
- 11) Fritze, R.E. 1977. Structure and reproduction of Algae. Cambridge University Press.

- 12) Goffinet B and Shaw A.J. 2009, Bryophyte Biology, 2nd ed. Cambridge University Press, Cambridge. Gymnosperms.
- 13) Srivastava, H N, 2003. Algae Pradeep Publication, Jalandhar, India.
- 14) Kakkar, R.K. and B.R.Kakkar ( 1995) The Gymnosperms (Fossils and Living) Central Publishing House, Allahabad.
- 15) Kumar H. D., 1999, Introductory Phycology, Affiliated East-West Press, Delhi.
- 16) Lee, R.E., 2008, Phycology, Cambridge University Press, Cambridge. 4th edition. McGraw Hill Publishing Co., New Delhi.
- 17) Parihar, N.S. 1970. An Introduction to Embryophyta. Vol. I. Bryophyta. Central Book, Allahabad.
- 18) Parihar, N.S. (1976) An Introduction to Pteridophytes, Central Book Depot, Allahabad.
- 19) Parihar, N.S. 1977. The Morphology of Pteridophytes. Central Book Depot, Allahabad. Press, Cambridge.
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- 22) Smith, G.M. 1971. Cryptogamic Botny. Vol. I Algae & Fungi. Tata McGraw Hill Publishing. New Delhi.
- 23) Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson & Co., Ltd., London.
- 24) Stewart, W.M. 1983. Paleobotany and the Evolution of Plants, Cambridge University Cambridge.
- 25) Sundarajan, S. 1997. College Botany Vol. I. S Chand & Co. Ltd., New Delhi.
- 26) Vanderpoorten, A. and Goffinet, B. 2009, Introduction to Bryophytes, Cambridge University Press, Cambridge.
- 27) Vashista, B.R. 1978. Bryophytes. S Chand & Co. Ltd., New Delhi.

## **Content of Practical Course 2: List of Experiments to be conducted**

**Practical-1:** Study of morphology, classification, reproduction and lifecycle of *Nostoc*, *Scytonema*, *Oedogonium*.

**Practical-2:** Study of morphology, classification, reproduction and life-cycle of *Chara*, *Sargassum*, *Polysiphonia*/ *Batrachospermum*.

**Practical -3:** Study of important blue green algae causing water blooms in the lakes.

**Practical-4:** Study of morphology, classification, reproduction and life-cycle of *Riccia*/*Anthoceros*. Any one locally available moss.

**Practical-5:** Study of morphology, classification, anatomy, reproduction and life-cycle of *Selaginella* and *Equisetum*.

**Practical -6:** Study of morphology, classification, anatomy, reproduction and life-cycle of *Pteris* and *Marselia*.

**Practical -7:** Study of morphology, classification, anatomy and reproduction in *Cycas*.

**Practical -8:** Study of morphology, classification, anatomy and reproduction in *Pinus*.

**Practical -9:** Study of morphology, classification, anatomy and reproduction in *Gnetum*.

**Practical -10:** Study of important ornamental ferns.

**Practical -11:** Preparation of natural media and cultivation of *Azolla* in artificial ponds.

**Practical -12:** Media preparation and cultivation of *Spirulina*.

**Practical -13:** Study of different algal products and fossils impressions and slides.

**Practical-14:** Visit to algal cultivation units/lakes with algal blooms/Fern house/Nurseries/Geology museum/lab to study plant fossils and the report is to be documented in the practical record.



## Scheme of Formative Assessment : Semester - 2

### Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| I TEST                    | 10                 |
| II TEST                   | 10                 |
| ASSIGNMENT                | 10                 |
| SEMINAR                   | 10                 |
| <b>Total</b>              | 40                 |

## **B.Sc. BOTANY: Open Elective Course (OE-2)**

### **II Semester**

#### **Title of the Course: Plant Propagation, Nursery management and Gardening**

##### **Paper Outcome:**

On completion of this course, the students will be able to

1. To gain knowledge of gardening, cultivation, multiplication, raising of seedlings of garden plants.
2. To get knowledge of new and modern techniques of plant propagation.
3. To develop interest in nature and plant life.

5.

| <b>Number of Theory Credits</b>                                                                                                                                                                                                                                       | <b>Number of lecture hours/semester</b> | <b>Number of practical Credits</b> | <b>Number of practical hours / semester</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------|---------------------------------------------|
| <b>3</b>                                                                                                                                                                                                                                                              | <b>30</b>                               | <b>0</b>                           | <b>00</b>                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                     |                                         |                                    | <b>36 Hrs</b>                               |
| <b>Unit I</b>                                                                                                                                                                                                                                                         |                                         |                                    |                                             |
| <b>Nursery:</b> Definition, objectives and scope and general practices and building up of infrastructure for nursery, planning and seasonal activities. Planting - direct seeding and transplants, Soil free/soilless/ synthetic growth mediums for pots and nursery. |                                         |                                    | 04                                          |
| <b>Unit II</b>                                                                                                                                                                                                                                                        |                                         |                                    |                                             |
| <b>Seed:</b> Structure and types - Seed dormancy; causes and methods of breaking dormancy. Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology. Seed testing and certification.                                    |                                         |                                    | 06                                          |
| <b>Unit III</b>                                                                                                                                                                                                                                                       |                                         |                                    |                                             |

|                                                                                                                                                                                                                                                                                                                                                                             |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Vegetative propagation:</b> Air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings. Hardening of plants .Green house ,mist chamber, shed root, shade house and glass house.                                                                                                                       | 06 |
| <b>Unit IV</b>                                                                                                                                                                                                                                                                                                                                                              |    |
| <b>Gardening:</b> Definition, objectives and scope. Different types of gardening - landscape and home/terrace gardening, parks and its components. Plant materials and design. Computer applications in landscaping, Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.                                                | 08 |
| <b>Unit V</b>                                                                                                                                                                                                                                                                                                                                                               |    |
| <b>Sowing/raising of seeds and seedlings -</b> Transplanting of seedlings - Study of cultivation of different vegetables and flowering plants: cabbage, brinjal, lady's finger, tomatoes, carrots, bougainvillea, roses, geranium, ferns, petunia, orchids etc. Storage and marketing procedures. Developing and maintenance of different types of lawns. Bonsai technique. | 06 |

### Text Books and References

1. Agrawal, P.K. (1993). Hand Book of Seed Technology. New Delhi, Delhi: Dept. of Agriculture and Cooperation, National Seed Corporation Ltd.
2. Bose T.K., Mukherjee, D. (1972). Gardening in India. New Delhi, Delhi: Oxford & IBH Publishing Co.
3. Jules, J. (1979). Horticultural Science, 3rd edition. San Francisco, California: W.H. Freeman and Co.
4. Kumar, N. (1997). Introduction to Horticulture. Nagercoil, Tamil Nadu: Rajalakshmi Publications.

**Additional Resources:**

1. Musser E., Andres. (2005). Fundamentals of Horticulture. New Delhi, Delhi: McGraw Hill Book Co.
2. Sandhu, M.K. (1989). Plant Propagation. Madras, Bangalore: Wile Eastern Ltd.

## **Scheme of Formative Assessment : (OE-2)**

### **Semester - 2**

#### **Pedagogy:**

**Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc**

| <b>Formative Assessment</b>      |                           |
|----------------------------------|---------------------------|
| <b>Assessment Occasion/ type</b> | <b>Weightage in Marks</b> |
| I TEST                           | 10                        |
| II TEST                          | 10                        |
| ASSIGNMENT                       | 10                        |
| SEMINAR                          | 10                        |
| <b>Total</b>                     | <b>40</b>                 |

# Mangalore University

## Question paper pattern of UG Botany Core subject

Total marks **60**

### PART A

I. Answer any **Five** of the following ( 5X2=10)

(Two questions from each unit)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

### PART B

#### UNIT 1

9. a) 4 marks

b) 4 marks

**OR**

10. a) 5 marks

b) 3 marks

#### UNIT 2

11. a) 4 marks

b) 4 marks

**OR**

12. a) 5 marks

b) 3 marks

#### UNIT 3

13. a) 4 marks

b) 4 marks

**OR**

14. a) 5 marks

b) 3 marks

**UNIT 4**

15. a) 4 marks

b) 4 marks

**OR**

16. a) 5 marks

b) 3 marks

**PART C**

III. Answer any **Three** of the following

(6X3=18)

17.

18.

19.

20.

# MANGALORE UNIVERSITY

## Name of the Degree Program: BSc (Honors) Chemistry with Analytical Specialization

Discipline Core: Chemistry      Total Credits for the Program: 176

Starting year of implementation: 2021-22

### Program Outcomes:

By the end of the program the students will be able to:

(Refer to literature on outcome based education (OBE) for details on Program Outcomes)

1. **PO. 1:** To create enthusiasm among students for Analytical chemistry and its application in various fields of life.
2. **PO. 2:** To provide students with broad and balanced knowledge and understanding of key concepts in Analytical chemistry
3. **PO. 3:** To develop in students a range of practical skills so that they can understand and assess risks and work safely measures to be followed in the laboratory.
4. **PO. 4:** To develop in students the ability to apply standard methodology to the solution of problems in chemistry
5. **PO. 5:** To provide students with knowledge and skill towards employment or higher education in Analytical chemistry or multi-disciplinary areas involving Analytical chemistry.
6. **PO. 6:** To provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes and to cater to the demands of chemical Industries of well-trained graduates
7. **PO. 7:** To develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
8. **PO. 8:** To instil critical awareness of advances at the forefront of chemical sciences, to prepare students effectively for professional employment or research degrees in chemical sciences and to develop an independent and responsible work ethics

### Assessment:

#### Weightage for assessments (in percentage)

| Type of Course                              | Formative Assessment / IA | Summative Assessment |
|---------------------------------------------|---------------------------|----------------------|
| Theory                                      | 40                        | 60                   |
| Practical                                   | 25                        | 25                   |
| Projects                                    | -                         | -                    |
| Experiential Learning<br>(Internships etc.) | -                         | -                    |



## Curriculum Structure for the Undergraduate Degree Program BSc (Honors) Chemistry with Analytical Specialization

**Total Credits for the Program: 176      Starting year of implementation: 2021-22**

**Name of the Degree Program: B. Sc (Honors) Discipline/Subject: Chemistry**

### Program Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately

| Semester | Title /Name<br>Of the course                             | Program outcomes<br>that the course<br>addresses (not more<br>than 3 per course)                                                                                                                                                                                                                                                                                            | Pre-<br>requisite<br>course(s) | Pedagogy##              | Assessment\$                                                 |
|----------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------|--------------------------------------------------------------|
| 1        | DSC-1:<br>Analytical and<br>Organic<br>Chemistry-I       | <ul style="list-style-type: none"> <li>The concepts of chemical analysis, accuracy, precision and statistical data treatment</li> <li>Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.</li> <li>Understand the mechanism of nucleophilic, electrophilic reactions</li> </ul>                                                               | P.U.C with Chemistry           | Assignment<br>Desk work | Internal<br>Exams,<br>Continuous<br>Evaluation,<br>Sem Exams |
|          | DSC lab-1:<br>Analytical and<br>Organic<br>Practical's-I | <ul style="list-style-type: none"> <li>The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents</li> <li>The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis.</li> </ul> | -                              | Assignment<br>Desk work | Internal<br>Exams,<br>Continuous<br>Evaluation,<br>Sem Exams |

|   |                                                                                                              |                                                                                                                                                                                                                                                                                 |                 |                      |                                                  |
|---|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|--------------------------------------------------|
|   |                                                                                                              | <ul style="list-style-type: none"> <li>The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation</li> </ul>                                                                                                   |                 |                      |                                                  |
| 2 | <b>DSC-2: Inorganic and Physical Chemistry-I</b>                                                             | <ul style="list-style-type: none"> <li>The Bohr's theory of atomic structure and how it was developed</li> <li>Quantum numbers and their necessity in explaining the atomic structure</li> <li>The concept of unit cell, symmetry elements, Nernst distribution law.</li> </ul> | -               | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
|   | <b>DSC Lab -2: Inorganic and Physical Practical's-I</b>                                                      | <ul style="list-style-type: none"> <li>To prepare standard solutions</li> <li>Techniques like precipitation, filtration, drying and ignition</li> <li>Various titrimetric techniques and gravimetric methods</li> </ul>                                                         |                 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
| 3 | <b>DSC-3: Analytical and Organic Chemistry-II</b><br><b>DSC Lab-3: Analytical and Organic Practical's-II</b> |                                                                                                                                                                                                                                                                                 | DSC-1 and DSC-2 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
|   |                                                                                                              |                                                                                                                                                                                                                                                                                 |                 |                      |                                                  |
| 4 | <b>DSC-4: Inorganic and Physical Chemistry-II</b><br><b>DSC Lab-4: Inorganic and Physical Practical's-II</b> |                                                                                                                                                                                                                                                                                 |                 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |

|    |                                                                                                                                                                                                                                      |  |                               |                                |                                                    |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--------------------------------|----------------------------------------------------|
|    |                                                                                                                                                                                                                                      |  |                               |                                |                                                    |
| 5. | <b>DSC-5: Selected topics in Inorganic Chemistry</b><br><b>DSC Lab-5: Inorganic Chemistry Practical's</b><br><b>DSC-6: selected topics in Organic Chemistry</b><br><b>DSC Lab-6: Organic Chemistry Practical's</b>                   |  | DSC-3 and DSC-4               | MOOC, Problem solving          | Internal tests, Assignments, Quiz                  |
|    |                                                                                                                                                                                                                                      |  |                               |                                |                                                    |
| 6. | <b>DSC-7: Selected topics in Physical Chemistry</b><br><b>DSC Lab-7: Physical Chemistry Practical's.</b><br><b>DSC-8: Spectroscopy</b><br><b>DSC Lab-8: Analytical and Industrial Chemistry Practical's</b>                          |  |                               | MOOC, Problem solving          | Internal tests, Assignments, Quiz                  |
|    |                                                                                                                                                                                                                                      |  |                               |                                |                                                    |
| 7. | <b>DSC-9 :Analytical Techniques-I</b><br><b>DSC Lab-9: Analytical Chemistry.</b><br><b>DSC-10:Applied Chemical Analysis.</b><br><b>DSC Lab-10 :Analytical Chemistry.</b><br><b>DSC-11: Enviornmental and Nanomaterial Chemistry.</b> |  | DSC-5, DSC-6, DSC-7 and DSC-8 | MOOC, Problem solving          | Internal tests, Assignments, Seminar, Debate, Quiz |
|    |                                                                                                                                                                                                                                      |  |                               |                                |                                                    |
| 8. | <b>DSC-12: Analytical Techniques-II</b><br><b>DISIPLINE A13(4)</b><br><b>DSC-13: Separation and Electroanalytical Techniques.</b><br><b>DSC-14: Analysis of food and pharmaceuticals</b>                                             |  |                               | Project work, Industrial Visit | Internal tests, Assignments, Seminar, Debate, Quiz |

\$ Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

|                                                         |                                |
|---------------------------------------------------------|--------------------------------|
| Course Title: DSC-1: Analytical and Organic Chemistry-I |                                |
| Total Contact Hours: 56                                 | Course Credits: 4              |
| Formative Assessment Marks: 40                          | Duration of ESA/Exam: 3 hrs    |
| Model Syllabus Authors: Chairman                        | Summative Assessment Marks: 60 |

## *PUC with Chemistry*

At the end of the course the student should be able to:

1. The concepts of chemical analysis, accuracy, precision and statistical data treatment
2. Prepare the solutions after calculating the required quantity of salts in preparing the reagents/solutions and dilution of stock solution.
3. The concept of volumetric and gravimetric analysis and deducing the conversion factor for determination
4. Handling of toxic chemicals, concentrated acids and organic solvents and practice safety procedures.
5. The concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming
6. The Concept of aromaticity, resonance, hyper conjugation, etc.
7. Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.
8. Understand the mechanism of nucleophilic, electrophilic reactions

[illegible]

|   |   |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 6 | X |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 | X |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 | X |  |  |  |  |  |  |  |  |  |  |  |  |

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

### BA/BSc/BCom/BBA/BCA

#### BSc Semester 1 – Chemistry (Hons) with specialization in Analytical Chemistry

#### Title of the Course: DSC-1: Analytical and Organic Chemistry – I

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 56                                | 2                           | 56                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |                             | <b>56Hrs</b>                         |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             | <b>14</b>                            |
| Language of analytical chemistry: Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation. Figures of merit of analytical methods and limit of detection (LOD), Limit of quantification (LOQ), linear dynamic range (working range).                                                                                               |                                   |                             |                                      |
| Errors and treatment of analytical data: Limitations of analytical methods – Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples -mean, median, range, standard deviation and variance. External standard calibration - regression equation (least squares method), correlation coefficient ( $R^2$ ).                                                                                                   |                                   |                             |                                      |
| Numerical problems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   |                             |                                      |
| Basic laboratory practices, calibration of glassware (pipette, burette and volumetric flask), Sampling (solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents. |                                   |                             |                                      |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             | <b>14</b>                            |
| Titrimetric analysis: Basic principle of titrimetric analysis. Classification, Preparation and dilution of reagents/solutions. Normality, Molarity and Mole fraction. Use of $N_1V_1 = N_2V_2$ formula, Preparation of ppm level solutions from source materials (salts), conversion factors.                                                                                                                                                                                                      |                                   |                             |                                      |
| Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations. Titration curves, Quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity.                                                                                                                                                                                                                            |                                   |                             |                                      |
| Complexometric titrimetry: Indicators for EDTA titrations - theory of metal ion indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application-determination of hardness of water.                                                                                                                                                                                                                                                             |                                   |                             |                                      |
| Redox titrimetry: Balancing redox equations, calculation of the equilibrium constant of redox                                                                                                                                                                                                                                                                                                                                                                                                      |                                   |                             |                                      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p>reactions, titration curves, Theory of redox indicators, calculation of standard potentials using Nernst equation. Applications.</p> <p>Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences.</p> <p>Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, Factors influencing precipitation, Co-precipitation, post-precipitation, Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG)).</p> <p>Numerical problems on all the above aspects.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>14</b> |
| <p>Classification and nomenclature of organic compounds, Hybridization, Shapes of organic molecules, Influence of hybridization on bond properties.</p> <p><b>Nature of bonding in Organic molecules</b></p> <p>Formation of Covalent bond, Types of chemical bonding, localized and delocalized, conjugation and cross conjugation, concept of resonance, electronic displacements: Inductive effect, Electromeric effect, Resonance and Hyper conjugation, cross conjugation explanation with examples. Concept of resonance, aromaticity, Huckel rule, anti-aromaticity explanation with examples. Strengths of Organic acid and bases: Comparative study with emphasis on factors effecting pK values. Relative strength of aliphatic and aromatic carboxylic acids-Acetic acid and chloroacetic acid, acetic acid and propionic acid, acetic acid and Benzoic acid. Steric effect- Relative stability of trans and cis-2-butene.</p> <p><b>Mechanisms of Organic Reactions</b></p> <p>Notations used to represent electron movements and directions of reactions- curly arrows, formal charges. Types of bonds breaking- homolytic and heterolytic. Types of reagents-Electrophiles, nucleophiles, nucleophilicity and basicity. Types of organic reactions- substitution, addition, elimination, rearrangement and pericyclic reactions, explanation with examples.</p> <p>Chemistry of Aliphatic hydrocarbons, Carbon-Carbon Sigma bonds</p> <p>Chemistry of alkanes: Formation of alkanes, Wurtz reaction, Wurtz-Fittig reaction, Free radical substitution, Halogenation- relative reactivity and selectivity</p> <p><b>Carbon-carbon pi bonds</b></p> <p>Formation of alkenes and alkynes by elimination reaction. Mechanism of E1, E2, E1cb reaction. Saytzeff and Hofmann eliminations. Addition of HBr to propene, Free radical addition of HBr to propene. Addition of halogens to alkenes-carbocation and halonium ion mechanism. Stereospecificity of halogen addition. Ozonolysis mechanism - ozonolysis of propene. Addition of hydrogen halides to alkenes, mechanism, regioselectivity and relative rates of addition. Hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples, 1,2 and 1,4- addition reactions in conjugated dienes. Diels-Alder reaction, Allylic and benzylic bromination and mechanism in propene, 1-butene, 1-toluene and ethylbenzene.</p> |           |
| <b>Unit - 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>14</b> |
| <p>Nucleophilic substitution at saturated carbon. Mechanism of <math>S_N^1</math> and <math>S_N^2</math> reactions with suitable examples. Energy profile diagrams, Stereochemistry and factors effecting <math>S_N^1</math> and <math>S_N^2</math> reactions.</p> <p>Aromatic Electrophilic substitution reactions, Mechanisms, <math>\sigma</math> and <math>\pi</math> complexes, Halogenation, Nitration, Sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, Ortho-para ratio.</p> <p>Aromatic nucleophilic substitution reaction: <math>S_N^{Ar}</math> and Benzyne mechanism with suitable examples</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |

### Text Books

1. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6<sup>th</sup> edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
2. Fundamentals of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8<sup>th</sup> edition, Saunders College Publishing, New York (2005).
3. Analytical Chemistry, G.D. Christian, 6<sup>th</sup> edition, Wiley-India (2007).
4. Practical Volumetric Analysis, Peter A C McPherson, Royal Society of Chemistry, Cambridge, UK (2015).
5. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
6. Finar, I. L. *Organic Chemistry (Volume I)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)

7. McMurry, J. E. *Fundamentals of Organic Chemistry*, 7<sup>th</sup> Ed. Cengage Learning India Edition, 2013
8. Organic Reaction mechanism by V. K. Ahluwalia and K. Parashar (Narosa Publishers).
9. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor. (Narosa Publishers)
10. A Guide book to mechanism in Organic Chemistry by Peter sykes. Pearson.

## References

## Pedagogy

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |

## Content of Practical Course 1: List of Experiments to be conducted

### PART-A Analytical Chemistry

1. Calibration of glassware, pipette, burette and volumetric flask.
2. Determination of sodium carbonate and sodium bicarbonate in a mixture.
3. Determination of alkali present in soaps/detergents
4. Determination of iron(II) using potassium dichromate
5. Determination of oxalic acid using potassium permanganate solution
6. Standardization of EDTA solution and determination of hardness of water
7. Standardization of silver nitrate and determination of chloride in a water sample (demonstration)
8. Determination of alkali content in antacids

### PART-B Organic Chemistry

1. Selection of suitable solvents for Purification/Crystallization of organic compounds.
2. Preparation of acetanilide from aniline using Zn/acetic acid (Green method).
3. Synthesis of p-nitro acetanilide from acetanilide using nitrating mixture.
4. Bromination of acetanilide (i) Conventional method and/or (ii) with ceric ammonium nitrate and potassium bromide (Green method).
5. Hydrolysis of methyl m-nitrobenzoate to m-nitrobenzoic acid (Conventional method)
6. Synthesis of diazoaminobenzene from aniline (conventional method).
7. Preparation of dibenzalacetone (Green method).
8. Diels Alder reaction between furan and maleic acid (Green method).

## BSc Semester 1 – Chemistry (Hons) with specialization in Analytical Chemistry

### Title of the Course: OE-1: CHEMISTRY IN DAILY LIFE

| Number of Theory Credits                                                                                                                                                                                                                                                                                                    | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 3                                                                                                                                                                                                                                                                                                                           | 42                                | -                           | 42                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                                           |                                   |                             | <b>42 Hrs</b>                        |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                             |                                   |                             | <b>14</b>                            |
| <b>Dairy Products:</b> Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk. Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages. |                                   |                             |                                      |
| <b>Food additives, adulterants, and contaminants-</b> Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose, and sodium cyclamate. Flavors: Vanillin, alkyl esters (fruit flavors), and monosodium glutamate.                               |                                   |                             |                                      |
| <b>Artificial food colorants:</b> Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food.                                                                                                                                                                                        |                                   |                             |                                      |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                             |                                   |                             | <b>14</b>                            |
| <b>Vitamins:</b> Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1.                                                                                                                                                     |                                   |                             |                                      |
| <b>Oils and fats:</b> Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. Halphen test.                                                                                                                                                   |                                   |                             |                                      |
| <b>Soaps &amp; Detergents:</b> Definition, classification, manufacturing of soaps and detergents, composition and uses                                                                                                                                                                                                      |                                   |                             |                                      |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                             |                                   |                             | <b>14</b>                            |
| <b>Chemical and Renewable Energy Sources:</b> principles and applications of primary & secondary batteries and fuel cells. Basics of solar energy, future energy storer.                                                                                                                                                    |                                   |                             |                                      |
| <b>Polymers:</b> Basic concept of polymers, classification and characteristics of polymers. Applications of polymers as plastics in electronic, automobile components, medical fields, and aerospace materials. Problems of plastic waste management. Strategies for the development of environment-friendly polymers.      |                                   |                             |                                      |

### Text Books

1. B. K. Sharma: Introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry- Ashtoush Kar.
3. Analysis of Foods – H.E. Cox: 13.
4. Chemical Analysis of Foods – H.E. Cox and Pearson.
5. Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4<sup>th</sup>ed. New Age International (1998)
6. Physical Chemistry – P I Atkins and J. de Paula – 7<sup>th</sup>Ed. 2002, Oxford University Press.



7. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6<sup>th</sup> ed. 2001, FAI.
8. Organic Chemistry by I. L. Finar, Vol. 1 & 2. 9. Polymer Science and Technology, J. R. Fried (Prentice Hall).

## References

## Pedagogy

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | 100                |

**BSc Semester 2 – Chemistry (Hons) with specialization in Analytical Chemistry**  
**Title of the Course: DSC – 2: INORGANIC AND PHYSICAL CHEMISTRY - I**

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                             | Number of lecture hours/semester | Number of practical Credits | Number of practical hours/ semesters |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|
| 4                                                                                                                                                                                                                                                                                                                                                                    | 56                               | 2                           | 56                                   |
| <b>Content of Theory Course 2</b>                                                                                                                                                                                                                                                                                                                                    |                                  |                             | <b>56Hrs</b>                         |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of $\psi$ and $\psi^2$ . Quantum numbers and their significance.                                                                                        |                                  |                             |                                      |
| Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.                                                                                                                          |                                  |                             |                                      |
| Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements (Z=1-30), effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic Table.                                                                         |                                  |                             |                                      |
| <b>Unit - 2</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| s, p, d and f-block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s and p-block elements:                                                                                                                                                                                            |                                  |                             |                                      |
| (a) Atomic radii (van der Waals)                                                                                                                                                                                                                                                                                                                                     |                                  |                             |                                      |
| (b) Ionic and crystal radii.                                                                                                                                                                                                                                                                                                                                         |                                  |                             |                                      |
| (c) Covalent radii                                                                                                                                                                                                                                                                                                                                                   |                                  |                             |                                      |
| (d) Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.                                                                                                                                                                                                                              |                                  |                             |                                      |
| (e) Electron gain enthalpy, trends of electron gain enthalpy.                                                                                                                                                                                                                                                                                                        |                                  |                             |                                      |
| (f) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.                                                                                                                                                |                                  |                             |                                      |
| Trends in the chemistry of the compounds of groups 13 to 17 (hydrides, carbides, oxides and halides) are to be discussed.                                                                                                                                                                                                                                            |                                  |                             |                                      |
| <b>Unit - 3</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| <b><u>Gaseous State</u></b>                                                                                                                                                                                                                                                                                                                                          |                                  |                             |                                      |
| Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency, collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosity, calculation of $\sigma$ and $\eta$ , variation of viscosity with temperature and pressure. |                                  |                             |                                      |
| Maxwell's Boltzmann distribution law of molecular velocities (Most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (Mathematical derivation not required), law of equipartition of                                                                                        |                                  |                             |                                      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p>energy.</p> <p>Behaviour of real gases: Deviation from ideal gas behaviour. Compressibility factor (Z) and its variation with pressure for different gases. Causes of deviation from ideal behaviour, vander Waals equation of state (No derivation) and application in explaining real gas behaviour. Critical phenomena - Andrews isotherms of CO<sub>2</sub>, critical constants and their calculation from van der Waals equation, Continuity of states, Law of corresponding states. Numerical problems.</p> <p><b>Liquid State</b></p> <p><b>Surface Tension:</b> Definition and its determination using stalagmometer, effect of temperature and solute on surface tension</p> <p><b>Viscosity:</b> Definition, Coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces.</p> <p><b>Refraction:</b> Specific and molar refraction- definition and advantages. Determination of refractive index by Abbes Refractometer.</p> <p>Additive and constitutive properties.</p> <p><b>Parachor:</b> Definition, Atomic and structure parachor, Elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and chemical constitution.</p> <p>Numerical Problems.</p>                                                                                 |    |
| <b>Unit - 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 14 |
| <p><b>Liquid Crystals</b></p> <p>Explanation, classification with examples- Smectic, nematic, cholesteric, disc shaped and polymeric. Structures of nematic and cholesteric phases-molecular arrangements in nematic and cholesteric liquid crystals. Applications of liquid crystals in LCDs and thermal sensing.</p> <p><b>Solids</b></p> <p><b>Forms of solids:</b> Unit cell and space lattice, anisotropy of crystals, size and shape of crystals,</p> <p>Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry (Symmetry elements), Crystal systems, Bravais lattice types and identification of lattice planes.</p> <p>Miller indices and its calculation, X-Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, Single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems.</p> <p><b>Distribution Law</b></p> <p>Nernst Distribution Law - Statement and its derivation. Distribution constant, factors affecting distribution constant, validity of Distribution Law, Modification of distribution law when molecules undergo a) Association b) Dissociation. Application of Distribution Law in Solvent extraction. Derivation for simple and multiple extraction. Principles of distribution law in Parkes Process of desilverisation of lead. Numerical Problems.</p> |    |

### Text Books

1. Concise Inorganic Chemistry: J D Lee, 4<sup>th</sup> Edn, Wiley, (2021)
2. Fundamentals Concepts of Inorganic Chemistry, Vol 1 and 2, 2<sup>nd</sup> Edition, Asim K Das, CBS Publishers and Distributors, (2013)
3. Basic Inorganic Chemistry, F A Cotton, G Wilkinson and P. L. Gaus, 3<sup>rd</sup> Edition. Wiley. India
4. Inorganic Chemistry, 2<sup>nd</sup> Edn. Catherine E. Housecroft and A.G. Sharpe, Pearson Prentice Hall (2005)
5. Atkins Physical Chemistry. 8<sup>th</sup> Edition. Peter Atkins & Julio De Paula Oxford University Press.
6. Physical Chemistry by Samuel Glasstone, ELBS (1982).

7. A Text book of Physical Chemistry, A S Negi & S C Anand, New Age International Publishers (2007).
8. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.
9. A Text Book of Physical Chemistry P.L.Soni , O.P. Dharmarhaand and U.N.Dash, Sultan Chand and Sons.
10. Advanced Physical Chemistry, Gurdeep Raj, Goel Publishing House (2018)

## References

## Pedagogy

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |

Date \_\_\_\_\_ Course Co-ordinator \_\_\_\_\_ Subject Committee Chairperson \_\_\_\_\_

## Content of Practical Course 2: List of Experiments to be conducted

### PART-A Inorganic Chemistry

#### TITRIMETRY

1. Determination of carbonate and hydroxide present in a mixture.
2. Determination of oxalic acid and sodium oxalate in a given mixture using standard  $\text{KMnO}_4/\text{NaOH}$  solution
3. Standardization of potassium permanganate solution and determination of nitrite in a water sample
4. Determination of chlorine in bleaching powder using iodometric method.

#### GRAVIMETRY

1. Determination of  $\text{Ba}^{2+}$  as  $\text{BaSO}_4$
2. Determination of  $\text{Cu}^{2+}$  as  $\text{CuSCN}$
3. Determination of  $\text{Fe}^{2+}$  as  $\text{Fe}_2\text{O}_3$
4. Determination of  $\text{Ni}^{2+}$  as  $\text{Ni(DMG)}_2$  complex.

### PART-B Physical Chemistry

1. Safety Practices in the Chemistry Laboratory, Knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glassware's
2. Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (Ethyl acetate, Toluene, Chloroform, Chlorobenzene or any other non-hazardous liquids)
3. Study of the variation of viscosity of sucrose solution with the concentration of a solute
4. Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (Ethyl acetate, Toluene, Chlorobenzene, any other non-hazardous liquids)

5. Study of variation of surface tension of detergent solution with concentration.
6. Determination of specific and molar refraction by Abbes Refractometer. (Ethyl acetate, Methyl acetate, Ethylene Chloride)
7. Determination of the composition of liquid mixture by refractometry. (Toluene & Alcohol, Water & Sucrose)
8. Determination of partition/distribution coefficient - i) Acetic acid in water and cyclohexane. ii) Acetic acid in Water and Butanol. iii) Benzoic acid in water and toluene.

## BSc Semester 2 – Chemistry (Hons) with specialization in Analytical Chemistry

### Title of the Course: OE – 2: Molecules of Life

| Number of Theory Credits                                                                                                                                                                                  | Number of lecture hours/semester | Number of practical Credits | Number of practical hours/ semesters |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|
| 3                                                                                                                                                                                                         | 42                               | -                           | 42                                   |
| <b>Content of Theory Course 2</b>                                                                                                                                                                         |                                  |                             | <b>42 Hrs</b>                        |
| <b>Unit – 1</b>                                                                                                                                                                                           |                                  |                             | <b>14</b>                            |
| <b>Carbohydrates</b>                                                                                                                                                                                      |                                  |                             |                                      |
| Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structures. Epimers, mutarotation and anomers.                            |                                  |                             |                                      |
| Linkage between monosaccharides, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.                                 |                                  |                             |                                      |
| <b>Amino Acids, Peptides and Proteins</b>                                                                                                                                                                 |                                  |                             |                                      |
| Classification of amino acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides. |                                  |                             |                                      |
| <b>Unit - 2</b>                                                                                                                                                                                           |                                  |                             | <b>14</b>                            |
| <b>Enzymes and correlation with drug action</b>                                                                                                                                                           |                                  |                             |                                      |
| Mechanism of enzyme action, factors affecting enzyme action, Co-enzymes and cofactors and their role in biological reactions, Specificity of enzyme action (including stereospecificity),                 |                                  |                             |                                      |
| Enzyme inhibitors and their importance, phenomenon of inhibition (Competitive and Non competitive inhibition including allosteric inhibition).                                                            |                                  |                             |                                      |
| <b>Drug action</b> -receptor theory. Structure–activity relationships of drug molecules, binding role of –OH group, -NH <sub>2</sub> group, double bond and aromatic ring                                 |                                  |                             |                                      |
| <b>Lipids</b>                                                                                                                                                                                             |                                  |                             |                                      |
| Introduction to lipids, classification. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol).                                                                   |                                  |                             |                                      |
| <b>Unit - 3</b>                                                                                                                                                                                           |                                  |                             | <b>14</b>                            |
| <b>Nucleic Acids</b>                                                                                                                                                                                      |                                  |                             |                                      |
| Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides ( <b>nomenclature</b> ),                             |                                  |                             |                                      |

Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (**types of RNA**), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation.

### Concept of Energy in Biosystems

Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates.

### Text Books

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry (Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Biochemistry 7th Ed.*,
5. W. H. Freeman. Berg, J.M., Tymoczko, J.L. & Stryer, L. *Biochemistry*, , 2002.

### References

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |

Sd/-

## Mangalore University

### Name of the Degree Program: BSc (Honors) Chemistry with Specialization in Industrial Chemistry

Discipline Core: Chemistry      Total Credits for the Program: 176

Starting year of implementation: 2021-22

Program Outcomes:

By the end of the program the students will be able to:

(Refer to literature on outcome based education (OBE) for details on Program Outcomes)

1. **PO. 1:** To instil in students an enthusiasm for industrial chemistry, an appreciation of its application in different contexts, and to involve them in an intellectually stimulating and satisfying experience of learning and studying
2. **PO. 2:** To provide students with broad and balanced knowledge and understanding of key chemical concepts and to develop in students a range of practical skills so that they can understand and assess risks and work safely and competently in the laboratory.
3. **PO. 3:** To develop in students the ability to apply standard methodology to the solution of problems in industrial chemistry
4. **PO. 4:** To provide students with knowledge and skill towards employment or higher education in Industrial chemistry or multi-disciplinary areas involving chemistry and to provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes.
5. **PO. 5:** To develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems and to instil critical awareness of advances at the forefront of chemical sciences.
6. **PO. 6:** To prepare students effectively for professional employment or research degrees in chemical sciences and to cater to the demands of chemical Industries of well-trained graduates
7. **PO. 7:** To build confidence in the candidate to be able to work on his own in Industry and Institution of higher education
8. **PO. 8:** To develop an independent and responsible work ethics

Assessment:

Weightage for assessments (in percentage)

| Type of Course        | Formative Assessment / I A | Summative Assessment |
|-----------------------|----------------------------|----------------------|
| Theory                | 40                         | 60                   |
| Practical             | 25                         | 25                   |
| Projects              | ----                       | ----                 |
| Experiential learning | ----                       | ----                 |

**Curriculum Structure for the Undergraduate Degree Program**  
**BSc (Honors) Chemistry with Specialization in Industrial**  
**Chemistry**

**Total Credits for the Program: 176    Starting year of implementation: 2021-22**

**Name of the Degree Program: B.Sc (Honors)**

**Discipline/Subject: Chemistry**

**Program Articulation Matrix:** This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.



| Semester | Title /Name<br>Of the course                                       | Program outcomes<br>that the course<br>addresses (not more<br>than 3 per course)                                                                                                                                                                                                                                                                                                                                                                                  | Pre-<br>requisite<br>courses | Pedagogy##              | Assessment\$                                              |
|----------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------|-----------------------------------------------------------|
|          | <b>DSC-1: Analytical<br/>and Organic<br/>Chemistry-I</b>           | <p>The concepts of chemical analysis, accuracy, precision and statistical data treatment</p> <p>Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.</p> <p>Understand the mechanism of nucleophilic, electrophilic reactions</p>                                                                                                                                                                                                    | P.U.C with Chemistry         | ASSIGNMENT<br>Desk work | Internal Exams,<br>Continuous<br>Evaluation, Sem<br>Exams |
|          | <b>DSC lab-1:<br/>Analytical and<br/>Organic<br/>Practical's-I</b> | <p>The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents</p> <p>The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis.</p> <p>The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation</p> | ---                          | Assignment<br>Desk work | Internal Exams,<br>Continuous<br>Evaluation, Sem<br>Exams |
|          | <b>DSC-2: Inorganic<br/>and Physical<br/>Chemistry-I</b>           | The Bohr's theory of atomic structure and how it was developed<br>Quantum numbers and their necessity in explaining the atomic structure                                                                                                                                                                                                                                                                                                                          |                              | Assignment<br>Desk work | Internal Exams,<br>Continuous<br>Evaluation, Sem<br>Exams |

|          |                                                                                                                                                                                                        |                                                                                                                                                               |                 |                          |                                                    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------|----------------------------------------------------|
|          |                                                                                                                                                                                                        | The concept of unit cell, symmetry elements, Nernst distribution law.                                                                                         |                 |                          |                                                    |
|          | <b>DSC Lab -2: Inorganic and Physical Practical's-I</b>                                                                                                                                                | To prepare standard solutions<br>Techniques like precipitation, filtration, drying and ignition<br><br>Various titrimetric techniques and gravimetric methods |                 | Assignment<br>Desk work  | Internal Exams, Continuous Evaluation, Sem Exams   |
| <b>3</b> | <b>DSC-3: Analytical and Organic Chemistry-II</b><br><b>DSC Lab-3: Analytical and Organic Practical's-II</b>                                                                                           |                                                                                                                                                               | DSC-1 and DSC-2 | Assignment<br>Desk work  | Internal Exams, Continuous Evaluation, Sem Exams   |
| <b>4</b> | <b>DSC-4: Inorganic and Physical Chemistry-II</b><br><b>DSC Lab-4: Inorganic and Physical Practical's-II</b>                                                                                           |                                                                                                                                                               |                 | Assignment<br>Desk work  | Internal Exams, Continuous Evaluation, Sem Exams   |
| <b>5</b> | <b>DSC-5: Selected topics in Inorganic Chemistry</b><br><b>DSC Lab-5: Inorganic Chemistry Practical's</b><br><b>DSC-6: selected topics in Organic Chemistry</b><br><b>DSC Lab-6: Organic Chemistry</b> |                                                                                                                                                               | DSC-3 and DSC-4 | Assignment<br>Desk work  | Internal Exams, Continuous Evaluation, Sem Exams   |
| <b>6</b> | <b>DSC-7: Selected topics in Physical Chemistry</b><br><b>DSC Lab-7: Physical Chemistry Practical's.</b><br><b>DSC-8: Spectroscopy</b><br><b>DSC Lab-8:</b>                                            |                                                                                                                                                               |                 | MOOC,<br>Problem solving | Internal tests, Assignments, Seminar, Debate, Quiz |

|          |                                                                                                                                                                                                                                                                                                                                                               |  |                               |                                |                                                    |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--------------------------------|----------------------------------------------------|
|          | <b>Analytical and Industrial Chemistry Practical's</b>                                                                                                                                                                                                                                                                                                        |  |                               |                                |                                                    |
| <b>7</b> | <b>DSC-9 :Concepts in classical and modern drug discovery process</b><br><b>DSC Lab-9: Advanced industrial physical chemistry practical</b><br><b>DSC-10: Electroanalytical techniques and electrochemical energy systems</b><br><b>DSC Lab-10: Advanced industrial organic chemistry practical's</b><br><b>DSC-11: Organometallic reagents and catalysis</b> |  | DSC-5, DSC-6, DSC-7 and DSC-8 | MOOC, Problem solving          | Internal tests, Assignments, Seminar, Debate, Quiz |
| <b>8</b> | <b>DSC-12: Inorganic and Organic chemical technology DISIPLINE A13(4)</b><br><b>DSC-13: Biopolymers, absorption and drug delivery systems</b><br><b>DSC-14: Petroleum, petrochemicals and non-conventional energy systems</b>                                                                                                                                 |  |                               | Project work, Industrial Visit | Internal tests, Assignments, Seminar, Debate, Quiz |

##Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. The list includes active learning/cour

se projects/ problem or project based learning/ case studies/self-study like seminar, term paper or MOOC

\$ Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

| <b>Course Title: DSC-1:Analytical and Organic Chemistry-I</b> |                                |
|---------------------------------------------------------------|--------------------------------|
| Total Contact Hours: 56                                       | Course Credits: 4              |
| Formative Assessment Marks: 40                                | Duration of ESA/Exam: 3 hr.    |
| Model Syllabus Authors: Chairman                              | Summative Assessment Marks: 60 |

**Course Pre-requisite(s):** *Mention only course titles from the curriculum that are needed to be taken by the students before registering for this course.*

***PUC with Chemistry***

**Course Outcomes (COs):**

At the end of the course the student should be able to:

*(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)*

1. The concepts of chemical analysis, accuracy, precision and statistical data treatment
2. Prepare the solutions after calculating the required quantity of salts in preparing the reagents/solutions and dilution of stock solution.
3. The concept of volumetric and gravimetric analysis and deducing the conversion factor for determination
4. Handling of toxic chemicals, concentrated acids and organic solvents and practice safety procedures.
5. The concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming
6. The Concept of aromaticity, resonance, hyper conjugation, etc.
7. Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.
8. Understand the mechanism of nucleophilic, electrophilic reactions

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

| Course Outcomes (COs) / Program Outcomes (POs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|
| 1                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 2                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 3                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 4                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 5                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 6                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 7                                              | X |   |   |   |   |   |   |   |   |    |    |    |
| 8                                              | X |   |   |   |   |   |   |   |   |    |    |    |

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

### **BSc Semester 1 – Chemistry (Hons) with specialization in Industrial Chemistry**

#### **Title of the Course: DSC-1: Analytical and Organic Chemistry – I**

| Number of Theory Credits | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|--------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 4                        | 56                                | 2                           | 56                                   |

| Content of Theory Course 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 56 Hr.    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit-1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b> |
| <p>Language of analytical chemistry: Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation. Figures of merit of analytical methods and limit of detection (LOD), Limit of quantification (LOQ), linear dynamic range (working range). Errors and treatment of analytical data: Limitations of analytical methods – Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples -mean, median, range, standard deviation and variance. External standard calibration - regression equation (least squares method), correlation coefficient (R<sup>2</sup>). Numerical problems</p> <p>Basic laboratory practices, calibration of glassware (pipette, burette and volumetric flask), Sampling (solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming</p> |           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| acids and organic solvents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |
| <b>Unit-2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>14</b> |
| <p>Titrimetric analysis: Basic principle of titrimetric analysis. Classification, Preparation and dilution of reagents/solutions. Normality, Molarity and Mole fraction. Use of <math>N_1V_1 = N_2V_2</math> formula, Preparation of ppm level solutions from source materials (salts), conversion factors.</p> <p>Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations. Titration curves, Quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity.</p> <p>Complexometric titrimetry: Indicators for EDTA titrations - theory of metal ion indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application-determination of hardness of water.</p> <p>Redox titrimetry: Balancing redox equations, calculation of the equilibrium constant of redox reactions, titration curves, Theory of redox indicators, calculation of standard potentials using Nernst equation. Applications.</p> <p>Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences.</p> <p>Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, Factors influencing precipitation, Co-precipitation, post-precipitation, Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG)).</p> <p>Numerical problems on all the above aspects.</p> |           |
| <b>Unt-3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>14</b> |
| <p>Classification and nomenclature of organic compounds, Hybridization, Shapes of organic molecules, Influence of hybridization on bond properties.</p> <p><b>Nature of bonding in Organic molecules</b></p> <p>Formation of Covalent bond, Types of chemical bonding, localized and delocalized, conjugation and cross conjugation, concept of resonance, electronic displacements: Inductive effect, Electromeric effect, Resonance and Hyper conjugation, cross conjugation explanation with examples. Concept of resonance, aromaticity, Huckel rule, anti-aromaticity explanation with examples. Strengths of Organic acid and bases: Comparative study with emphasis on factors effecting pK values. Relative strength of aliphatic and aromatic carboxylic acids-Acetic acid and chloroacetic acid, acetic acid and propionic acid, acetic acid and Benzoic acid. Steric effect-Relative stability of trans and cis-2-butene.</p> <p><b>Mechanisms of Organic Reactions</b></p> <p>Notations used to represent electron movements and directions of reactions- curly arrows, formal charges. Types of bonds breaking- homolytic and heterolytic. Types of reagents-Electrophiles, nucleophiles, nucleophilicity and basicity. Types of organic reactions- substitution, addition, elimination, rearrangement and pericyclic reactions, explanation with examples.</p> <p>Chemistry of Aliphatic hydrocarbons, Carbon-Carbon Sigma bonds</p> <p>Chemistry of alkanes: Formation of alkanes, Wurtz reaction, Wurtz-Fittig reaction, Free radical substitution, Halogenation- relative reactivity and selectivity</p>                             |           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <p><b>Carbon-carbon pi bonds</b></p> <p>Formation of alkenes and alkynes by elimination reaction. Mechanism of E1, E2, E1cb reaction. Saytzeff and Hofmann eliminations. Addition of HBr to propene, Free radical addition of HBr to propene. Addition of halogens to alkenes-carbocation and halonium ion mechanism. Stereospecificity of halogen addition. Ozonolysis mechanism - ozonolysis of propene. Addition of hydrogen halides to alkenes, mechanism, regioselectivity and relative rates of addition. Hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples, 1,2 and 1,4- addition reactions in conjugated dienes. Diels-Alder reaction, Allylic and benzylic bromination and mechanism in propene, 1-butene, 1-toluene and ethylbenzene.</p> |                                              |
| <p style="text-align: center;"><b>Unit-4</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p style="text-align: center;"><b>14</b></p> |
| <p>Nucleophilic substitution at saturated carbon. Mechanism of SN1 and SN2 reactions with suitable examples. Energy profile diagrams, Stereochemistry and factors effecting SN1 and SN2 reactions.</p> <p>Aromatic Electrophilic substitution reactions, Mechanisms, <math>\sigma</math> and <math>\pi</math> complexes, Halogenation, Nitration, Sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, Ortho-para ratio.</p> <p>Aromatic nucleophilic substitution reaction: SNAr and Benzyne mechanism with suitable examples</p>                                                                                                                                                                            |                                              |

### Reference Text Books

1. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
2. Fundamentals of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
3. Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
4. Practical Volumetric Analysis, Peter A C McPherson, Royal Society of Chemistry, Cambridge, UK (2015).
5. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
6. Finar, I. L. *Organic Chemistry (Volume I)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
7. McMurry, J. E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013
8. Organic Reaction mechanism by V. K. Ahluwalia and K. Parashar (Narosa Publishers).
9. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor. (Narosa Publishers)
10. A Guide book to mechanism in Organic Chemistry by Peter sykes. Pearson.

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| Total                     | 100                |

**Content of Practical Course 1:** List of Experiments to be conducted

### **PART-A Analytical Chemistry**

1. Calibration of glassware, pipette, burette and volumetric flask.
2. Determination of sodium carbonate and sodium bicarbonate in a mixture.
3. Determination of alkali present in soaps/detergents
4. Determination of iron(II) using potassium dichromate
5. Determination of oxalic acid using potassium permanganate solution
6. Standardization of EDTA solution and determination of hardness of water
7. Standardization of silver nitrate and determination of chloride in a water sample (demonstration)
8. Determination of alkali content in antacids

### **PART-B Organic Chemistry**

1. Selection of suitable solvents for Purification/Crystallization of organic compounds.
2. Preparation of acetanilide from aniline using Zn/acetic acid (Green method).
3. Synthesis of p-nitro acetanilide from acetanilide using nitrating mixture.
4. Bromination of acetanilide (i) Conventional method and/or (ii) with ceric ammonium nitrate and potassium bromide (Green method).
5. Hydrolysis of methyl m-nitrobenzoate to m-nitrobenzoic acid (Conventional method)
6. Synthesis of diazoaminobenzene from aniline (conventional method).
7. Preparation of dibenzalacetone (Green method).
8. Diels Alder reaction between furan and maleic acid (Green method).

## **BSc Semester 1 – Chemistry (Hons) with specialization in Industrial Chemistry**

**Title of the Course: OE-1: CHEMISTRY IN DAILY LIFE**

| Number of Theory Credits | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|--------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 3                        | 42                                | -                           | 42                                   |



| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>42 Hr.</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit-1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b>     |
| <p><b>Dairy Products:</b> Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk. Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages.</p> <p><b>Food additives, adulterants, and contaminants-</b> Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose, and sodium cyclamate. Flavors: Vanillin, alkyl esters (fruit flavors), and monosodium glutamate.</p> <p><b>Artificial food colorants:</b> Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food.</p> |               |
| <b>Unit-2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b>     |
| <p><b>Vitamins:</b> Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E &amp; Vitamin K1.</p> <p><b>Oils and fats:</b> Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. Halphen test.</p> <p><b>Soaps &amp; Detergents:</b> Definition, classification, manufacturing of soaps and detergents, composition and uses</p>                                                                                                                                                                                                                                                                                   |               |
| <b>Unit-3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b>     |
| <p><b>Chemical and Renewable Energy Sources:</b> principles and applications of primary &amp; secondary batteries and fuel cells. Basics of solar energy, future energy storer.</p> <p><b>Polymers:</b> Basic concept of polymers, classification and characteristics of polymers. Applications of polymers as plastics in electronic, automobile components, medical fields, and aerospace materials. Problems of plastic waste management. Strategies for the development of environment-friendly polymers.</p>                                                                                                                                                                                                                                                                   |               |

### Reference Text Books

1. B. K. Sharma: Introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry- Ashtoush Kar.
3. Analysis of Foods – H.E. Cox: 13.
4. Chemical Analysis of Foods – H.E. Cox and Pearson.
5. Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4th ed. New Age International (1998)
6. Physical Chemistry – P I Atkins and J. de Paula – 7th Ed. 2002, Oxford University Press.
7. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6th ed. 2001, FAI.
8. Organic Chemistry by I. L. Finar, Vol. 1 & 2. 9. Polymer Science and Technology, J. R. Fried (Prentice Hall).

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| Total                     | 100                |

**BSc Semester 2 – Chemistry (Hons) with specialization in Industrial Chemistry**  
**Title of the Course: DSC – 2: INORGANIC AND PHYSICAL CHEMISTRY - I**

| Number of Theory Credits | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|--------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 4                        | 56                                | 2                           | 56                                   |

| Content of Theory Course 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 56Hr      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit-1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>14</b> |
| Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of $\psi$ and $\psi^2$ . Quantum numbers and their significance.<br>Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.<br>Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements (Z=1-30), effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic Table.          |           |
| <b>Unit-2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>14</b> |
| s, p, d and f-block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s and p-block elements:<br>(a) Atomic radii (van der Waals)<br>(b) Ionic and crystal radii.<br>(c) Covalent radii<br>(d) Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.<br>(e) Electron gain enthalpy, trends of electron gain enthalpy.<br>(f) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.<br>Trends in the chemistry of the compounds of groups 13 to 17 (hydrides, carbides, oxides and halides) are to be discussed. |           |
| <b>Unit-3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>14</b> |
| <b>Gaseous State</b><br>Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p>collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosity, calculation of <math>\sigma</math> and <math>\eta</math>, variation of viscosity with temperature and pressure.</p> <p>Maxwell's Boltzmann distribution law of molecular velocities (Most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (Mathematical derivation not required), law of equipartition of energy.</p> <p>Behaviour of real gases: Deviation from ideal gas behaviour. Compressibility factor (Z) and its variation with pressure for different gases. Causes of deviation from ideal behaviour, vander Waals equation of state (No derivation) and application in explaining real gas behaviour. Critical phenomena - Andrews isotherms of CO<sub>2</sub>, critical constants and their calculation from van der Waals equation, Continuity of states, Law of corresponding states. Numerical problems.</p> <p><b>Liquid State</b></p> <p><b>Surface Tension:</b> Definition and its determination using stalagmometer, effect of temperature and solute on surface tension</p> <p><b>Viscosity:</b> Definition, Coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces.</p> <p><b>Refraction:</b> Specific and molar refraction- definition and advantages. Determination of refractive index by Abbes Refractometer.</p> <p>Additive and constitutive properties.</p> <p><b>Parachor:</b> Definition, Atomic and structure parachor, Elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and chemical constitution.</p> <p>Numerical Problems.</p> |           |
| <b>Unit-4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>14</b> |
| <p><b>Solids</b></p> <p><b>Forms of solids:</b> Unit cell and space lattice, anisotropy of crystals, size and shape of crystals,</p> <p>Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry (Symmetry elements), Crystal systems, Bravais lattice types and identification of lattice planes.</p> <p>Miller indices and its calculation, X-Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, Single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems.</p> <p><b>Liquid Crystals</b></p> <p>Explanation, classification with examples- Smectic, nematic, cholesteric, disc shaped and polymeric. Structures of nematic and cholesteric phases-molecular arrangements in nematic and cholesteric liquid crystals. Applications of liquid crystals in LCDs and thermal sensing.</p> <p><b>Distribution Law</b></p> <p>Nernst Distribution Law - Statement and its derivation. Distribution constant, factors affecting distribution constant, validity of Distribution Law, Modification of distribution law when molecules undergo a) Association b) Dissociation. Application of Distribution Law in Solvent extraction. Derivation for simple and multiple extraction. Principles of distribution law in Parkes Process of desilverisation of lead. Numerical Problems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |

## Reference Text Books

1. Concise Inorganic Chemistry: J D Lee, 4th Edn, Wiley, (2021)
2. Fundamentals Concepts of Inorganic Chemistry, Vol 1 and 2, 2nd Edition, Asim K Das, CBS Publishers and Distributors, (2013)
3. Basic Inorganic Chemistry, F A Cotton, G Wilkinson and P. L. Gaus, 3rd Edition. Wiley. India
4. Inorganic Chemistry, 2nd Edn. Catherine E. Housecroft and A.G. Sharpe, Pearson Prentice Hall (2005)
5. Atkins Physical Chemistry.8th Edition. Peter Atkins & Julio De Paula Oxford University Press.
6. Physical Chemistry by Samuel Glasstone, ELBS (1982).
7. A Text book of Physical Chemistry, A S Negi & S C Anand, New Age International Publishers (2007).
8. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.
9. A Text Book of Physical Chemistry P.L.Soni , O.P. Dharmarhaand and U.N.Dash, Sultan Chand and Sons.
10. Advanced Physical Chemistry, Gurdeep Raj, Goel Publishing House (2018)

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| Total                     | 100                |

## Content of Practical Course 2: List of Experiments to be conducted

### PART-A Inorganic Chemistry

#### TITRIMETRY

1. Determination of carbonate and hydroxide present in a mixture.
2. Determination of oxalic acid and sodium oxalate in a given mixture using standard  $\text{KMnO}_4/\text{NaOH}$  solution
3. Standardization of potassium permanganate solution and determination of nitrite in a water sample
4. Determination of chlorine in bleaching powder using iodometric method.

#### GRAVIMETRY

1. Determination of  $\text{Ba}^{2+}$  as  $\text{BaSO}_4$
2. Determination of  $\text{Cu}^{2+}$  as  $\text{CuSCN}$
3. Determination of  $\text{Fe}^{2+}$  as  $\text{Fe}_2\text{O}_3$
4. Determination of  $\text{Ni}^{2+}$  as  $\text{Ni(DMG)}_2$  complex

## PART-B Physical Chemistry

1. Safety Practices in the Chemistry Laboratory, Knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glassware's
2. Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (Ethyl acetate, Toluene, Chloroform, Chlorobenzene or any other non-hazardous liquids)
3. Study of the variation of viscosity of sucrose solution with the concentration of a solute
4. Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (Ethyl acetate, Toluene, Chlorobenzene, any other non-hazardous liquids)
5. Study of variation of surface tension of detergent solution with concentration.
6. Determination of specific and molar refraction by Abbes Refractometer. (Ethyl acetate, Methyl acetate, Ethylene Chloride)
7. Determination of the composition of liquid mixture by refractometry. (Toluene & Alcohol, Water & Sucrose)
8. Determination of partition/distribution coefficient - i) Acetic acid in water and cyclohexane. ii) Acetic acid in Water and Butanol. iii) Benzoic acid in water and toluene.

## BSc Semester 2 – Chemistry (Hons) with specialization in Industrial Chemistry

Title of the Course: OE – 2: Molecules of Life

| Number of Theory Credits | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|--------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 3                        | 42                                | -                           | 42                                   |

| Content of Theory Course 2                                                                                                                                                                                                                                                                                                                                                          | 42 Hr.    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Unit-1</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b> |
| <b>Carbohydrates</b><br>Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structures. Epimers, mutarotation and anomers.<br>Linkage between monosaccharides, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation. |           |
| <b>Amino Acids, Peptides and Proteins</b><br>Classification of amino acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides.                                                                                                                              |           |
| <b>Unit-2</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>14</b> |
| <b>Enzymes and correlation with drug action</b><br>Mechanism of enzyme action, factors affecting enzyme action, Co-enzymes and                                                                                                                                                                                                                                                      |           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p>cofactors and their role in biological reactions, Specificity of enzyme action (including stereospecificity),</p> <p>Enzyme inhibitors and their importance, phenomenon of inhibition (Competitive and Non competitive inhibition including allosteric inhibition).</p> <p><b>Drug action</b>-receptor theory. Structure–activity relationships of drug molecules, binding role of –OH group, -NH<sub>2</sub> group, double bond and aromatic ring</p> <p><b>Lipids</b></p> <p>Introduction to lipids, classification. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol).</p>                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| <b>Unit-3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>14</b> |
| <p><b>Nucleic Acids</b></p> <p>Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (<b>nomenclature</b>), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (<b>types of RNA</b>), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation.</p> <p><b>Concept of Energy in Biosystems</b></p> <p>Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates.</p> |           |

### Reference Text Books

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry (Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Biochemistry 7th Ed.*,
5. W. H. Freeman. Berg, J.M., Tymoczko, J.L. & Stryer, L. *Biochemistry*, , 2002.

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| Total                     | 100                |

Sd/-

## MANGALORE UNIVERSITY

**Name of the Degree Program: BSc (Honors) Chemistry with Organic Specialization**

**Discipline Core: Chemistry      Total Credits for the Program: 176**

**Starting year of implementation: 2021-22**

### **Program Outcomes:**

**By the end of the program the students will be able to:**

**(Refer to literature on outcome based education (OBE) for details on Program Outcomes)**

1. **PO. 1:** To create enthusiasm among students for organic chemistry and its application in various fields of life.
2. **PO. 2:** To provide students with broad and balanced knowledge and understanding of key concepts in organic chemistry
3. **PO. 3:** To develop in students a range of practical skills so that they can understand and assess risks and work safely measures to be followed in the laboratory.
4. **PO. 4:** To develop among students the ability to apply standard methodology to the solution of problems in organic chemistry
5. **PO. 5:** To provide students with knowledge and skill towards employment or higher education in organic chemistry or multi-disciplinary areas involving organic chemistry.
6. **PO. 6:** To provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes and to cater to the demands of chemical Industries through well-trained graduates
7. **PO. 7:** To develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
8. **PO. 8:** To instil critical awareness of advances at the forefront of chemical sciences, to prepare students effectively for professional employment or research degrees in chemical sciences with emphasis on organic chemistry and to develop an independent and responsible work ethics

### **Assessment:**

#### **Weightage for assessments (in percentage)**

| Type of Course                           | Formative Assessment / IA | Summative Assessment |
|------------------------------------------|---------------------------|----------------------|
| Theory                                   | 40                        | 60                   |
| Practical                                | 25                        | 25                   |
| Projects                                 | -                         | -                    |
| Experiential Learning (Internships etc.) | -                         | -                    |

# Curriculum Structure for the Undergraduate Degree Program

## BSc (Honors) Chemistry with Organic Specialization

**Total Credits for the Program: 176      Starting year of implementation: 2021-22**

**Name of the Degree Program: B. Sc (Honors) Discipline/Subject: Chemistry**

### Program Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately

| Semester | Title /Name<br>Of the course                             | Program outcomes<br>that the course<br>addresses (not more<br>than 3 per course)                                                                                                                                                                                                                                                                                            | Pre-<br>requisite<br>course(s) | Pedagogy##              | Assessment\$                                                 |
|----------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------|--------------------------------------------------------------|
| 1        | DSC-1:<br>Analytical and<br>Organic<br>Chemistry-I       | <ul style="list-style-type: none"> <li>The concepts of chemical analysis, accuracy, precision and statistical data treatment</li> <li>Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.</li> <li>Understand the mechanism of nucleophilic, electrophilic reactions</li> </ul>                                                               | P.U.C with Chemistry           | Assignment<br>Desk work | Internal<br>Exams,<br>Continuous<br>Evaluation,<br>Sem Exams |
|          | DSC lab-1:<br>Analytical and<br>Organic<br>Practical's-I | <ul style="list-style-type: none"> <li>The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents</li> <li>The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis.</li> </ul> | -                              | Assignment<br>Desk work | Internal<br>Exams,<br>Continuous<br>Evaluation,<br>Sem Exams |



|   |                                                                                                              |                                                                                                                                                                                                                                                                                 |                 |                      |                                                  |
|---|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|--------------------------------------------------|
|   |                                                                                                              | <ul style="list-style-type: none"> <li>The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation</li> </ul>                                                                                                   |                 |                      |                                                  |
| 2 | <b>DSC-2: Inorganic and Physical Chemistry-I</b>                                                             | <ul style="list-style-type: none"> <li>The Bohr's theory of atomic structure and how it was developed</li> <li>Quantum numbers and their necessity in explaining the atomic structure</li> <li>The concept of unit cell, symmetry elements, Nernst distribution law.</li> </ul> | -               | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
|   | <b>DSC Lab -2: Inorganic and Physical Practical's-I</b>                                                      | <ul style="list-style-type: none"> <li>To prepare standard solutions</li> <li>Techniques like precipitation, filtration, drying and ignition</li> <li>Various titrimetric techniques and gravimetric methods</li> </ul>                                                         |                 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
| 3 | <b>DSC-3: Analytical and Organic Chemistry-II</b><br><b>DSC Lab-3: Analytical and Organic Practical's-II</b> |                                                                                                                                                                                                                                                                                 | DSC-1 and DSC-2 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |
|   |                                                                                                              |                                                                                                                                                                                                                                                                                 |                 |                      |                                                  |
| 4 | <b>DSC-4: Inorganic and Physical Chemistry-II</b><br><b>DSC Lab-4: Inorganic and Physical Practical's-II</b> |                                                                                                                                                                                                                                                                                 |                 | Assignment Desk work | Internal Exams, Continuous Evaluation, Sem Exams |

|    |                                                                                                                                                                                                                                                                                           |  |                               |                                |                                                    |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--------------------------------|----------------------------------------------------|
|    |                                                                                                                                                                                                                                                                                           |  |                               |                                |                                                    |
| 5. | <b>DSC-5: Selected topics in Inorganic Chemistry</b><br><b>DSC Lab-5: Inorganic Chemistry Practical's</b><br><b>DSC-6: selected topics in Organic Chemistry</b><br><b>DSC Lab-6: Organic Chemistry Practical's</b>                                                                        |  | DSC-3 and DSC-4               | MOOC, Problem solving          | Internal tests, Assignments, Quiz                  |
|    |                                                                                                                                                                                                                                                                                           |  |                               |                                |                                                    |
| 6. | <b>DSC-7: Selected topics in Physical Chemistry</b><br><b>DSC Lab-7: Physical Chemistry Practical's.</b><br><b>DSC-8: Spectroscopy</b><br><b>DSC Lab-8: Analytical and Industrial Chemistry Practical's</b>                                                                               |  |                               | MOOC, Problem solving          | Internal tests, Assignments, Quiz                  |
|    |                                                                                                                                                                                                                                                                                           |  |                               |                                |                                                    |
| 7. | <b>DSC-9: Advanced Organic Chemistry-I</b><br><b>DSC Lab-9: Multistep Organic Synthesis.</b><br><b>DSC-10: Synthetic Reagents and Spectroscopic Techniques.</b><br><b>DSC Lab-10: Isolation and Separation Techniques</b><br><b>DSC-11: Reaction Mechanism and Organic Photochemistry</b> |  | DSC-5, DSC-6, DSC-7 and DSC-8 | MOOC, Problem solving          | Internal tests, Assignments, Seminar, Debate, Quiz |
|    |                                                                                                                                                                                                                                                                                           |  |                               |                                |                                                    |
| 8. | <b>DSC-12: Synthetic Methods</b><br><b>DSC-13: Natural Product Chemistry</b><br><b>DSC-14: Advanced Organic</b>                                                                                                                                                                           |  |                               | Project work, Industrial Visit | Internal tests, Assignments, Seminar, Debate, Quiz |

|  |                     |  |  |  |  |
|--|---------------------|--|--|--|--|
|  | <b>Chemistry-II</b> |  |  |  |  |
|--|---------------------|--|--|--|--|

#

## Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. The list includes active learning/ course projects/ problem or project based learning/ case studies/self study like seminar, term paper or MOOC

\$ Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

## BSc Chemistry (Honors) with Organic Specialization Semester 1

|                                                         |                                |
|---------------------------------------------------------|--------------------------------|
| Course Title: DSC-1: Analytical and Organic Chemistry-I |                                |
| Total Contact Hours: 56                                 | Course Credits: 4              |
| Formative Assessment Marks: 40                          | Duration of ESA/Exam: 3 hrs    |
| Model Syllabus Authors: Chairman                        | Summative Assessment Marks: 60 |

**Course Pre-requisite(s):** *Mention only course titles from the curriculum that are needed to be taken by the students before registering for this course.*

## ***PUC with Chemistry***

**Course Outcomes (COs):**

At the end of the course the student should be able to:

*(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)*

1. The concepts of chemical analysis, accuracy, precision and statistical data treatment
2. Prepare the solutions after calculating the required quantity of salts in preparing the reagents/solutions and dilution of stock solution.
3. The concept of volumetric and gravimetric analysis and deducing the conversion factor for determination
4. Handling of toxic chemicals, concentrated acids and organic solvents and practice safety procedures.
5. The concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming
6. The Concept of aromaticity, resonance, hyper conjugation, etc.
7. Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.
8. Understand the mechanism of nucleophilic, electrophilic reactions

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

[illegible]

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

### BSc Semester 1 – Chemistry (Hons) with Organic Specialization

#### Title of the Course: DSC-1: Analytical and Organic Chemistry – I

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 56                                | 2                           | 56                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |                             | <b>56Hrs</b>                         |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             | <b>14</b>                            |
| Language of analytical chemistry: Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation. Figures of merit of analytical methods and limit of detection (LOD), Limit of quantification (LOQ), linear dynamic range (working range).                                                                                               |                                   |                             |                                      |
| Errors and treatment of analytical data: Limitations of analytical methods – Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples -mean, median, range, standard deviation and variance. External standard calibration - regression equation (least squares method), correlation coefficient ( $R^2$ ).                                                                                                   |                                   |                             |                                      |
| Numerical problems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   |                             |                                      |
| Basic laboratory practices, calibration of glassware (pipette, burette and volumetric flask), Sampling (solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents. |                                   |                             |                                      |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             | <b>14</b>                            |
| Titrimetric analysis: Basic principle of titrimetric analysis. Classification, Preparation and dilution of reagents/solutions. Normality, Molarity and Mole fraction. Use of $N_1V_1 = N_2V_2$ formula, Preparation of ppm level solutions from source materials (salts), conversion factors.                                                                                                                                                                                                      |                                   |                             |                                      |
| Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations. Titration curves, Quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity.                                                                                                                                                                                                                            |                                   |                             |                                      |
| Complexometric titrimetry: Indicators for EDTA titrations - theory of metal ion indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application-determination of hardness of water.                                                                                                                                                                                                                                                             |                                   |                             |                                      |
| Redox titrimetry: Balancing redox equations, calculation of the equilibrium constant of redox reactions, titration curves, Theory of redox indicators, calculation of standard potentials using Nernst equation. Applications.                                                                                                                                                                                                                                                                     |                                   |                             |                                      |
| Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences.                                                                                                                                                                                                                                                                                                          |                                   |                             |                                      |
| Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, Factors influencing precipitation, Co-precipitation, post-precipitation, Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG)).                                                                                                                                                                                             |                                   |                             |                                      |
| Numerical problems on all the above aspects.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                   |                             |                                      |
| <b>Unit – 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             | <b>14</b>                            |
| Classification and nomenclature of organic compounds, Hybridization, Shapes of organic molecules, Influence of hybridization on bond properties.                                                                                                                                                                                                                                                                                                                                                   |                                   |                             |                                      |
| <b>Nature of bonding in Organic molecules</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                   |                             |                                      |
| Formation of Covalent bond, Types of chemical bonding, localized and delocalized, conjugation and cross conjugation, concept of resonance, electronic displacements: Inductive effect, Electromeric                                                                                                                                                                                                                                                                                                |                                   |                             |                                      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p>effect, Resonance and Hyper conjugation, cross conjugation explanation with examples. Concept of resonance, aromaticity, Huckel rule, anti-aromaticity explanation with examples. Strengths of Organic acid and bases: Comparative study with emphasis on factors effecting pK values. Relative strength of aliphatic and aromatic carboxylic acids-Acetic acid and chloroacetic acid, acetic acid and propionic acid, acetic acid and Benzoic acid. Steric effect- Relative stability of trans and cis-2-butene.</p> <p><b>Mechanisms of Organic Reactions</b></p> <p>Notations used to represent electron movements and directions of reactions- curly arrows, formal charges. Types of bonds breaking- homolytic and heterolytic. Types of reagents-Electrophiles, nucleophiles, nucleophilicity and basicity. Types of organic reactions- substitution, addition, elimination, rearrangement and pericyclic reactions, explanation with examples.</p> <p>Chemistry of Aliphatic hydrocarbons, Carbon-Carbon Sigma bonds</p> <p>Chemistry of alkanes: Formation of alkanes, Wurtz reaction, Wurtz-Fittig reaction, Free radical substitution, Halogenation- relative reactivity and selectivity</p> <p><b>Carbon-carbon pi bonds</b></p> <p>Formation of alkenes and alkynes by elimination reaction. Mechanism of E1, E2, E1cb reaction. Saytzeff and Hofmann eliminations. Addition of HBr to propene, Free radical addition of HBr to propene. Addition of halogens to alkenes-carbocation and halonium ion mechanism. Stereospecificity of halogen addition. Ozonolysis mechanism - ozonolysis of propene. Addition of hydrogen halides to alkenes, mechanism, regioselectivity and relative rates of addition. Hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples, 1,2 and 1,4- addition reactions in conjugated dienes. Diels-Alder reaction, Allylic and benzylic bromination and mechanism in propene, 1-butene, 1-toluene and ethylbenzene.</p> |           |
| <b>Unit – 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>14</b> |
| <p>Nucleophilic substitution at saturated carbon. Mechanism of <math>S_N^1</math> and <math>S_N^2</math> reactions with suitable examples. Energy profile diagrams, Stereochemistry and factors effecting <math>S_N^1</math> and <math>S_N^2</math> reactions.</p> <p>Aromatic Electrophilic substitution reactions, Mechanisms, <math>\sigma</math> and <math>\pi</math> complexes, Halogenation, Nitration, Sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, Ortho-para ratio.</p> <p>Aromatic nucleophilic substitution reaction: <math>S_N^Ar</math> and Benzyne mechanism with suitable examples</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |

### Text Books

1. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6<sup>th</sup> edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
2. Fundamentals of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8<sup>th</sup> edition, Saunders College Publishing, New York (2005).
3. Analytical Chemistry, G.D. Christian, 6<sup>th</sup> edition, Wiley-India (2007).
4. Practical Volumetric Analysis, Peter A C McPherson, Royal Society of Chemistry, Cambridge, UK (2015).
5. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
6. Finar, I. L. *Organic Chemistry (Volume I)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
7. McMurry, J. E. *Fundamentals of Organic Chemistry*, 7<sup>th</sup> Ed. Cengage Learning India Edition, 2013
8. Organic Reaction mechanism by V. K. Ahluwalia and K. Parashar (Narosa Publishers).
9. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor. (Narosa Publishers)
10. A Guide book to mechanism in Organic Chemistry by Peter sykes. Pearson.

### References

#### Pedagogy

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |

|              |            |
|--------------|------------|
| Sem End Exam | 60         |
| <b>Total</b> | <b>100</b> |

### Content of Practical Course 1: List of Experiments to be conducted

#### PART-A Analytical Chemistry

1. Calibration of glassware, pipette, burette and volumetric flask.
2. Determination of sodium carbonate and sodium bicarbonate in a mixture.
3. Determination of alkali present in soaps/detergents
4. Determination of iron(II) using potassium dichromate
5. Determination of oxalic acid using potassium permanganate solution
6. Standardization of EDTA solution and determination of hardness of water
7. Standardization of silver nitrate and determination of chloride in a water sample (demonstration)
8. Determination of alkali content in antacids

#### PART-B Organic Chemistry

1. Selection of suitable solvents for Purification/Crystallization of organic compounds.
2. Preparation of acetanilide from aniline using Zn/acetic acid (Green method).
3. Synthesis of p-nitro acetanilide from acetanilide using nitrating mixture.
4. Bromination of acetanilide (i) Conventional method and/or (ii) with ceric ammonium nitrate and potassium bromide (Green method).
5. Hydrolysis of methyl m-nitrobenzoate to m-nitrobenzoic acid (Conventional method)
6. Synthesis of diazoaminobenzene from aniline (conventional method).
7. Preparation of dibenzalacetone (Green method).
8. Diels Alder reaction between furan and maleic acid (Green method).

### BSc Semester 1 – Chemistry (Hons) with Organic Specialization

#### Title of the Course: OE-1: CHEMISTRY IN DAILY LIFE

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Number of lecture hours/ semester | Number of practical Credits | Number of practical hours/ semesters |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 42                                | -                           | 42                                   |
| <b>Content of Theory Course 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   |                             | <b>42 Hrs</b>                        |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                             | <b>14</b>                            |
| <b>Dairy Products:</b> Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk. Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages.<br><b>Food additives, adulterants, and contaminants-</b> Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose, and sodium cyclamate. Flavors: Vanillin, alkyl esters (fruit flavors), and monosodium |                                   |                             |                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                             |                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                             |                                      |

|                                                                                                                                                                                                                                                                                                                        |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| glutamate.<br><b>Artificial food colorants:</b> Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food.                                                                                                                                                                     |           |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                        | <b>14</b> |
| <b>Vitamins:</b> Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1.                                                                                                                                                |           |
| <b>Oils and fats:</b> Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. Halphen test.                                                                                                                                              |           |
| <b>Soaps &amp; Detergents:</b> Definition, classification, manufacturing of soaps and detergents, composition and uses                                                                                                                                                                                                 |           |
| <b>Unit – 3</b>                                                                                                                                                                                                                                                                                                        | <b>14</b> |
| <b>Chemical and Renewable Energy Sources:</b> principles and applications of primary & secondary batteries and fuel cells. Basics of solar energy, future energy storer.                                                                                                                                               |           |
| <b>Polymers:</b> Basic concept of polymers, classification and characteristics of polymers. Applications of polymers as plastics in electronic, automobile components, medical fields, and aerospace materials. Problems of plastic waste management. Strategies for the development of environment-friendly polymers. |           |

## Text Books

1. B. K. Sharma: Introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry- Ashtoush Kar.
3. Analysis of Foods – H.E. Cox: 13.
4. Chemical Analysis of Foods – H.E. Cox and Pearson.
5. Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4<sup>th</sup>ed. New Age International (1998)
6. Physical Chemistry – P I Atkins and J. de Paula – 7<sup>th</sup>Ed. 2002, Oxford University Press.
7. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6<sup>th</sup> ed. 2001, FAI.
8. Organic Chemistry by I. L. Finar, Vol. 1 & 2. 9. Polymer Science and Technology, J. R. Fried (Prentice Hall).

## References

## Pedagogy

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |



**BSc Semester 2 – Chemistry (Hons) with Organic Specialization**  
**Title of the Course: DSC – 2: INORGANIC AND PHYSICAL CHEMISTRY - I**

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                             | Number of lecture hours/semester | Number of practical Credits | Number of practical hours/ semesters |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|
| 4                                                                                                                                                                                                                                                                                                                                                                    | 56                               | 2                           | 56                                   |
| <b>Content of Theory Course 2</b>                                                                                                                                                                                                                                                                                                                                    |                                  |                             | <b>56Hrs</b>                         |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of $\psi$ and $\psi^2$ . Quantum numbers and their significance.                                                                                        |                                  |                             |                                      |
| Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.                                                                                                                          |                                  |                             |                                      |
| Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements (Z=1-30), effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic Table.                                                                         |                                  |                             |                                      |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| s, p, d and f-block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s and p-block elements:                                                                                                                                                                                            |                                  |                             |                                      |
| (a) Atomic radii (van der Waals)                                                                                                                                                                                                                                                                                                                                     |                                  |                             |                                      |
| (b) Ionic and crystal radii.                                                                                                                                                                                                                                                                                                                                         |                                  |                             |                                      |
| (c) Covalent radii                                                                                                                                                                                                                                                                                                                                                   |                                  |                             |                                      |
| (d) Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.                                                                                                                                                                                                                              |                                  |                             |                                      |
| (e) Electron gain enthalpy, trends of electron gain enthalpy.                                                                                                                                                                                                                                                                                                        |                                  |                             |                                      |
| (f) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.                                                                                                                                                |                                  |                             |                                      |
| Trends in the chemistry of the compounds of groups 13 to 17 (hydrides, carbides, oxides and halides) are to be discussed.                                                                                                                                                                                                                                            |                                  |                             |                                      |
| <b>Unit – 3</b>                                                                                                                                                                                                                                                                                                                                                      |                                  |                             | <b>14</b>                            |
| <b><u>Gaseous State</u></b>                                                                                                                                                                                                                                                                                                                                          |                                  |                             |                                      |
| Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency, collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosity, calculation of $\sigma$ and $\eta$ , variation of viscosity with temperature and pressure. |                                  |                             |                                      |
| Maxwell's Boltzmann distribution law of molecular velocities (Most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (Mathematical derivation not required), law of equipartition of energy.                                                                                |                                  |                             |                                      |
| Behaviour of real gases: Deviation from ideal gas behaviour. Compressibility factor (Z) and its variation with pressure for different gases. Causes of deviation from ideal behaviour,                                                                                                                                                                               |                                  |                             |                                      |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p>vander Waals equation of state (No derivation) and application in explaining real gas behaviour. Critical phenomena - Andrews isotherms of CO<sub>2</sub>, critical constants and their calculation from van der Waals equation, Continuity of states, Law of corresponding states. Numerical problems.</p> <p><b>Liquid State</b></p> <p><b>Surface Tension:</b> Definition and its determination using stalagmometer, effect of temperature and solute on surface tension</p> <p><b>Viscosity:</b> Definition, Coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces.</p> <p><b>Refraction:</b> Specific and molar refraction- definition and advantages. Determination of refractive index by Abbe's Refractometer.</p> <p>Additive and constitutive properties.</p> <p><b>Parachor:</b> Definition, Atomic and structure parachor, Elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and chemical constitution.</p> <p>Numerical Problems.</p>                                                                                                                                                                                                                                                                                      |           |
| <b>Unit – 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>14</b> |
| <p><b>Liquid Crystals</b></p> <p>Explanation, classification with examples- Smectic, nematic, cholesteric, disc shaped and polymeric. Structures of nematic and cholesteric phases-molecular arrangements in nematic and cholesteric liquid crystals. Applications of liquid crystals in LCDs and thermal sensing.</p> <p><b>Solids</b></p> <p><b>Forms of solids:</b> Unit cell and space lattice, anisotropy of crystals, size and shape of crystals,</p> <p>Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry (Symmetry elements), Crystal systems, Bravais lattice types and identification of lattice planes.</p> <p>Miller indices and its calculation, X-Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, Single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems.</p> <p><b>Distribution Law</b></p> <p>Nernst Distribution Law - Statement and its derivation. Distribution constant, factors affecting distribution constant, validity of Distribution Law, Modification of distribution law when molecules undergo a) Association b) Dissociation. Application of Distribution Law in Solvent extraction. Derivation for simple and multiple extraction. Principles of distribution law in Parkes Process of desilverisation of lead. Numerical Problems.</p> |           |

## Text Books

1. Concise Inorganic Chemistry: J D Lee, 4<sup>th</sup> Edn, Wiley, (2021)
2. Fundamentals Concepts of Inorganic Chemistry, Vol 1 and 2, 2<sup>nd</sup> Edition, Asim K Das, CBS Publishers and Distributors, (2013)
3. Basic Inorganic Chemistry, F A Cotton, G Wilkinson and P. L. Gaus, 3<sup>rd</sup> Edition. Wiley. India
4. Inorganic Chemistry, 2<sup>nd</sup> Edn. Catherine E. Housecroft and A.G. Sharpe, Pearson Prentice Hall (2005)
5. Atkins Physical Chemistry. 8<sup>th</sup> Edition. Peter Atkins & Julio De Paula Oxford University Press.
6. Physical Chemistry by Samuel Glasstone, ELBS (1982).
7. A Text book of Physical Chemistry, A S Negi & S C Anand, New Age International Publishers (2007).
8. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.

9. A Text Book of Physical Chemistry P.L.Soni , O.P. Dharmarhaand and U.N.Dash, Sultan Chand and Sons.
10. Advanced Physical Chemistry, Gurdeep Raj, Goel Publishing House (2018)

## References

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |

## Content of Practical Course 2: List of Experiments to be conducted

### PART-A Inorganic Chemistry

#### TITRIMETRY

1. Determination of carbonate and hydroxide present in a mixture.
2. Determination of oxalic acid and sodium oxalate in a given mixture using standard  $\text{KMnO}_4/\text{NaOH}$  solution
3. Standardization of potassium permanganate solution and determination of nitrite in a water sample
4. Determination of chlorine in bleaching powder using iodometric method.

#### GRAVIMETRY

1. Determination of  $\text{Ba}^{2+}$  as  $\text{BaSO}_4$
2. Determination of  $\text{Cu}^{2+}$  as  $\text{CuSCN}$
3. Determination of  $\text{Fe}^{2+}$  as  $\text{Fe}_2\text{O}_3$
4. Determination of  $\text{Ni}^{2+}$  as  $\text{Ni(DMG)}_2$  complex

### PART-B Physical Chemistry

1. Safety Practices in the Chemistry Laboratory, Knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glassware's
2. Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (Ethyl acetate, Toluene, Chloroform, Chlorobenzene or any other non-hazardous liquids)
3. Study of the variation of viscosity of sucrose solution with the concentration of a solute
4. Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (Ethyl acetate, Toluene, Chlorobenzene, any other non-hazardous liquids)
5. Study of variation of surface tension of detergent solution with concentration.
6. Determination of specific and molar refraction by Abbes Refractometer. (Ethyl acetate, Methyl acetate, Ethylene Chloride)
7. Determination of the composition of liquid mixture by refractometry. (Toluene & Alcohol, Water & Sucrose)
8. Determination of partition/distribution coefficient - i) Acetic acid in water and

cyclohexane. ii) Acetic acid in Water and Butanol. iii) Benzoic acid in water and toluene.

**BSc Semester 2 – Chemistry (Hons) with Organic Specialization**  
**Title of the Course: OE – 2: Molecules of Life**

| Number of Theory Credits                                                                                                                                                                                                                                                                                                                                                      | Number of lecture hours/semester | Number of practical Credits | Number of practical hours/ semesters |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|--------------------------------------|
| 3                                                                                                                                                                                                                                                                                                                                                                             | 42                               | -                           | 42                                   |
| <b>Content of Theory Course 2</b>                                                                                                                                                                                                                                                                                                                                             |                                  |                             | <b>42 Hrs</b>                        |
| <b>Unit – 1</b>                                                                                                                                                                                                                                                                                                                                                               |                                  |                             | <b>14</b>                            |
| <b>Carbohydrates</b>                                                                                                                                                                                                                                                                                                                                                          |                                  |                             |                                      |
| Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structures. Epimers, mutarotation and anomers.                                                                                                                                                                                                |                                  |                             |                                      |
| Linkage between monosaccharides, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.                                                                                                                                                                                                     |                                  |                             |                                      |
| <b>Amino Acids, Peptides and Proteins</b>                                                                                                                                                                                                                                                                                                                                     |                                  |                             |                                      |
| Classification of amino acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides.                                                                                                                                                                     |                                  |                             |                                      |
| <b>Unit – 2</b>                                                                                                                                                                                                                                                                                                                                                               |                                  |                             | <b>14</b>                            |
| <b>Enzymes and correlation with drug action</b>                                                                                                                                                                                                                                                                                                                               |                                  |                             |                                      |
| Mechanism of enzyme action, factors affecting enzyme action, Co-enzymes and cofactors and their role in biological reactions, Specificity of enzyme action (including stereospecificity),                                                                                                                                                                                     |                                  |                             |                                      |
| Enzyme inhibitors and their importance, phenomenon of inhibition (Competitive and Non competitive inhibition including allosteric inhibition).                                                                                                                                                                                                                                |                                  |                             |                                      |
| <b>Drug action</b> -receptor theory. Structure–activity relationships of drug molecules, binding role of –OH group, -NH <sub>2</sub> group, double bond and aromatic ring                                                                                                                                                                                                     |                                  |                             |                                      |
| <b>Lipids</b>                                                                                                                                                                                                                                                                                                                                                                 |                                  |                             |                                      |
| Introduction to lipids, classification. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol).                                                                                                                                                                                                                                       |                                  |                             |                                      |
| <b>Unit – 3</b>                                                                                                                                                                                                                                                                                                                                                               |                                  |                             | <b>14</b>                            |
| <b>Nucleic Acids</b>                                                                                                                                                                                                                                                                                                                                                          |                                  |                             |                                      |
| Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides ( <b>nomenclature</b> ), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA ( <b>types of RNA</b> ), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation. |                                  |                             |                                      |
| <b>Concept of Energy in Biosystems</b>                                                                                                                                                                                                                                                                                                                                        |                                  |                             |                                      |
| Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to                                                                                                                                                                                            |                                  |                             |                                      |

|                                                                                                                                                                                                                                                                                                                                                                                         |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates. |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

### Text Books

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry (Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Biochemistry 7th Ed.*,
5. W. H. Freeman. Berg, J.M., Tymoczko, J.L. & Stryer, L. *Biochemistry*, , 2002.

### References

| Formative Assessment      |                    |
|---------------------------|--------------------|
| Assessment Occasion/ type | Weightage in Marks |
| Internal Test             | 40                 |
| Sem End Exam              | 60                 |
| <b>Total</b>              | <b>100</b>         |

Sd/-



ಕ್ರಮಾಂಕ/No. :MU/ACC/CR.32/2021-22/A8

ಕುಲಸಚಿವರ ಕಛೇರಿ

ಮಂಗಳಗಂಗೋತ್ರಿ - 574 199

Office of the Registrar

Mangalagangothri - 574 199

ದಿನಾಂಕ/Date:04.12.2021

**CIRCULAR**

Sub: Practical lists and Blown up syllabus for first semester BCA(Basic/Hons)/  
B.Sc. (Basic/Hons) in Computer Science)-reg

Ref: 1) This Office Notification of No: MU/ACC/CR.15/2021-22/A8,  
Dated:4/11/2021.

2) E-mail letter dated 26/11/2021 from the Chairman, UG combined BOS in  
Computer Science & Computer Applications, Mangalore University.

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In continuation to this office Notifications cited under reference (1), above, the practical lists and blown up syllabus for I Semester BCA(Basic/Hons) and B.Sc. (Basic/Hons) in Computer Science) to be implemented under NEP-2020 and sent vide reference 2 are enclosed herewith for information and necessary action.

REGISTRAR.

To:

- 1) The Principals of affiliated Colleges offering B.Sc. (Basic/Hons) in Computer Science)/BCA(Basic/Hons) Programmes.
- 2) The Registrar (Evaluation), Mangalore University.
- 3) Dr. Manjaiah D.H., Chairman, U.G. combined BOS in Computer Science and Computer Applications and Professor, Dept. of Computer Science, Mangalore University.
- 4) The A.R/ Superintendent, Academic Section, O/o the Registrar, Mangalore University.
- 5) The Director, DUIMS, Mangalore University - with a request to publish in Website.
- 6) Guard File.

MANGALORE UNIVERSITY

Choice Based Credit System Semester Scheme with Multiple Entry and Exit Options in the UG Programmes under NEP 2020

Bachelor of Science (B. Sc.) Degree Programme

2021-2022 Onwards

I Semester B. Sc. – Computer Science

BLOWN UP SYLLABUS & PRACTICAL LISTS

Course Code: DSC-1	Course Title: Computer Fundamentals and Programming in C
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Contents	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers – Definition of a computer, Characteristics of computers, Evolution of computers, Generations of computers, Classification of computers. Computer system, applications of computers. Number Systems – different types, conversion from one number system to another; Coding schemes – ASCII and Unicode. Computer Software – Categories of software. Computer Programming and Languages – Machine Level, Assembly level, and High level languages; Translator Programs – Assembler, Interpreter and Compiler. Developing a computer program, Program Development Cycle - Algorithm, Flowchart and Pseudocode with examples. Introduction to C Programming: Overview of C; History and Importance of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.	13
Unit - 2	
C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration and initialization of variables; Symbolic constants. C Operators and Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity; Evaluation of arithmetic expressions; Type conversion. Input and output with C: Formatted I/O functions - <i>printf</i> and <i>scanf</i> , control stings and escape sequences, output specifications with <i>printf</i> functions; Unformatted I/O functions to read and display single character and a string - <i>getchar</i> , <i>putchar</i> , <i>gets</i> and <i>puts</i> functions.	13
Unit - 3	
Control Structures: Branching: if, if-else, nested if, else-if ladder, switch. Looping: while, do-while and for loop, nested loops, exit, break, jumps in loops. Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. Strings: Declaring and Initializing string variables; String handling functions - <i>strlen</i> , <i>strcmp</i> , <i>strcpy</i> and <i>strcat</i> ; Character handling functions - <i>toascii</i> , <i>toupper</i> , <i>tolower</i> , <i>isalpha</i> , <i>isnumeric</i> etc.	13

Unit - 4

13

Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers.

User-Defined Functions: Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.

User-Defined Data Types: Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.

Text Books

1. Pradeep K. Sinha and Priti Sinha: **Computer Fundamentals** (Sixth Edition), BPB Publication
2. ITL Education Solution Limited, **Introduction to Information Technology**, Second Edition 2018, Pearson Education
3. E. Balagurusamy: **Programming in ANSI C** (TMH)

Reference Books

1. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
2. V. Rajaraman: Programming in C (PHI – EEE)
3. S. Byron Gottfried: Programming with C (TMH)
4. Kernighan & Ritchie: The C Programming Language (PHI)
5. Yashwant Kanitkar: Let us C
6. P. B. Kottur: Programming in C (Sapna Book House)

Course Code: DSC-1 Lab	Course Title: C Programming Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 3 Hours

Practice Lab

The following activities to be carried out in the lab during the initial period of the semester.

1. Basic Computer Proficiency
 - a. Familiarization of Computer Hardware Parts
 - b. Basic Computer Operations and Maintenance
 - c. Do's and Don'ts, Safety Guidelines in Computer Lab
2. Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.
3. Type Program Code, Debug and Compile basic programs covering C Programming fundamentals discussed during theory classes.

Programming Lab

Part A

1. Write a program to read three numbers and find the biggest of three
2. Write a program to find the area of a triangle using three sides of triangle.
3. Write a program to check for prime number.
4. Write a program to generate n Fibonacci numbers.
5. Write a program to read a multidigit number find the sum of the digits, reverse the number and check it for palindrome
6. Write a program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
7. Write a program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
8. Write a program to find the roots of quadratic equation (demonstration of switch-case statement)
9. Write a program to find largest and smallest element in a list of 'n' elements (Demonstration of single dimensional array)
10. Write a program to perform addition and subtraction of Matrices

Part B

1. Write a program to accept 'n' and find the sum of the series $1! + 3! + 5! + \dots + n!$
2. Write user-defined functions to (a) find the length of a string (b) concatenate two strings. Call these functions in the main program.
3. Write a function to reverse a string using pointers. Use it in a program to find whether a given string is palindrome or not.
4. Write a program to transpose a matrix of order NxM and check whether it is symmetric or not.
5. Write a program to add two matrices using pointers.
6. Write a program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
7. Write a function to generate the n^{th} Fibonacci number and use this function in the main program to display the first 'n' Fibonacci numbers.

8. Write a function to find the GCD of two integers and use this function in the main program to find the GCD of 'n' integers.
9. Write a program to enter the information of n students (name, register number, marks in three subjects) into an array of structures. Compute and print the result of all students. For passing, student should get at least 35 in each subject, otherwise result is "FAIL".
If the student passes and if percentage ≥ 70 , result is DISTINCTION; If percentage is < 70 and ≥ 60 , result is FIRST CLASS; if percentage is < 60 and ≥ 50 , result is SECOND CLASS; otherwise result is PASS CLASS. Get the output of all students in a tabular form with proper column headings.
10. Write a program to prepare the pay slip of n employees using an array of structures. Input the employee name, employee number and basic pay. Calculate the DA, HRA, PF, PT, Gross Pay and Net Pay as follows:
If Basic < 40000 , DA = 50% of Basic, HRA = 12% of Basic, PF = 12% of Gross Pay, PT = 250. Otherwise DA = 40% of Basic, HRA = 10% of Basic, PF = 13% of Gross, PT = 300.
Gross Pay = Basic + DA + HRA and Net Pay = Gross Pay – PF – PT.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course.

Evaluation Scheme for Practical Examination

Assessment Criteria		Marks
Program-1 from Part A	Writing the Program	5
	Execution and Formatting	3
Program-2 from Part B	Writing the Program	7
	Execution and Formatting	5
Practical Records		5
Total		25

Course Content

Semester:

Course Title: Digital Fluency	Course Credits: 2
Total Contact Hours: 15 hours of theory and 30 hours of practicals	Duration of ESA :
Formative Assessment Marks: 50 marks	Summative Assessment Marks: 50 marks
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

1. Have an intelligent conversation on the key concepts and applications of Artificial Intelligence (AI), Big Data Analytics (BDA), Internet of Things (IoT), Cloud Computing, and Cybersecurity
2. Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork
3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth?

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

This mapping needs to be done considering POs of respective programs.

[illegible]

3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth													
---	--	--	--	--	--	--	--	--	--	--	--	--	--

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content (Digital 101)

	Details of topic	Duration
Module 1: Emerging Technologies	Overview of Emerging Technologies: i. Artificial Intelligence, Machine Learning, Deep Learning, ii. Database Management for Data Science, Big Data Analytics, iii. Internet of Things (IoT) and Industrial Internet of Things (IIoT) iv. Cloud computing and its service models v. Cyber Security and Types of cyber attack	05 hours
Module 2: Applications of Emerging Technologies	Applications of emerging technologies: i. Artificial Intelligence ii. Big Data Analytics iii. Internet of Things iv. Cloud Computing v. Cyber Security	05 hours
Module 3: Building Essential Skills Beyond Technology	Importance of the following: i. Effective Communication Skills ii. Creative Problem Solving & Critical Thinking iii. Collaboration and Teamwork Skills iv. Innovation & Design Thinking v. Use of tools in enhancing skills	05 hours

References to learning resources:

1. The learning resources made available for the course titled “Digital 101” on Future Skills Prime Platform of NASSCOM

Pedagogy

Flipped classroom pedagogy is recommended for the delivery of this course.

For every class:

1. Before coming to the class students are expected to go through the content (both video and other resources) on the related topic and give the quiz on Future Skills Prime Platform of NASSCOM.
2. Class room activities are designed around the topic of the session towards developing better understanding, clearing mis-conceptions and discussions of higher order thinking skills like application, analysis, evaluation and design.
3. Every theory class ends with announcement of exercise for practical activity of the week

Assessment

Formative Assessment	
Assessment Occasion	Weightage in Marks
1. After watching videos of each topic, 05 marks tests are to be given by the students on Future Skills Prime Platform. The total marks earned by students is to be computed.	No weightage
2. Practical Sessions: A total of 05 activities from Module 1 and Module 2 and 03 activities from Module 03 need be completed by students. All the activities are expected to be done in teams of 02 -03 students per team. Each session performance is assessed for 10 marks against announced rubrics for assessment. The total marks earned by students is to be computed.	50%
3. Summative Assessment : After completion of all 3 modules students will be giving Final Assessment with 30 questions (30 min) on Future Skills Prime platform. Students will have two attempts and those who score at least 50% marks will get certificate from NASSCOM-AICTE.	This assessment may be given 50% weight in computing the final grade of the students.

Date:**Co-Ordinator**

**चार वर्ष के बहु विषयक स्नातक कार्यक्रम
हिन्दी भाषा का अध्ययन दो वर्ष (चार सेमिस्टर)
BA,BSW,BHRD के लिए प्रस्तावित पाठ्यक्रम**

**Programme Structure for UG Programme
BA,BSW,BHRD. Ability Enhancement Compulsory Course**

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	हिन्दी कहानी साहित्य + हिन्दी व्याकरण	60+40=100
II	हिन्दी उपन्यास साहित्य + प्रयोजनमूलक हिन्दी	60+40=100
III	निबंध संग्रह + आत्मकथा, अनुवाद कला	60+40=100
IV	खण्ड काव्य + पत्र लेखन, आलेखन	60+40=100

**चार वर्ष के बहु विषयक स्नातक कार्यक्रम
हिन्दी भाषा का अध्ययन दो वर्ष (चार सेमिस्टर)**

**B.SC { B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD),) B.SC(AVE)
B.SC(C), B.SC(CS), BHM }**

के लिए प्रस्तावित पाठ्यक्रम

Programme Structure for UG Programme

**B.SC { B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD),) B.SC(AVE)
B.SC(C), B.SC(CS), BHM }**

Ability Enhancement Compulsory Course

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	हिन्दी कहानी साहित्य	60+40=100
II	आधुनिक हिन्दी काव्य + हिन्दी व्याकरण	60+40=100
III	नाटक साहित्य + संचार माध्य और हिन्दी	60+40=100
IV	लघु उपन्यास + भाषा के विविध रूप	60+40=100

चार वर्ष के बहु विषयक स्नातक कार्यक्रम
हिन्दी भाषा का अध्ययन दो वर्ष (चार सेमिस्टर)
B.Com के लिए प्रस्तावित पाठ्यक्रम

Programme Structure for UG Programme
B.Com. Ability Enhancement Compulsory Course

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	गद्य विधाएँ + व्याकरण	60+40=100
II	कविता संग्रह + पत्र लेखन + शब्दावली	60+40=100
III	कहानी संग्रह + मीडिया लेखन	60+40=100
IV	नाटक + कम्प्यूटर और हिन्दी	60+40=100

चार वर्ष के बहु विषयक स्नातक कार्यक्रम
हिन्दी भाषा का अध्ययन दो वर्ष (चार सेमिस्टर)
B.C.A के लिए प्रस्तावित पाठ्यक्रम

Programme Structure for UG Programme
B.C.A Ability Enhancement Compulsory Course

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	निबंध + व्याकरण	60+40=100
II	कहानी + व्याकरण + प्रयोजनमूलक हिन्दी	60+40=100
III	कविता + कम्प्यूटर अनुप्रयोग	60+40=100
IV	नाटक + अन्तर्जाल पर पत्रिकाएं+चिट्ठा लेखन	60+40=100

चार वर्ष के बहु विषयक स्नातक कार्यक्रम
हिन्दी भाषा का अध्ययन दो वर्ष (चार सेमिस्टर)
B.B.A के लिए प्रस्तावित पाठ्यक्रम

Programme Structure for UG Programme
B.B.A Ability Enhancement Compulsory Course

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	कहानी + व्याकरण	60+40=100
II	गद्य + कार्यालयी हिन्दी	60+40=100
III	कविता + समाचार लेखन + रिपोर्टाज	60+40=100
IV	नाटक + पत्र लेखन	60+40=100

Open Elective Syllabus
हिन्दी भाषा और साहित्य का परिचयात्मक अध्ययन
Introduction of Hindi Language and Literature

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	संभाषण कला	60+40=100
II	हिन्दी भाषा और हिन्दी साहित्य का परिचय	60+40=100
III	अनुवाद कौशल्य	60+40=100
IV	चरित्र निर्माण एवं व्यक्ति विकास	60+40=100

Skill Based Hindi Syllabus
कौशलाधारित हिन्दी पाठ्यक्रम
(All Course)

Semester	AECC/Credits-3 (L-4+T-0+P-0) Total teaching hours – 4 Hrs./Week	Marks
I	अनुवाद कौशल	60+40=100
III	समाचार संकलन और विज्ञापन लेखन	60+40=100
V	सृजनात्मक लेखन	60+40=100
VI	पटकथा और संवाद लेखन	60+40=100

MANGALORE UNIVERSITY MANGALORE
Department of Hindi
Implementation of National Education Policy 2020
Effect from 2021-2022 onwards

Program Structures for UnderGraduate BA,BA(HRD),BSW/B.Sc/B.Com/BBA/ BCA & B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD), B.SC(AVE) B.SC(C), B.SC(CS), BHM without practical. The syllabi comprises of the following courses-Discipline Specific Core Course (DSCC) Discipline Specific Elective Course (DSEC) Open Elective Course (OEC) Skills Enhancement Course (SEC) & Ability Enhancement Compulsory Courses (AECC) Vocational, Internship.

B.A. program Annexure 1 B
Discipline Specific Core (DSC)

I Semester

Semesters	Title of the paper	Credits	Marks
A-1/B - 1	कथा साहित्य Collection of Hindi Stories प्रचलित हिन्दी कहानियाँ –सं.डॉ.सुमा.टी.आर डॉ.नागरत्ना एन राव 'वतन' उपन्यास Novel: vatan	3	60 + 40 = 100
A – 2/B – 2	हिन्दी व्याकरण Hindi Grammar हिन्दी व्याकरण – कामताप्रसाद गुरू	3	60 + 40 = 100

II Semester

A - 3	आधुनिक हिन्दी काव्य Modern Hindi poetry आधुनिक हिन्दी कविता सं. खण्डकाव्य Fragment गोपा गौतम – जगदीश गुप्ता	3	60 +40 = 100
A - 4	प्रयोजनमूलक हिन्दी Functional Hindi	3	60 +40 = 100

Exit Option with Certificate Course

III Semester

Semesters	Title of the paper	Credits	Marks
A - 5	हिन्दी साहित्य का इतिहास History of Hindi literature (आदिकाल, भक्तिकाल, रीतिकाल) हिन्दी साहित्य का इतिहास -- डॉ. नगेन्द्र हिन्दी साहित्य का इतिहास – डॉ. शिवकुमार शर्मा	3	60 + 40 = 100
A – 6	नाटक और रंगमंच रंग और व्यंग्य – सुशिला टागबोरे श्रेष्ठ एकांकी – सं. डॉ. सुमा. टी. आर डॉ. श्रीधर हेगडे Drama And one act play	3	60 + 40 = 100

IV Semester

A - 7	हिन्दी साहित्य का इतिहास (आधुनिक काल) हिन्दी साहित्य का इतिहास -- डॉ. नगेन्द्र हिन्दी साहित्य का इतिहास – डॉ. शिवकुमार शर्मा History of Hindi literature (modern Hindi literature)	3	60 + 40 = 100
A – 8	हिन्दी साहित्यिक निबंध निबंधमणि – सं. डॉ. सुमा. टी. आर डॉ. गुरुदत्ता Hindi Literary Essay	3	60 + 40 = 100

Exit Option with Diploma

V Semester

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Semesters	Title of the paper	Credits	Marks
A - 9	हिन्दी भाषा का इतिहास हिन्दी भाषा का इतिहास – डॉ. धीरेन्द्र वर्मा हिन्दी भाषा का इतिहास – डॉ. भोलानाथ तिवारी	4	60 +40 = 100
A-10	History of Hindi Language छायावादोत्तर हिन्दी काव्य काव्य तरंग – सं. डॉ. निरंजन Chayavadottar Hindi Kavya	4	60 +40 = 100
Discipline Core B-9	अनुवाद सिद्धान्त अनुवाद सिद्धान्त और प्रयोग- डॉ. भोलानाथ तिवारी Theory of Translation	4	60 +40 = 100
DSE A – 1	कर्नाटक साहित्य और संस्कृति Literature and culture of Karnataka		
VOCATIONAL – 1	पठकथा और संवाद लेखन Screenplay and Dialogue Writing	3	60 +40 = 100
		3	60 +40 = 100

VI Semester

A -11	साहित्यशास्त्र छंद और अलंकार काव्यशास्त्र के विविध सोपान – डॉ. बट्टीनाथ तिवारी Sahitya shastra Chand Aur Alankar	4	60 +40 = 100
A- 12	राष्ट्रीय चेतना और हिन्दी साहित्य आजादी की अग्निशिखाएँ – चयन एवं संयोजन : डॉ. शिव कुमार मिश्र National Consciousness and Hindi Literature	4	60 +40 = 100
Discipline (Core) B-10	संपादन कला और व्यवस्थापन Sampadankala aur vyavasthapan	4	60 +40 = 100
DSE A – 2	चर्चित रचनाकार (कवि और लेखक) Famous writers (poets and writers)	3	60 +40 = 100
VOCATIONA – 2	मीडिया लेखन Media writing	3	60 +40 = 100

Exit Option with Basic Degree

VII Semester

Semesters	Title of the paper	Credits	Marks
A-13	हिन्दी पत्रकारिता हिन्दी पत्रकारिता - सं.प्रो.प्रतिभा मुदलियार Hindi Journalism	4	60 +40 = 100
A- 14	हिन्दी आलोचना और आलोचक hindi criticism and critic writers साहित्यशास्त्र और हिन्दी आलोचना -डॉ.सभापति मिश्र	4	60 +40 = 100
A- 15	भारतीय काव्यशास्त्र काव्यशास्त्र के विविध सोपान - डॉ.बद्रीनाथ तिवारी		
	शोध प्रविधि Research methodology शोध प्रविधि -- विनय मोहन शर्मा	4	60 +40 = 100
DSE A – 3	शोध प्रविधि - डॉ.दीपमाला	4	60 +40 = 100
	अनुवाद सिद्धान्त और प्रयोग Anuvad sidhant aur prayog अनुवाद सिद्धान्त और प्रयोग - डॉ.भोलानाथ तिवारी	3	60 +40 = 100
DSE A – 4	प्रवासी साहित्य Pravasi sahitya	3	60 + 40 = 100

VIII Semester

A-16	भारतीय साहित्य INDIAN LITERATURE	4	60 +40 = 100
A - 17	साहित्य आलोचना की दृष्टि Sahity Alochana ki drushti	4	60 +40 = 100
A. 18	भाषा विज्ञान Linguistics भाषा विज्ञान की भूमिका डॉ - आ.देवेन्द्रनाथ शर्मा/दीप्ति शर्मा भाषा विज्ञान - डॉ.भोलानाथ तिवारी	4	60 +40 = 100
DSE A – 5	स्त्री लेखन Female writing Research project	3	60 +40 = 100
DSE A – 6	सिनेमा और साहित्य Film and literature दक्षिण का हिन्दी साहित्य Dakshin ka Hindi Sahitya	6	60 +40 = 100
DSE A – 7			

Exit Option with Award of Bachelor of Arts Honours

I Semester BA,BSW,BHRD Syllabus
प्रथम सेमिस्टर बी.ए.बी.एस.डब्ल्यू.बी.हेच.आर.डी पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	हिन्दी कहानी साहित्य 1. सुभद्रा कुमारी चौहान – राही 2. प्रेमचंद – सुभागी 3. जैनेन्द्र – पाजेब 4. अज्ञेय – रोज़	20
II	हिन्दी कहानी साहित्य 1. अमरकांत – दोपहर का भोजन 2. ज्ञानरंजन – पिता 3. सुशील टाकभौरे – सिलिया 4. मुक्ता – काठलूम अपने-अपने	20
III	हिन्दी व्याकरण – 1.वर्ण विचार-भाषा का स्वरूप, स्वर,व्यंजन,वर्तनी, संधि और उसके भेद	10
IV	हिन्दी व्याकरण – शब्द विचार-परिभाषा, शब्द के विविध प्रकार 1. उत्पत्ति के आधार पर – तत्सम शब्द, तद्भव शब्द, देशज शब्द, विदेश शब्द,संकर शब्द 2. व्युत्पत्ति के आधार पर – रूढ़ शब्द, यौगिक शब्द, योगरूढ़ शब्द 3. अर्थ के आधार पर – सार्थक शब्द, निरर्थक शब्द 4. विकार के आधार पर – विकारी और अविकारी (सामान्य परिचय) 5. शब्द शुद्धि	10

Prescribed Books :

1. कहानी विविधा – संपादक : प्रो. नागभूषण एच.जी
2. व्याकरण – संक्षिप्त हिन्दी व्याकरण – कामता प्रसाद गुरु
3. समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान, कहानी का पठन, गतिविधि आधारित शिक्षण, सामूहिक चर्चा

Expected Out-come : अपेक्षित परिणाम :

1. कहानी के पठन-पाठन में रुचि उत्पन्न होगी
2. कहानी के माध्यम से जीवन की वास्तविक और आदर्श की पहचान
3. भाषा कौशल का निर्माण
4. भाषा शुद्धता के प्रति सजगता उत्पन्न होगी

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I & II) Internal Choice	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10
V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Tatsam & Tadbhav 2. Correction of words.	1X5 1X5	5 5
	TOTAL		60

II Semester BA,BSW,BHRD Syllabus
द्वितीय सेमिस्टर बी.ए.बी.एस.डब्ल्यू.बी.हेच.आर.डी पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	हिन्दी उपन्यास साहित्य भगवान दास मोरवाल का उपन्यास – शकुंतिका	20
II	हिन्दी उपन्यास साहित्य भगवान दास मोरवाल का उपन्यास – शकुंतिका	20
III	प्रयोजन मूलक हिन्दी के विविध रूप	10
IV	प्रयोजन मूलक हिन्दी की शब्दावली	10

Prescribed Books : 1. शकुंतिका (उपन्यास) – लेखक: भगवानदास मोरवाल

2. प्रयोजन मूलक हिन्दी के विविध रूप – डॉ. कल्पना प्रभु

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान, उपन्यास का पठन, गतिविधि आधारित शिक्षण, सामूहिक चर्चा

Expected Out-come : अपेक्षित परिणाम :

- उपन्यास के पठन-पाठन में रुचि उत्पन्न होगी
- उपन्यास के माध्यम से जीवन की वास्तविक और आदर्श की पहचान
- भाषा कौशल का निर्माण
- भाषा शुद्धता के प्रति सजगता उत्पन्न होगी

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Short Notes (Unit I&II) (2 out of 4)	5X2	10
III	Essay Type Questions (Unit I&II 2 out of 4 Internal Choice)	10X2	20
IV	Short Notes From Prayojanmoolak Hindi (Unit III) (2 out of 4)	5X2	10
V	Practical Grammar (Unit IV)		
	1.Convert from Hindi To English 2. Convert from Eng To Hindi	1X5 1X5	05 05
	TOTAL		60

I Semester B.A./B.S.W/B.A.(HRD) Degree Examination, April 2022
Choice Based Credit System(2021-22 Batch onwards)
Ability Enhancement Compulsory Course
Language 2 : HINDI
(Group - III) (Paper - I)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

I एक शब्द या वाक्य में उत्तर लिखिए :-

1X10 = 10

1. तुलसी महतो के कितने बच्चे थे ?
2. सजनसिंह ने सुभागी को अपनी पुत्रवधू के रूप में क्यों चुना ?
3. राही – कहानी की लेखिका का नाम लिखिए ।
4. सुभागी – कहानी के लेखक का नाम लिखिए ।
5. राही को किस अपराध के कारण सज़ा हुई थी ?
6. पाजेब – कहानी के लेखक का नाम लिखिए ।
7. मुन्नी के लिए पाजेब कौन ले आया ?
8. दोपहर का भोजन कहानी के लेखक का नाम लिखिए ।
9. सिद्धेश्वरी के मझले बेटे का नाम क्या है ?
10. पिता कहानी के लेखक का नाम लिखिए ।

II किन्हीं दो पर ससंदर्भ व्याख्या कीजिए :-

5X2=10

1. “आज तो सचमुच नहीं रोया । वह बड़ा ही होशियार हो गया है । कहता था, बड़का भय्या के यहाँ जाऊँगा । ऐसा लड़का . . .”
2. ‘भाभी, मैंने तुम्हारा आसरा कभी नहीं किया और भगवान ने चाहा तो कभी करूँगी भी नहीं। तुम अपनी देखो, मेरी चिंता न करो ।’
3. हाँ, हमें मजदूरी नहीं मिलती सरकार । हमारी जाति माँगोरी है । हम केवल मांगते-खाते हैं ।
4. मालती एक बिलकुल अनैच्छिक, अनुभूतिहीन, नीरस, यन्त्रवत – वह भी थके हुए यन्त्र के से स्वर में कह रही है, “चार बज गये” ।

III “ सुभागी” कहानी का सार लिखकर विशेषताओं पर प्रकाश डालिए ।

अथवा

10

“ रोज़” कहानी की मालती का चरित्र चित्रण कीजिए ।

IV “दोपहर का भोजन” कहानी का सार लिखकर विशेषताओं पर प्रकाश डालिए ।

अथवा

10

“पिता” का चरित्र चित्रण कीजिए ।

V किन्हीं दो प्रश्नों का उत्तर लिखिए :-

5X2=10

1. भाषा के स्वरूप का वर्णन कीजिए ।
2. शब्द विचार की परिभाषा और अर्थ के भेदों को उदाहरण सहित लिखिए ।
3. उत्पत्ति के आधार पर शब्द के प्रकारों को उदाहरण सहित लिखिए ।
4. विकारी और अविकारी शब्दों का अंतर समझाइए ।

VI निम्न लिखित तत्सम शब्दों का तद्भव रूप लिखिए ।

1X5=5

- | | | | | |
|---------|-----------|----------|--------|---------|
| 1. चक्र | 2. रात्रि | 3. अक्षि | 4. वधू | 5. कर्म |
|---------|-----------|----------|--------|---------|

VII निम्न लिखित शब्दों का शुद्ध रूप लिखिए ।

1X5=5

- | | | | | |
|---------|-----------|---------|-----------|----------|
| 1. बिली | 2. धरवाजा | 3. भाशा | 4. अतियंत | 5. मंदीर |
|---------|-----------|---------|-----------|----------|

II Semester B.A./B.S.W/B.A(HRD) Degree Examination, April 2022
Choice Based Credit System(2021-22 Batch onwards)
Ability Enhancement Compulsory Course
Language 2 : HINDI
(Group - III) (Paper - II)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

- I एक शब्द या वाक्य में उत्तर लिखिए :-** **1X10 = 10**
1. शकुंतिका उपन्यास के लेखक का नाम लिखिए ।
 2. दुर्गा किसको पुत्र जन्म का आश्वासन देती है ?
 3. भगवती क्यों चिंतित थी ?
 4. दुर्गा के छोटे लड़के का नाम लिखिए ।
 5. दादा का नाम क्या है ?
 6. “हे राम ! ये सारे कौरव इसी घर में पैदा हो गए ? – यह किसका कथन है ?
 7. भगवती की पोतियों में से किसी एक का नाम लिखिए ।
 8. उग्रसेन कौन है ?
 9. भगवती की बहू कौन है ?
 10. सिया कौन-सी शिक्षा पा रही थी ?
- II किन्हीं दो विषयों पर टिप्पणी लिखिए :-** **5X2=10**
1. सिया 2. मार्गी 3. उग्रसेन 4. दशरथ
- III किन्हीं दो प्रश्नों के उत्तर लिखिए :-** **10X2=20**
1. “शकुंतिका” उपन्यास का सार लिखकर विशेषताओं पर प्रकाश डालिए ।
 2. भारतीय पितृ सत्तात्मक परिवार में वर्तमान पुत्र-पुत्री भेद भाव पर लेखक ने कैसे कटाक्ष किया है ? समझाइए ।
 3. दुर्गा का चरित्र चित्रण कीजिए ।
 4. भगवती का चरित्र चित्रण कीजिए ।
- IV किन्हीं दो प्रश्नों का उत्तर लिखिए :-** **5X2=10**
1. प्रयोजन मूलक हिन्दी किसे कहते हैं ? समझाइए ।
 2. प्रयोजन मूलक हिन्दी के किन्हीं दो रूपों का परिचय दीजिए ।
 3. राजभाषा अधिनियम माने क्या है ? पूर्ण परिचय दीजिए ।
- V निम्नलिखित पारिभाषिक शब्दों को हिन्दी से अंग्रेज़ी में परिवर्तित कीजिए :-** **1X5=5**
1. वार्षिक 2. खाता 3. अक्षि 4. पूँजी 5. बंधपत्र
- VI निम्नलिखित पारिभाषिक शब्दों को अंग्रेज़ी से हिन्दी में परिवर्तित कीजिए :-** **1X5=5**
1. Graduate 2. Fundamental 3. Acknowledgement 4. Document 5. Tax

{ B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD),) B.SC(AVE) B.SC(C), B.SC(CS), BHM }

बी.एस.सी प्रथम सेमिस्टर पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	हिन्दी कहानी साहित्य 1. चंद्राधर शर्मा गुलेरी – उसने कहा था 2. प्रेमचंद – माँ 3. जयशंकर प्रसाद – आकाश दीप 4. विश्वभरनाथ कौशिक – तार्ई	20
II	हिन्दी कहानी साहित्य 1. फणिश्वरनाथ रेणु – मारे गए गुलफाम 2. जैनेन्द्र कुमार – इनाम 3. शिवानी – मित्र 4. कमलेश्वर – तलाश	20
III	हिन्दी व्याकरण 1. संज्ञा – उसके भेद 2. सर्वनाम – सर्वनाम के भेद 3. विशेषण – विशेषण के भेद 4. क्रिया – क्रिया के भेद (कर्म के अनुसार)	10
IV	हिन्दी पत्र व्यवहार : शब्द विचार : अविकारी शब्द 1. क्रिया विशेषण – उसके भेद 2. समुच्चय बोधक अव्यय – उसके भेद 3. सम्बन्ध बोधक –उसके भेद 4. विस्मयादिबोधक अव्यय – उसके भेद 5. 'ने' नियम	10

Prescribed Books :

1. कहानी पीयूष – संपादक : डॉ. कल्पना जे प्रभु
2. समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान 2. सामूहिक चर्चा 3. कक्षाओं में पठन पाठन की पद्धति 4. कहानी पाठ

Expected Out-come : अपेक्षित परिणाम :

1. छात्रों को हिन्दी साहित्य के प्रति रुची उत्पन्न होगी
2. रचनात्मकता में अभिरुचि का निर्माण
3. भाषायी सौंदर्य की समझ निर्माण होगी
4. कहानी लेखन के प्रति प्रेरित होंगे
5. कहानी रचने की क्षमता प्राप्त करेंगे।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I & II 2 out of 4) Internal Choice	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10
V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Recognition of type of the word 2. Correction of sentence	1X5 1X5	5 5
	TOTAL		60

II Semester B.Sc Syllabus

{ B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD), B.SC(AVE) B.SC(C), B.SC(CS), BHM }

बी.एस.सी द्वितीय सेमेस्टर पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	आधुनिक हिन्दी कविताएँ 1. मैथिलीशरण गुप्त – कुब्जा 2. बालकृष्ण भट्ट – धरती पर स्वर्ग 3. सुमित्रानंदन पंत – नौका विहार 4. नागार्जुन – हम भी साड़ीदार थे	20
II	आधुनिक हिन्दी कविताएँ 1. केदारनाथ अग्रवाल – कहाँ नहीं पड़ती है किस पर 2. डॉ. नीरज जैन – धोखेबाज़ों की दुनिया 3. सुशीला टाकभौरे – विद्रोहिणी 4. भगवत रावत – यह तो अच्छा हुआ	20
III	हिन्दी व्याकरण 1. लिंग- उसके भेद (पहचान के नियम) 2. वचन – उसके भेद (पहचान के नियम) 3. कारक – उसके भेद	10
IV	हिन्दी पत्र व्यवहार : शब्द विचार : अविकारी शब्द 1. काल – उसके भेद 2. वाच्य – उसके भेद 3. पद परिचय	10

Prescribed Books :

- कविता कुसुम – संपादक : डॉ. कल्पना जे प्रभु
- समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान 2. सामूहिक चर्चा 3. कक्षाओं में पठन पाठन की पद्धति 4. कहानी पाठ

Expected Out-come : अपेक्षित परिणाम :

- छात्रों को हिन्दी साहित्य के प्रति रुची उत्पन्न होगी
- रचनात्मकता में अभिरुचि का निर्माण
- भाषायी सौंदर्य की समझ निर्माण होगी
- कविता लेखन के प्रति प्रेरित होंगे
- कविता रचने की क्षमता प्राप्त करेंगे।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I & II 2 out of 4) Internal Choice	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10
V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Pad Parichay 2. Change of sentence (Vachya Badaliye)	5X1 1X5	5 5
	TOTAL		60

I Semester B.Sc. { B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD), B.SC(AVE) B.SC(C), B.SC(CS), BHM } Degree Examination, April 2022

Choice Based Credit System(2021-22 Batch onwards)

Ability Enhancement Compulsory Course

Language 2 : HINDI (Group - III) (Paper - I)

Time : 3 Hrs.

Question Paper Pattern प्रश्न पत्र का नमूना

Max. Marks :60

I एक शब्द या वाक्य में उत्तर लिखिए :-

1X10 = 10

1. करुणा के पति का नाम क्या है ?
2. चंपा अतल जल में क्या डुबा देती है ?
3. लहना सिंह किसे पानी पिलाने को कहता है ?
4. लाजवन्ती किस जमात तक पढी थी ?
5. “ईनाम” कहानी के लेखक कौन है ?
6. कामेश्वर के कितने बच्चे थे ?
7. सुमी अपनी माँ के लिए कौनसा फूल लेकर आयी थी ?
8. मंजीरा किसके लिए जीना चाहती थी ?
9. धनंजय ने प्रमीला से क्या ईनाम माँगा?
10. फणीश्वरनाथ रेणुजी की कहानी का नाम लिखिए ?

II किसी एक अवतरण की सप्रसंग व्याख्या कीजिए :-

5X1=5

- अ) 1. यह न पूछों करुणा बड़ी करुण कथा है । बस, यही गनीमत समझो कि जीता लौट आया ।
2. “तो चम्पा ! अब उससे भी अच्छे ढंग से हम लोग विचार सकते हैं । तुम मेरी प्राणधात्री हो, मेरे सर्वस्व हो ।”

आ) किसी एक अवतरण की सप्रसंग व्याख्या कीजिए :-

5X1=5

1. “अच्छा जब आपको इतना सौक है तो सुनिए नहवा घटवारिन का गीत । इसमें गीत भी है, कथा भी है ।”
2. “मैं दिल्ली छोड़ दूँगा । इस सबके बाद मुझसे यहाँ रहा भी नहीं जाएगा । तुम शायद यहीं लौटकर आना पसंद करोगी । इस घर को अपने नाम ही रहने दो ।”

III किसी एक प्रश्न का उत्तर लिखिए

(अ) “माँ” कहानी का सार अपने शब्दों में लिखिए ।

अथवा

10X1=10

“उसने कहा था” कहानी का सार लिखकर विशेषताओं पर प्रकाश डालिए ।

(आ) “ईनाम” कहानी का सार अपने शब्दों में लिखिए ।

अथवा

10X1=10

“मित्र” कहानी का सार अपने शब्दों में लिखिए ।

IV किन्हीं दो प्रश्नों का उत्तर लिखिए :-

5X2=10

1. व्यंजन किसे कहते हैं ? उसकी परिभाषा लिखकर उसके भेदों को उदाहरण सहित लिखिए ।
2. संज्ञा की परिभाषा लिखकर उसके भेदों को उदाहरण सहित लिखिए ।
3. “ने” प्रत्यय प्रयोग के नियमों को अपवाद सहित लिखिए ?
4. समुच्चय बोधक अव्यय की परिभाषा लिखकर उसके भेदों को उदाहरण सहित लिखिए ?

V नीचे दिए गए शब्दों को पहचानिए :-

1X5=5

1. गणेश
2. तुमको
3. सुशील
4. तेज़
5. ऊपर

VI नीचे दिए गए वाक्यों को शुद्ध कीजिए :-

1X5=5

1. गीता फल खाया ।
2. राधा किताब पढ़ी होगी ।
3. वह ने खाना खाया ।
4. मैंने शहर जाना है ।
5. लड़की साड़ी पहनली है ।

II Semester B.Sc. { B.SC(FND), B.SC(FD,GD,LD), B.SC(FT) B.SC(IDGD), B.SC(AVE) B.SC(C), B.SC(CS), BHM } Degree Examination, April 2022

Choice Based Credit System(2021-22 Batch onwards)

Ability Enhancement Compulsory Course

Language 2 : HINDI (Group - III) (Paper - II)

Time : 3 Hrs.

Question Paper Pattern प्रश्न पत्र का नमूना

Max. Marks :60

I एक शब्द या वाक्य में उत्तर लिखिए :-

1X10 = 10

1. किसका नंदनवन भूतल में छाया था ?
2. श्री बालकृष्ण शर्मा नवीन हमें किसकी बखानी सुनने को कहते हैं ?
3. कवि को कौन मधु यौवन आकर्षण पिलाती है ?
4. माँ के उर पर शिशु सा कौन धारा में सोया हुआ था ?
5. “यदि मैं होता घन सावन का” कविता के कवि कौन है ?
6. किसके कारण मन में संकल्प नहीं जमता ?
7. विस्फारित मन क्या कहकर हूँकारता है ?
8. क्या कुंठित कृपाण बन जाती है ?
9. गली का नाम किस में नहीं था ?
10. “वह तो अच्छा हुआ” कविता के कवी का नाम लिखिए ?

II किसी एक संदर्भ की व्याख्या कीजिए :-

5X1=5

- अ) 1. सत्य हुआ मैं देख रही थी अनदेखे सपने को;
आत्मा-ग्लानि छोड़कर मैंने देखा तब अपने को ।
“अब फिर कभी मिलूंगा” कहकर हँसता चला गया वह;
ज्यों-ज्यों दूर गया मानस में धँसता चला गया वह ॥
2. साडी की सिकुडन-सी जिस पर, शशि को रेशमी विभा से भर
सिमटी है वर्तुल मृदुल, लहार !
चांदनी रात का प्रथम प्रहर!
हम चले नाव लेकर सत्वर !

आ) किसी एक संदर्भ की व्याख्या कीजिए :-

5X1=5

1. सागर हो जाया करता है उद्विग्न
खोलने लगा करता है उसका गुरु गम्भीर अस्तित्व
और वह उड़ने लगा करता है भाप बनकर ऊपर
बदल-बदल जाया करता है क्षण-पर क्षण उसका स्वरूप
2. बच्चे का रोना पैदा करता है दिल में दया
इसलिए इस तरफ लोगों का ध्यान जाना भी जरूरी था
कुछ लोग फुरसत में यह दृश्य दूर से देख रहे थे
और उनके ऐन सामने देश के भविष्य का सवाल था ॥

III (अ) “कुब्जा” इस कविता का सार अपने शब्दों में लिखिए ।

अथवा

10

“नौका विहार कविता का सार लिखकर विशेषताओं पर प्रकाश डालिए ।

(आ) “विद्रोहिणी” कविता का सार अपने शब्दों में लिखिए ।

अथवा

10

“धोखेबाज़ो की दुनिया” कविता का सार अपने शब्दों में लिखिए ।

IV किन्हीं दो प्रश्नों का उत्तर लिखिए :-

5X2=10

1. लिंग किसे कहते हैं ? उसकी परिभाषा लिखकर उसे पहचानने के नियमों को उदाहरण सहित लिखिए ।
2. कारक की परिभाषा लिखकर उसके चार भेदों को उदाहरण सहित लिखिए ।
3. वाच्य किसे कहते हैं उसके भेदों के साथ बदलने के नियमों को लिखिए ।
4. वर्तमान काल की परिभाषा लिखकर उसके भेदों को उदाहरण सहित लिखिए ?

V वाच्य बदलिए :-

1X5=5

1. बच्चा रो रहा है
2. लंगड़ा दौड़ेगा ।
3. राधा गा नहीं सकती ।
4. नेता भाषण दे रहा है ।
5. श्याम पुस्तक पढ़ता है ।

VI पद परिचय दीजिए :-

5X1=5

मोहन प्रथम श्रेणी में उत्तीर्ण हुआ ।

I Semester B.Com Syllabus
प्रथम सेमेस्टर बी.काम पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	हिन्दी गद्य साहित्य 1. बालकृष्ण भट्ट – बातचीत 2. आचार्य रामचन्द्र शुक्ल – भय 3. महादेवी वर्मा – गौरा 4. आचार्य हज़ारीप्रसाद द्विवेदी – कुटज	20
II	हिन्दी गद्य साहित्य 1. जैनेन्द्रकुमार – बाज़ार दर्शन 2. अज्ञेय – मौत की घाटी में 3. वासुदेव शरण अग्रवाल – मातृभूमि 4. नरेन्द्र कोहली – त्रासदी एक कामना की	20
III	हिन्दी व्याकरण 1. वर्ण विचार – वर्ण के भेद 2. शब्द विचार – शब्द के भेद (रूपांतर के अनुसार) 3. संज्ञा – संज्ञा के भेद 4. कारक – कारक भेद 5. लिंग – लिंग के भेद 6. वचन – वचन के भेद	10
IV	हिन्दी पत्र व्यवहार : 1. पूछताछ पत्र, आदेश पत्र, शिकायती पत्र, आवेदन पत्र (नौकरी संबंधी) स्ववृत्त लेखन, प्रतिवेदन (रिपोर्ट लेखन) 2. पारिभाषिक शब्दावली	10

Prescribed Books :

1. गद्य मंगला – संपादक : डॉ. एस.ए. मंजुनाथ
2. व्याकरण – नवीन हिन्दी व्याकरण और रचना – संपादक : डॉ. एस.ए. मंजुनाथ
3. समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. एकांकी का पठन , गतिविधि आधारित शिक्षण, सामूहिक चर्चा

Expected Out-come : अपेक्षित परिणाम :

1. हिन्दी भाषा में एकांकी विधाओं का परिचय
2. गद्य के पठन-पाठन में रुचि उत्पन्न होगी
3. गद्य के माध्यम से जीवन की वास्तविक और आदर्श की पहचान
4. गद्य के माध्यम से भाषा कौशल का निर्माण और भाषा शुद्धता के प्रति सजगता उत्पन्न होगी

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I & II) Internal Choice	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10
V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Change the Gender OR Change the Number 2. Technical Terms	1X5 1X5	5 5
	TOTAL		60

II Semester B.Com Syllabus
द्वितीय सेमिस्टर बी.काम पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

Syllabus पाठ्यक्रम

UNIT	SUBJECT	Marks
I	मध्यकालीन हिन्दी काव्य 1. कबीरदास – दोहे 2. तुलसीदास – दोहे 3. सूरदास – पद 4. मीराबाई – पद	20
II	आधुनिक हिन्दी काव्य 1. मैथिलीशरण गुप्त – मनुष्यता 2. सूर्यकांत त्रिपाठी निराला – जूही की कली 3. अरुण कमल – पुतली में संसार 4. अनामिका – बेजगह	20
III	हिन्दी व्याकरण और रचना : 1. सर्वनाम – सर्वनाम के भेद 2. विशेषण – विशेषण के भेद 3. क्रिया – क्रिया के भेद 4. अव्यय – अव्यय के भेद 5. काल – काल के भेद 6. वाच्य – वाच्य के भेद	10
IV	हिन्दी व्यावहारिक व्याकरण 1. शब्द शुद्धीकरण 2. वाक्य शुद्धीकरण 3. विलोम शब्द 4. पद परिचय 5. प्रशासनिक शब्दावली	10

1. Prescribed Books : 1. काव्य मंगला – संपादक : डॉ. एस.ए. मंजुनाथ
 2. व्याकरण – नवीन हिन्दी व्याकरण और रचना – संपादक : डॉ. एस.ए. मंजुनाथ

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान, गतिविधि आधारित शिक्षण, सामूहिक चर्चा

Expected Out-come : अपेक्षित परिणाम :

- हिन्दी भाषा के मध्यकालीन और आधुनिक हिन्दी कविता का परिचय
- काव्य पठन-पाठन में रुचि उत्पन्न होगी
- मध्यकालीन और आधुनिक काव्य के अंतर की पहचान प्राप्त होगी
- कविता के अध्ययन के द्वारा काव्य सृजन के लिए प्रेरणा मिलेगी
- आधुनिक हिन्दी काव्य के संबंध सोचने की क्षमता मिलेगी।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I & II) Internal Choice	5X2	10
III	Essay Type Questions (Unit I&II 2 out of 4 Internal Choice)	10X2	20
IV	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
V	Practical Grammar (Unit IV)		
	1.Change the Tence OR Voice	1X5	05
	2. Pad Parichay	5X1	05
	TOTAL		60

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- 1) Amendment
- 2) Capital
- 3) Detail
- 4) Document
- 5) Excise Duty

Time : 3 Hrs. **(Group-III) (Paper- II)** **Max. Marks : 60**

$$1 \times 10 = 10$$

- ## II

$$10 \times 2 = 20$$

- [illegible]

$$5 \times 2 = 10$$

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I Semester B.B.A Syllabus
प्रथम सेमिस्टर बी.बी.ए पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

UNIT	SUBJECT	Marks
I	हिन्दी कहानी साहित्य 1. प्रेमचंद – मंत्र 2. सुदर्शन – प्रेम-तरु 3. जैनेन्द्र – अपना पराया 4. यशपाल – कर्मफल	20
II	हिन्दी कहानी साहित्य 1. भीष्म साहनी – माता-विमाता 2. मेहरुनीसा परवेज़ – पितृशोक 3. जयप्रकाश कर्दम – मज़दूर खाता 4. डॉ. सुरेश मूले – माँ मुझे भी स्कूल जाना है	20
III	हिन्दी सैद्धांतिक व्याकरण 1. वर्ण विचार-भाषा का स्वरूप, स्वर, व्यंजन, वर्तनी 2. शब्द विचार-परिभाषा, अर्थ के आधार पर सार्थक और निरर्थक शब्द	10
IV	हिन्दी सैद्धांतिक व्याकरण 1. शब्द के विविध प्रकार 2. उत्पत्ति के आधार पर – तत्सम शब्द, तद्भव शब्द, देशज शब्द, विदेश शब्द 3. व्युत्पत्ति के आधार पर – रूढ़ शब्द, यौगिक शब्द, योगरूढ़ शब्द 4. विकार के आधार पर – विकारी और अविकारी (सामान्य परिचय)	10

Prescribed Books : 1. हिन्दी की मधुर कहानियाँ – संपादक : डॉ. राजीव. सी
 2. व्याकरण – समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान, सामूहिक चर्चा

Expected Out-come : अपेक्षित परिणाम :

1. कहानी के विविध रूप का परिचय
2. कहानी के माध्यम से जीवन की वास्तविकता और सामाजिक आदर्श का चिंतन
3. भाषा कौशल तथा भाषा के प्रति सजगता उत्पन्न होगी

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I&II) (2 out of 4)	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10

V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Change the Tatsam To Tadbhav and Tadbhav To Tatsam word OR Correction of Spelling. 2. Bifurcation of Deshaj and Videshi Shabdh OR Identification of Roodh our Yogaroodh Shabdh	1X5 1X5	5 5
	Total		60

II Semester B.B.A Syllabus

द्वितीय सेमिस्टर बी.बी.ए पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Credits : 3

Exam Duration : 3 Hrs.

Total Marks : 100

Theory : 60

IA : 40

UNIT	SUBJECT	Marks
I	हिन्दी गद्य साहित्य 1. श्री राहुल सांकृत्यायन – घुमक्कड जिज्ञासा (यात्रा संस्मरण) 2. हरिजोशी – ऐनक है तो रौनक है (व्यंग्य लेख) 3. रामधारी सिंह दिनकर – ईर्ष्या तू न गई मेरे मन से (ललित निबंध) 4. धर्मवीर भारती – अपनी ही मौत पर (रम्य रचना)	20
II	हिन्दी गद्य साहित्य 1. शरद जोशी – अफसर (हास्यात्मक निबंध) 2. शिवपूजन सहाय – त्यागमूर्ति निराला (संस्मरण) 3. हरिशंकर परसाई – विधायकों की बिक्री (व्यंग्य) 4. डॉ.एन.ई.विश्वनाथ अय्यर – होली और ओणम (निबंध)	20
III	कार्यलयी हिन्दी 1. संघ की राजभाषा (राजभाषा, राष्ट्रभाषा और संपर्क भाषा) 2. राजभाषा अधिनियम 3. राज्यों की राजभाषाएँ 4. संसद में प्रयोग होनेवाली भाषा	10
IV	कार्यलयी हिन्दी 1. हिन्दी का सामाजिक संस्कृति- रूप 2. बैंकिंग शब्दावली 3. अनुवाद	10

Prescribed Books :

1. गद्य परिज्ञात – संपादक : डॉ. राजीव. सी
2. प्रयोजनमूलक हिन्दी के विविध रूप- डॉ. कल्पना जे प्रभु

Pedagogy : शिक्षा पद्धति :

1. कक्षा व्याख्यान, सामूहिक चर्चा, रंगमंच कौशल

Expected Out-come : अपेक्षित परिणाम :

1. गद्य के विविध रूप का परिचय
2. गद्य के माध्यम से जीवन की वास्तविकता और सामाजिक आदर्श की चिंतन
3. भाषा कौशल तथा भाषा के प्रति सजगता उत्पन्न होगी

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Essay Type Questions (Unit I 1 out of 2)	10X1	10

III	Essay Type Questions (Unit II 1 out of 2)	10X1	10
IV	Short Notes (Unit I&II 2 out of 4 Internal Choice)	5X2	10
V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar (Unit IV) 1. Banking Shabdhauli 2. Translation (Kan/Eng To Hindi)	1X5 5X1	05 05
	Total		60

I Semester B.B.A. Degree Examination, April 2022

Choice Based Credit System(2021-22 Batch onwards)

Ability Enhancement Compulsory Course

Language 2 : HINDI

(Group - III) (Paper - I)

Time : 3 Hrs.

Question Paper Pattern

प्रश्न पत्र का नमूना

Max. Marks :60

- I एक शब्द या वाक्य में उत्तर लिखिए :-** **1X10 = 10**
- मंत्र कहानी में साँप किसको काट लेता है ?
 - प्रेम-तरु कहानी में श्री सुदर्शन जी ने किसके वात्सल्य को साकार कर दिया है ।
 - अपना-पराया कहानी के रचनाकार का नाम लिखिए ।
 - ‘कर्मफल’ कहानी किसकी निरीह अवस्था का बड़ा करुणाजनक चित्र है ?
 - ‘तमस’ उपन्यास के रचनाकार का नाम लिखिए ।
 - पितृशोक कहानी में पिता के कर्मों से बचने के लिए बेटा कहाँ भाग जाता है ?
 - ‘मजदूर खाता’ कहानी के रचनाकार का नाम लिखिए ।
 - किसको स्कूल जाना है ?
 - कर्मफल किसकी रचना है ?
 - डेढ़ सौ साल बीत चुके हैं परन्तु किसकी नाम आज भी उसी तरह ज़िन्दा है ।
- II किन्हीं दो प्रश्नों के लिए सप्रसंग व्याख्या कीजिए :-** **5X2=10**
- भाई ! यह बात तो तुमने मेरे मुँह से छीन ली । मैं भी यही कहने जा रहा था । हाँ, बेटा तो है ही । इसे खूब प्यार करोगी न ?
 - “उससे कहो, बच्चे को चुप करे, नहीं तो हमारी नींद में खलल पड़ता है । चले जाओ ।”
 - ‘क्या बात है ? क्या हल्ला मचा रही हो ?’ उसने दबे-दबे के साथ कहा ।
 - ‘इमरजेंसी ही है साहब ! मेरा बेटा सख्त बीमार है साहब । उसके इलाज के लिए पैसे की ज़रूरत है । उसी के लिए गाँव पैसे भिजवाने हैं ।”
- III निःस्वार्थ सेवा-भाव ही सबसे श्रेष्ठ है “मंत्र” कहानी के आधार स्पष्ट कीजिए ।**
- अथवा** **10**
- ‘कर्मफल’ कहानी का सारांश अपने शब्दों में लिखिए ।
- IV ‘पितृशोक’ कहानी का सारांश लिखिए ।**
- अथवा** **10**
- ‘माँ मुझे स्कूल जाना’ कहानी के माध्यम से आगामी पीढ़ी को शिक्षा की महत्ता को कहानिकार कैसे अवगत कराते हैं ?
- V किन्हीं दो प्रश्नों का उत्तर लिखिए :-** **5X2=10**
- भाषा के स्वरूप का वर्णन कीजिए ।
 - शब्द विचार की परिभाषा और अर्थ के भेदों को उदाहरण सहित लिखिए ।
 - उत्पत्ति के आधार पर शब्द के प्रकारों को उदाहरण सहित लिखिए ।

4. विकार के आधार पर शब्द के भेदों को उदाहरण सहित लिखिए ।
- VI अ) इन शब्दों का तद्धव रूप लिखिए :- 1X5=5
1. अंगुली 2. अगणित 3. दंत 4. अर्ध 5. कर्ण
- आ) रूढ, यौगिक और योगरूढ शब्दों को चुनकर लिखिए :- 1X5=5
1. शिक्षा 2. रात 3. गोमुख 4. हिमालय 5. एकदंत

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II Semester B.B.A. Degree Examination, April 2022

Choice Based Credit System(2021-22 Batch onwards)

Ability Enhancement Compulsory Course

Language 2 : HINDI

(Group - III) (Paper - II)

Time : 3 Hrs.

Question Paper Pattern

प्रश्न पत्र का नमूना

Max. Marks :60

- I एक शब्द या वाक्य में उत्तर लिखिए :- 1X10 = 10
1. 'ईर्ष्या: तू न गयी मेरे मन से' किस प्रकार के निबंध है ?
 2. 'ईर्ष्या: तू न गयी मेरे मन से' निबंधकार कौन है ?
 3. 'अपनी ही मौत पर' निबंध के रचनाकार का नाम क्या है ?
 4. नाव में किसके साथ बैठकर जाने से डूबकर मरना बेहतर समझते हैं ?
 5. आजकल किसकी बिक्री हो रही है ?
 6. होली और ओणम के पीछे किस तरह की कथा छिपी हुई है ?
 7. हिन्दी संसार में महान त्यागवृत्ति साहित्यसेवी महाकवि कौन है ?
 8. किस पुस्तक में राहुल जी ने घुमककड़ी का शास्त्रीय विवेचन किया है ?
 9. 'ऐनक है तो रौनक है' जोशी जी के किस व्यंग्य गद्य संग्रह से लिया गया है ?
 10. देश में किसके उद्योग का विस्तार हो रहा है ?
- II श्री राहुल सांकृत्यायन के अनुसार 'घुमककड जिज्ञासा' माने क्या है ? निबंध के आधार पर विस्तार से लिखिए ।
- अथवा 10
- 'अपनी ही मौत पर' निबंध का सार लिखिए ।
- III 'त्यागमूर्ति निराला' जी का चरित्र-चित्रण कीजिए ।
- अथवा 10
- 'होली और ओणम' निबंध में चर्चित कथाओं के बारे में विस्तार से लिखिए ।
- IV किन्हीं दो पर टिप्पणी लिखिए :- 5X2=10
1. ईर्ष्या
 2. ऐनक
 3. अफसर
 4. दलबदल विरोध कानून
- V किन्हीं दो प्रश्नों का उत्तर लिखिए :- 5X2=10
1. संघ की राजभाषा का परिचय दीजिए ।
 2. राजभाषा अधिनियम माने क्या है ? पूर्ण परिचय दीजिए ।
 3. हमारे संविधान में राज्यों की राजभाषाओं के बारे में क्या कहा गया है ?
 4. हिन्दी का सामाजिक संस्कृति-रूप क्या है ?
- VI अ) इन बैंकिंग शब्दों का हिन्दी रूप लिखिए :- 1X5=5
1. Check
 2. Cash
 3. Debit
 4. Account
 5. Balance
- आ) हिन्दी में अनुवाद कीजिए :- 5

Lal bahadur Shastri was born and brought up in poverty. He rose to high office of Prime Minister. Even as Prime Minister, he was very simple in his dress and food. He worked for long hours even at the cost of his health. For his great services, he was honored with the 'Bharat Ratna' after his death.

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ಲಾಲ್ ಬಹದ್ದೂರ್ ಶಾಸ್ತ್ರಿಯವರು ಬಡತನದಲ್ಲಿ ಹುಟ್ಟಿ ಬೆಳೆದವರಾಗಿದ್ದು ನಂತರ ಅತ್ಯುನ್ನತ ಪ್ರಧಾನಮಂತ್ರಿ ಹುದ್ದೆಗೇರಿದರು. ಪ್ರಧಾನಮಂತ್ರಿಯಾದ ಬಳಿಕವೂ ಅವರ ಉಡುಪು, ಆಹಾರ ಅತ್ಯಂತ ಸರಳವಾಗಿದ್ದವು. ತನ್ನ ಆರೋಗ್ಯವನ್ನು ಲೆಕ್ಕಿಸದೆ ಗಂಟೆಗಟ್ಟಲೆ ಅವರು ಕೆಲಸ ಮಾಡುತ್ತಿದ್ದರು. ಅವರ ಶ್ರೇಷ್ಠವಾದ ಸೇವೆಯನ್ನು ಗುರುತಿಸಿ ಮರಣೋತ್ತರವಾಗಿ “ಭಾರತ ರತ್ನ” ಪ್ರಶಸ್ತಿ ನೀಡಿ ಅವರನ್ನು ಗೌರವಿಸಲಾಯಿತು.

I Semester B.C.A Syllabus प्रथम सेमिस्टर बी.सी.ए पायक्रम

Teaching Hours : 4 Hrs. Per Week

Total Marks : 100

Credits : 3

Theory : 60

Exam Duration : 3 Hrs.

Syllabus पायक्रम

IA : 40

UNIT	SUBJECT	Marks
I	1. आत्मनिर्भरता – बालकृष्ण भट्ट 2. नई संस्कृति की ओर – रामवृक्ष बेनीपुरी 3. मित्रता – रामचन्द्र शुक्ल 4. मैं थोबी हूँ – शिवपूजन सहाय	20
II	1. जब मैं फेल हुआ – डॉ. ए.पी.जे. अब्दुल कलाम 2. पानी है अनमोल – श्रीराम परिहार 3. ताज – रघुवीर सिंह 4. वेशीकरण का भारतीय संस्कृति पर प्रभाव – डॉ. नामदेव	20
III	सैद्धांतिक व्याकरण 1. वर्ण विचार-भाषा का स्वरूप, स्वर, व्यंजन, वर्तनी 2. शब्द विचार-परिभाषा, अर्थ के आधार पर सार्थक और निरर्थक शब्द 3. रचना के आधार पर वाक्य भेद – सरल, संयुक्त और मिश्र वाक्य	10
IV	व्यावहारिक व्याकरण 1. पल्लवन 2. संक्षिप्तिकरण 3. विज्ञापन	10

Prescribed Books : 1. निबंध सौरभ – संपादक : डॉ. सुमा टी रोडनवर
2. व्याकरण – समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

Pedagogy : शिक्षा पद्धति : 1. गतिविधि आधारित शिक्षण 2. रचनात्मक अभिव्यक्ति

Expected Out-come : अपेक्षित परिणाम :

1. गद्य के तत्वों के आधार पर निबन्ध रचने की क्षमता प्राप्त होगी ।
2. छात्रों में पढ़ने की आदत का विकास होगा ।
3. वाचनकौशल तथा लेखन कौशल में बढोत्तरी ।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I&II) (2 out of 4)	5X2	10
III	Essay Type Questions (Unit I 1 out of 2)	10X1	10
IV	Essay Type Questions (Unit II 1 out of 2)	10X1	10

V	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10
VI	Practical Grammar(Unit IV) 1. Pallavana OR Sankshithikarana 2. Vignapan	5X1 5X1	5 5
	Total		60

II Semester B.C.A Syllabus द्वितीय सेमिस्टर बी.सी.ए पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Total Marks : 100

Credits : 3

Theory : 60

Exam Duration : 3 Hrs.

Syllabus पाठ्यक्रम

IA : 40

UNIT	SUBJECT	Marks
I	हिन्दी कहानी साहित्य 1. प्रेमचंद – सद्गति 2. जयशंकर प्रसाद – गुण्डा 3. यशपाल – कर्मफल 4. सुदर्शन – हार की जीत	20
II	हिन्दी कहानी साहित्य 1. जैनेन्द्र – पत्नी 2. सियारामशरण गुप्त – बैल की बिक्री 3. रत्नकुमार सांभरिया – फुलवा 4. मृदुला गर्ग – मीरा नाची	20
III	प्रयोजनमूलक हिन्दी – 1 1. हिन्दी की सांविधानिक स्थिति 2. राजभाषा अधिनियम 3. राजभाषा तथा सम्पर्क भाषा के रूप में हिन्दी	10
IV	प्रयोजनमूलक हिन्दी – 2 1. प्रयोजनमूलक हिन्दी की अवधारणा, स्वरूप और क्षेत्र का महत्व 2. टिप्पणी लेखन, प्रतिवेदन 3. अनुवाद	10

Prescribed Books : 1. कथा सरगम – संपादक – डॉ. नागरत्ना राव. एन
2. प्रयोजनमूलक हिन्दी के विविध रूप – डॉ. कल्पना जे प्रभु

Pedagogy : शिक्षा पद्धति : 1. गतिविधि आधारित शिक्षण 2. परिवेश सृजन और रचनात्मक अभिव्यक्ति 3. व्याख्यान, संवाद एवं बहस

Expected Out-come : अपेक्षित परिणाम :

- गद्य के तत्व के आधार पर कहानी रचने की क्षमता
- वाचन कौशल तथा लेखन कौशल बढ़ेगा
- हिन्दी कथा के बारे में जानकारी प्राप्त होगी
- प्रयोजन मूलक हिन्दी के अन्तर्गत राष्ट्रभाषा, राजभाषा और सम्पर्क भाषा की जानकारी प्राप्त होगी।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Annotations (Unit I&II) (2 out of 4)	5X2	10
III	Essay Type Questions (Unit I&II 2 out of 4 Internal Choice)	10X2	20
IV	Theoretical Grammar – (Unit III & IV - 2 out of 4)	5X2	10

V	Practical Grammar (Unit IV)		
	1. Tippani Lekhan OR Prativedan	5X1	05
	2. Translation (Kan/Eng To Hindi)	5X1	05
	Total		60

BCA – I SEM Choice Based Credit System(2021-22 Batch onwards)

Ability Enhancement Compulsory Course

Language 2 : HINDI, (Group - III) (Paper - I)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

I एक शब्द या वाक्य में उत्तर लिखिए :- 1X10 = 10

1. आत्मनिर्भरता की तरह देश के कल्याण का प्रधान अंग कौन-सा है ?
2. हमारे यहाँ नई तालीम ने कौन-सा रंग दिखलाया है ?
3. लेखक किस दिन गंगा मैया से साक्षात्कार लेने गए ?
4. 'आदमी सर्प से भी अधिक ज़हरीला हो गया' – यह वाक्य किसने कहा ?
5. 'नई संस्कृति की ओर' निबन्ध के निबन्धकार कौन है ?
6. अब्दुल कलाम ने रात-दिन मेहनत करके किस तरह का विज्ञान डिज़ाइन तैयार किया ?
7. 'ताज' निबन्ध किसके द्वारा लिखित है ?
8. सरोवर तट पर किसका झुण्ड आ पहुँचा था ?
9. भूमण्डलीकरण का समानार्थी शब्द क्या है ?
10. "बहु अंतर राष्ट्रीय सार्वभौमिकता को दर्शाने के लिए कौन-सा शब्द का प्रयोग होता है ?

II किसी एक संदर्भ की व्याख्या कीजिए :- 5X1=5

- अ) 1. जो संकल्पों को दृढ़ करने में सहायक होता है। वही सच्चा मित्र है। जिसके संकल्प शक्ति क्षीण होती है, वह मित्र नहीं है।
2. मैं धोबी हूँ, भगवान भी धोबी हैं। मैं कपड़े धोता हूँ, वे पाप धोते हैं।

आ) किसी एक संदर्भ की व्याख्या कीजिए :- 5X1=5

1. कैसा जमाना आया कि जिस देश में दूध नहीं बिकता था, वहाँ अब पानी बिक रहा है।
2. वैश्विक आत्मकेन्द्रित और उपभोक्तावादी संस्कृति का प्रभाव भारतीय संस्कृति पर भी पड़ा है।

III अ) 'आत्मनिर्भरता' निबन्ध के माध्यम से निबन्धकार क्या कहना चाहते हैं। – स्पष्ट कीजिए

अथवा

10

'ताज' निबन्ध का सार लिखकर उसकी विशेषताओं पर प्रकाश डालिए।

आ) 'पानी है अनमोल' निबन्ध के माध्यम से निबन्धकार का आशय समझाइए।

अथवा

10

'जब मैं फेल हुआ' पठित निबन्ध के आधार पर अब्दुल कलाम के उद्देश्य को व्यक्त कीजिए।

IV किन्हीं दो प्रश्नों का उत्तर लिखिए :- 5X2=10

1. 'भाषा' की परिभाषा लिखकर उसके स्वरूप का वर्णन कीजिए।
2. वर्ण किसे कहते हैं ? उसके भेदों को उदाहरणसहित समझाइए।

3. शब्द कैसे बनते हैं ? अर्थ के आधार पर भेदों को परिभाषा के साथ स्पष्ट कीजिए ।
4. वाक्य कैसे बनते हैं ? उसके भेदों को उदाहरणसहित समझाइए ।

V पल्लवन लिखिए :- 'नर और नारी जनमते और मरते हैं, परन्तु राष्ट्र सदा अमर रहता है । **5X1=5**
अथवा

संक्षिप्तीकरण कीजिए :-

हमारे देश के त्योहार चाहे धार्मिक दृष्टी से मनाए जा रहे हों या नए वर्ष के आगमन के रूप में फसल की कटाई या खलिहानों के भरने की खुशी में हों या महापुरुषों की याद में; सभी अपनी-अपनी विशेषताओं एवं क्षेत्रीय प्रभाव से युक्त होने के साथ ही राष्ट्रीय एवं सांस्कृतिक एकता और अखंडता को मजबूती प्रदान करते हैं । ये त्योहार जहाँ जन-मानस में उल्लास, उमंग और खुशहाली भर देते हैं, वहीं हमारे अंदर देशप्रेम और गौरव की भावना के साथ-साथ विश्व-बंधुत्व की भावना भी बढ़ाते हैं ।

VI टी.वी के संबंध एक विज्ञापन तैयार कीजिए :- **5X1=5**

II Semester B.C.A Degree Examination, April 2022
Choice Based Credit System(2021-22 Batch onwards)
Ability Enhancement Compulsory Course
Language 2 : HINDI (Group - III) (Paper - II)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

-
- I एक शब्द या वाक्य में उत्तर लिखिए :- 1X10 = 10
1. सुरिया किस कहानी का पात्र है ?
 2. राजमाता का नाम क्या है ?
 3. सेठानी क्यों दुःखी थी ?
 4. आनंद बाबा भारती अपने घोड़े को किस नाम से पुकारते थे ?
 5. कालीचरण किस कहानी का पात्र है ?
 6. बैल की बिक्री कहानी में किसकी समस्याओं को दिखाया गया है?
 7. 'मीरा नाची' कहानी किसके द्वारा लिखित है ?
 8. फुलवा के बेटे का नाम क्या था ?
 9. दुखिया गोंड की लडकी को लेकर साह की दूकान क्यों जाती है ?
 10. यशपाल द्वारा लिखित कहानी कौन-सी है ?
- II किसी एक संदर्भ की व्याख्या कीजिए :- 5X1=5
- अ) 1. 'ऐसा चलता है जैसे मोर घटा को देखकर नाच रहा हो' ।
2. बिन्दी न डाक्टर थी न वैद्य, लेकिन बच्चे के दर्द को माँ का हृदय अनुभव न करेगा, तो कौन करेगा ।
- आ) किसी एक संदर्भ की व्याख्या कीजिए :- 5X1=5
1. नहीं सोचती कहा है ? असल भाव से वह तो वहा बैठी ही है, पत्नी सोचने को है तो यही कि कोयले न बुझ जाए ।
 2. 'रामेश्वर जी, सुबह कोठी पर आ जाना । इतने तुम्हारे दाढ़ का दर्द भी ठीक हो जाएगा । देशी घी का हलवा बनाऊँगी, कुंवर से ।'
- III अ) 'सद्गति' कहानी लिखकर उसकी विशेषताओं को स्पष्ट कीजिए ।
- अथवा 10
- 'हार की जीत' कहानी के आधार पर उसकी चारित्रिक विशेषताओं पर प्रकाश डालिए ।
- आ) 'बैल की बिक्री' कहानी के महत्व को प्रतिपादित कीजिए ।
- अथवा 10
- फुलवा कहानी में व्यक्त समस्याओं को रेखांकित कीजिए
- IV किन्हीं दो प्रश्नों का उत्तर लिखिए :- 5X2=10

1. प्रयोजन मूलक हिन्दी की सबसे बड़ी विशेषता क्या है ?
2. राजभाषा और राष्ट्रभाषा के अन्तर को स्पष्ट कीजिए ।
3. प्रयोजन मूलक हिन्दी की उपयोगिता को स्पष्ट कीजिए ?
4. टिप्पणी लेखन क्या है ?

V निम्न में से किसी एक विषय पर लेख लिखिए :-

5X1=5

1. प्रतिवेदन
2. सम्पर्क भाषा

VI हिन्दी में अनुवाद कीजिए :-

5

Lal bahadura Shaastrri was born and brought up in poverty. He rose to high office of Prime Minister. Even as Prime Minister, he was very simple in his dress and food. He worked for long hours even at the cost of his health. For his great services, he was honored with the 'Bharat Rathna' after his death.

लाल बहदुर शास्त्री यावतु बडतनदल्लु, कुडुडु बलडदवरागलदु नततर अतुनूत प्रुधानमंतुरलु कुदुडुगुलदरु. प्रुधानमंतुरलुयाद बलकवु अवतर लुडुवु, अकलर अतुंत सरलवलगलदुवु. तनु अरुलुगुवनु लुकुसदु गंतुगलुलु अवतु कलस मलडुतुलदु. अवतर शुलुवुवद सलवुलनु गुरुतुलस मरलुलुतुवरवलगु "भलरत रतु" प्रुशसुतु नलडु अवतरनु गुरुवसललुतु.

I Semester Open Elective Syllabus
BA,B.Sc,B.Com,BBA,BCA (Open Elective Course)
प्रस्तावित पाठ्यक्रम

Teaching Hours : 4 Hrs. Per Week

Total Marks : 100

Credits : 3

Theory : 60

Exam Duration : 3 Hrs.

Syllabus पाठ्यक्रम

IA : 40

UNIT	SUBJECT	Marks
I	1. सरल व्याकरण :- वर्णमाला:-स्वर – उसके भेद, व्यंजन-उसके भेद, वर्तनी का मानकीकरण, बोलचाल में प्रायुक्त शब्द	20
II	1. वाक्य विचार : अर्थ और परिभाषा, आवश्यक तत्व, भेद, सरल वाक्य रचना	20
III	1. संवाद कला : संवाद की परिभाषा, अर्थ, प्रकार, संवाद लेखन अभ्यास	10
IV	1. संभाषण कला : अर्थ एवं स्वरूप, विविध रूप, आवश्यकता, अभ्यास	10

Prescribed Books :

1. समग्र हिन्दी व्याकरण – डॉ. बालमुकुंद सुखवाल

2. संभाषण कला अर्थ एवं विविध रूप :- सागरिका

Pedagogy : शिक्षा पद्धति :

1. कक्षा व्याख्यान 2. सामूहिक चर्चा 3. परिवेश निर्माण 4. आई.सी.टी तथा यू ट्यूब का प्रयोग

5. भिन्न भिन्न स्थानों पर वार्तालाप का अभ्यास

Expected Out-come : अपेक्षित परिणाम :

- छात्रों में अंतर्निहित सम्प्रेषण एवं बोलने का विकास होगा ।
- लिखने की कला में निपुणता हासिल होगी ।
- सम्भाषण कला के आधार पर व्यक्तित्व के निरूपण में विकास होगा ।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Marks
I	One word or One Sentence Answer (Unit I&II)	1X12	12
II	Theoretical Grammar – (All Units 4 out of 5)	5X4	20
III	Correction of Sentences	1X5	5
IV	Change of Sentences	1X5	5
V	Samvaada Lekhan	6X2	12
VI	Sambhashan Lekhan	1X6	6

	Total		60

II Semester Hindi Open Elective Syllabus
BA,B.Sc,B.Com,BBA,BCA (Open Elective Course)

Teaching Hours : 4 Hrs. Per Week

Total Marks : 100

Credits : 3

Theory : 60

Exam Duration : 3 Hrs.

Syllabus पाठ्यक्रम

IA : 40

UNIT	SUBJECT	Marks
I	1. हिन्दी भाषा – हिन्दी भाषा व्युत्पत्ति, हिन्दी भाषा का अर्थ, परिभाषा, हिन्दी भाषा के विविध रूप	20
II	1. तत्सम, तद्भव, देशी, विदेशी, हिन्दी बोलिया, हिन्दी के शब्द भण्डार	20
III	1. हिन्दी साहित्य के प्रमुख काल, कहानी का अर्थ, प्रमुख कहानीकार, उपन्यास का अर्थ, प्रमुख उपन्यासकार, नाटक	10
IV	1. स्त्रीवादी साहित्यकार, दलित साहित्यकार	10

Prescribed Books : 1. हिन्दी भाषा एवं हिन्दी साहित्य का इतिहास – डॉ. पी.एम.वाघमारे
2. हिन्दी साहित्य का इतिहास – बाबू गुलाबराय

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान, समूह चर्चा 2. स्थानों पर वार्तालाप का अभ्यास

Expected Out-come : अपेक्षित परिणाम :

1. हिन्दी कथा के बारे में जानकारी प्राप्त होगी
2. छात्रों में अंतर्निहित सम्प्रेषण एवं बोलने की कला का विकास होगा
3. इतिहास की जानकारी मिलेगी
4. इतिहास में रुचि बढ़ेगी।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Essay Type Questions (Unit I To IV) Internal Choice	10X4	40
III	Short Notes (2 out of 4)	5X2	10
	Total		60

I Semester Hindi Open Elective Syllabus
BA,B.Sc,B.Com,BBA,BCA (Open Elective Course)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

-
- I) एक शब्द या एक वाक्य में उत्तर लिखिए। (12 X1=12)
- १) स्वर के कितने प्रकार हैं ?
 - २) व्यंजन के लिए एक उदाहरण दीजिए ?
 - ३) वाक्य के कितने अंग माने गए हैं?
 - ४) अनुनासिक का एक उदाहरण लिखिए?
 - ५) प्लुत स्वर किसे कहते हैं ?
 - ६) वाक्य किसे कहते हैं ?
 - ७) संवाद लेखन कितने प्रकार का होता है ?
 - ८) संवाद की पहली शर्त क्या है ?
 - ९) संवाद किस भाषा में होनी चाहिए?
 - १०) सम्भाषण के लिए व्यक्ति का क्या होना आवश्यक है ?
 - ११) सम्भाषण का एक अनिवार्य तत्व क्या है ?
 - १२) एकालाप किसे कहते हैं ?
- II) किन्हीं चार प्रश्नों का उत्तर लिखिए। (5 x 4 =20)
- १) वर्ण किसे कहते हैं ? उसके भेदों को उदाहरण सहित समझाइए ?
 - २) वाक्य के आवश्यक तत्वों को स्पष्ट लिखिए ?
 - ३) वार्तालाप या संवाद किसे कहते हैं ? स्पष्ट कीजिए ?
 - ४) संभाषण के विविध रूपों का संक्षिप्त परिचय दीजिए ?
 - ५) संभाषण की आवश्यकता पर प्रकाश डालिए ?
- III) नीचे दिए गए वाक्यों का रूपांतरण कीजिए। (1 x 5 =5)
- १) कमाने वाला खायेगा। (मिश्र वाक्य में बदलिए)
 - २) सूर्य के उगते ही अँधेरा भागा। (संयुक्त वाक्य में बदलिए)
 - ३) उसने मुझे देखा और खिसक गया। (मिश्र वाक्य में बदलिए)
 - ४) संकट आ जाये ,तो घबराना उचित नहीं। (सरल वाक्य में बदलिए)
 - ५) मैं अपना शेष जीवन अमेरिका में बिताऊँगी। (संयुक्त वाक्य में बदलिए)
- IV) नीचे दिए गए वाक्य को शुद्ध कीजिए :- (1x5=5)
- १) दृष्टी बदल जाता है। २) मकान की दोनों तरफ दीवार है। ३) गरमी के मारे बुरी हाल है।

- ४) पंकज ने एक पुस्तक खरीदा। ५) वह पुस्तक पढ़ते हैं।
 V) नीचे दिए प्रश्नों का उत्तर लिखिए :- (6 x 2 =12)
 १) दो मित्रों के बीच अपने कॉलेज में बिताए पहले दिन के बारे संवाद लिखिए।
 २) यातायात पुलिसकर्मी और हेलमेट न पहने हुए वाहन चालक के बीच संवाद प्रस्तुत कीजिए।
 VI) परीक्षा की तैयारी को लेकर रौनक और भैरवी के बीच संभाषण लिखिए। (6 x 1 =6)

II Semester Open Elective Syllabus BA,B.Sc,B.Com,BBA,BCA (Open Elective Course)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

- | | | |
|---|---|------------------|
| I | एक शब्द या वाक्य में उत्तर लिखिए :-
1. भाषा के लिए हिन्दी का प्रयोग कहा से आरंभ होता है ?
2. प्राकृत भाषा का जन्म किस भाषा से हुआ ?
3. ब्रज भाषा किस क्षेत्र में बोली जाती है ?
4. तद्धव शब्द के दो उदाहरण दीजिए ?
5. हिन्दी किस लिपि में लिखी जाती है ?
6. हिन्दी साहित्य के इतिहास को कितने भागों में बांटा है ?
7. कबीरदास किस युग के कवि है ?
8. किस उपन्यासकार को उपन्यास सम्राट कहा जाता है ?
9. किसी एक महिला साहित्यकार का नाम लिखिए ?
10. 'जूठन' किस साहित्यकार की आत्मकथा है ? | 1X10 = 10 |
| II निम्नलिखित प्रश्नों का उत्तर लिखिए :- | | |
| अ) | हिन्दी की प्रमुख बोलियों पर प्रकाश डालिए।
<div style="text-align: right;">अथवा</div> हिन्दी के शब्द भण्डार पर लेख लिखिए। | 10 |
| आ) | हिन्दी भाषा का अर्थ और उसके स्वरूप पर प्रकाश डालिए।
<div style="text-align: right;">अथवा</div> हिन्दी के विविध रूप पर प्रकाश डालिए। | 10 |
| इ) | आदिकाल के प्रमुख दो कवियों का परिचय दीजिए।
<div style="text-align: right;">अथवा</div> तुलसीदास का जीवन परिचय पर लेख लिखिए। | 10 |
| ई) | प्रेमचन्द की साहित्य को रेखांकित कीजिए।
<div style="text-align: right;">अथवा</div> महिला उपन्यासकारों के किसी एक उपन्यास की चर्चा कीजिए। | 10 |
| III | किन्हीं दो प्रश्नों का टिप्पणी लिखिए :- | 5X2=10 |

1. खडीबोली 2. विदेशी भाषा 3. सूरदास 4. सूर्यकान्त त्रिपाठी निराला

**I Semester Hindi Skill Based Enhancement
BA,B.Sc,B.Com,BBA,BCA (All Course)**

Teaching Hours : 4 Hrs. Per Week

Total Marks : 100

Credits : 3

Theory : 60

Exam Duration : 3 Hrs.

Syllabus पाठ्यक्रम

IA : 40

UNIT	SUBJECT	Marks
I	अनुवाद भेद और प्रभेद/अनुवाद के कार्यक्षेत्र	20
II	अनुवाद की सीमाएँ	10
III	अनुवाद के प्रकार	10
IV	अनुवाद अभ्यास	20

Prescribed Books : 1. अनुवाद उसके विविध रूप – प्रो.अनुराग कुमार

2. अनुवाद कुछ नमूने कुछ पैमाने – डॉ.अर्जु

Pedagogy : शिक्षा पद्धति : 1. कक्षा व्याख्यान 2. सामूहिक चर्चा 3. कक्षाओं में पठन पाठन की पद्धति

4. अनुवाद का व्यावहारिक प्रयोग 5. भाषायी कौशल का विकास

Expected Out-come : अपेक्षित परिणाम :

1. भाषायी कौशल का निर्माण होगा । 2. भाषायी शुद्धता के प्रति सजग निर्माण होगी ।

3. अनुवाद के व्यावहारिक ज्ञान में वृद्धि होगी । 4. अनुवाद करने में सक्षम होंगे ।

5. अनुवाद के द्वारा अपने रोजगार को प्राप्त कर सकेंगे ।

Question Paper Pattern प्रश्न पत्र का नमूना

Question No.	Type of Question	Division of Marks	Total Marks
I	One word or One Sentence Answer (Unit I&II)	1X10	10
II	Essay Type Questions (Unit I To IV) Internal Choice	10X3	30
III	Short Notes (2 out of 4)	5X2	20
	Total		60

I Semester Hindi Skill Based Enhancement
BA,B.Sc,B.Com,BBA,BCA (All Course)

Time : 3 Hrs.

Max. Marks :60

Question Paper Pattern प्रश्न पत्र का नमूना

- | | | |
|------------|---|------------------|
| I | एक शब्द या वाक्य में उत्तर लिखिए :- | 1X10 = 10 |
| | <ol style="list-style-type: none">1. अनुवाद करनेवाले व्यक्ति को क्या कहते हैं ?2. अनुवाद के लिए कितनी भाषाएँ होनी हैं ?3. अनुवाद किस भाषा का शब्द है ?4. 'सेवा में' शब्द का अंग्रेज़ी रूप लिखिए ?5. शब्दानुवाद का अर्थ लिखिए ?6. किस अनुवाद के कारण दुनिया में नयी क्रांति आ गयी है ?7. तकनीकी अनुवाद के लिए क्या बहुत उपयोगी है ?8. 'Manager' का हिन्दी रूप लिखिए ।9. अनुवाद की एक प्रक्रिया का नाम लिखिए ।10. जिस भाषा से अनुवाद किया जाता है उसे क्या कहते हैं? | |
| II | किन्हीं तीन प्रश्नों के लिए उत्तर लिखिए :- | 10X3=30 |
| | <ol style="list-style-type: none">1. अनुवाद क्या है परिभाषा देते हुए उसके प्रकारों को लिखिए ।2. अच्छे अनुवाद की विशेषता बताइए ।3. अनुवाद की प्रक्रिया को अपने शब्दों में स्पष्ट लिखिए ।4. अनुवाद की भाषापरक सीमाओं पर प्रकाश डालिए ? | |
| III | हिन्दी में अनुवाद कीजिए :- | 1X5=5 |
| | <ol style="list-style-type: none">1. We are citizens of India. - ನಾವು ಭಾರತ ದೇಶದ ಪ್ರಜೆಗಳು.2. If we get up early, we can see sun rise. - ನಾವು ಒಗ್ಗಟ್ಟಾಗಿ ಬಾಳಬೇಕು.3. We should live unitedly. - ನಾವು ಬೇಗ ಎದ್ದರೆ, ಸೂರ್ಯೋದಯವನ್ನು ನೋಡಬಹುದು.4. I will answer these questions tomorrow. ನಾನು ಈ ಪ್ರಶ್ನೆಗಳಿಗೆ ನಾಳೆ ಉತ್ತರಿಸುವೆ.5. Have you ever travelled by air ? ನೀವು ಎಂದಾದರೂ ವಿಮಾನದಲ್ಲಿ ಪ್ರಯಾಣ ಮಾಡಿದ್ದೀರಾ ? | |

IV अंग्रेज़ी में अनुवाद कीजिए :-

1X5=5

1. ताजमहल को किसने बनवाया ।
2. हम भार देश की प्रजा है ।
3. युवा वर्ग देश की अमूल्य संपत्ति हैं ।
4. हमें एकता से जीना है ।
5. हर एक राज्य की अपनी ही राजभाषा है ।

VI हिन्दी में अनुवाद कीजिए :-

1X5=5

Raja Dushyanta in the course of his deer-hunt reached very near Kanwashram. There he saw a damsel of incomparable, watering the plants along with her maids. Seeing him, the girls showed all hospitality on him. As he was enjoying their hospitality, he heard that Sakintala's mother was the divine damsel Menaka of immortal beauty and her father was Viswamitra.

बैँटियाडुत्ता राज दुष्यन्तनु कण्वाश्रमद समीपक्के बन्दनु. अत तन्न सखियरौडने गिडगळिगे निरैरैयुत्तिरुव अनुपम सुन्दरियौब्लुङ्गनु कंडनु. अवनु अवळ एदुरु बन्दनु. अतिष्ठ स्वीकरीसुवाग शकुंतलय तायियु अमर सुन्दरियाद मैनके मत्तु तंदे विश्वामित्ररैन्दु तिळिदुकेण्डनु.

VII अंग्रेज़ी में अनुवाद कीजिए :-

1X5=5

In ancient times Srirangapattanam was a city of historic fame. In those days it was the capital of Mysore State. The City is at a distance of nine miles by road of rail from Mysore. Now it has a railway station also. At present this city is almost in ruins. It is a small island in the Kaveri river. There is an ancient temple of Sri Ranganatha near the railway station.

BA

Semester 1

Course Title: Political history of Karnataka (BCE-3 to 10 CE) Part-1	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Political history of Karnataka (BCE-3 to 10 CE) Part-1

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

- ☐ Understand the continuity of Political developments and strategies.
- ☐ Analysis the importance of causes for the rise of regional political dynasties.
- ☐ Understand contextual necessities which influenced the era of political supremacy.
- ☐ Understand and describe the contemporary political history.
- ☐ Appreciate the confluence of diverse political elements.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1- 12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	X	x	X	x	x	x	x	x		
Communication Skills	X	x	X	x	x	x	x	x		
Critical Thinking	X	x	X	x	x	x	x	x	x	x
Problem Solving			X	x	x	x	x	x	x	x
Analytical Reasoning	X	x	X	x	x	x	x	x		
Cooperation and Team Work		x	X	x		x	x	x		x
Reflective Thinking		x	X	x	x	x	x	x	x	x
Self-motivated Learning			X	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	X	x	X	x		x	x	x		

Moral and Ethical Awareness Reasoning	X	x	X	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 1

Title of the Course: Political History of Karnataka (BCE-3 to 10 CE) Part-1

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Survey of sources- Pre historic culture	04
Chapter No. 2 The Early Alupas- The Satavahanas – Kadambas of Banavasi	06
Chapter No. 3 The Gangas of Talakad - Durvineetha	04
Unit – 2 The Age of Empires	13/14
Chapter No. 4. Chalukyas of Badami – Pulikesin – II	04
Chapter No. 5. The Rastrakutas – Amoghavarsha	04
Chapter No. 6. The Chalukyas of Kalyani - Vikramaditya VI-Kalachuries of Kalyani– Bijalla-II	06
Unit – 3 Formation of State	13/14
Chapter No. 7 Central And Provincial Administration.	12
Chapter No. 8. Map- The Chalukya Empire under Pulikesin - II Places – Badami, Aihole, Pattadakal, Banavasi, Kanchipuram, Mahakuta, Alampur, Talakadu	02

Books for Reference:

- | | | |
|---|---|--|
| 1. K.R Basavaraja | - | “History and Culture of Karnataka” |
| 2. R.S Mugali | - | “Glimpses of Karnataka” |
| 3. P.B. Desai | - | “A History of Karnataka” |
| 4. H.V Shrinivasa Murthy
and R. Ramakrishnan | - | “ A Concise History of Karnataka” |
| 5. A. Sundara (Ed) | - | “Karnataka Charitre” Volume I |
| 6. B. Surendra Rao (Ed.) | - | “Karnataka Charitre” Volume II |
| 7. R.R Diwakar | - | “ Karnataka Through the Ages” |
| 8. M. Chidananda Murthy | - | “Karnataka Shasanagala Samskrutika
Adhyayana” |

9. S. Settar - “Halagannada – Lipi, Lipikara, Lipi Vyavasaya”
10. A.C. Nagesh - “Pracheena Karnataka Charithre”
11. Dr. Suryanatha U Kamath - History of Karnataka

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Learning Through Project work
- ☐ Collaborative learning strategies
- ☐ Use of Learning Recourses like
 - as Audio – Visual aids
 - Films
 - Documentaries
 - Visit to historical sites

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/ Seminar/ Field visit/ Lab practice	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajanna

BA

Semester 1

Course Title: Cultural Heritage of India	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Cultural Heritage of India

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Provide an insight about an extensive survey of heritage of India
- ☐ Familiarize Indian history and culture
- ☐ Expertize to analyse further development of culture of India
- ☐ Analyse the factor responsible for origin and decline of culture
- ☐ Provide the opportunity to understand the process of cultural development

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X’ in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 1

Title of the Course: Cultural Heritage of India

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Meaning, Definition Historical Cultural Heritage-Concepts, Characteristics-types of Indian Cultural Heritage: Oral and Written traditions.	10
Chapter No. 2 Significance of fairs and festivals.	04
Unit – 2 Legends, Narratives and Cultural Ethos	13/14
Chapter No.3. Meaning, significance, forms and tradition of legends. Ramayana and Mahabharata: Tradition of Cultural Heritage; Panchatantra, Jataka.	06
Chapter No. 4. Traditional Performing Art, Folk dances and theatre: Bharata Natya Shastra: The Source of Performing Indian Classical Arts and other Indian classical dances as cultural Heritage	08
Unit – 3 Architecture and Built Heritage	13/14
Chapter No. 5. Important Monuments of India-Caves Shore Temple (Mahabalipuram), Aihole. Badami, Pattadakal. Ajanta, Ellora	08
Chapter No. 6. Important Monumental Centers of India Sarnath, Sanchi, Konark, Khajuraho, Hampi, Vijayanagar, Taj Mahal, Red fort. <i>Places of Historical importance :</i> Delhi, Agra, Nalanda, Saranatha, Sanchi, Hampi, Badami, Mahabalipuram, Ajantha, Ellora, Prayaga, Varanasi, Rameshwaram, Dwaraka, Konark, Khajuraho	06

Books for Reference

- | | | |
|--------------------------|---|---|
| 1. S. Radhakrishnan | - | “Culture of India” |
| 2. K.T Achaya | - | Indian food: A Historical Companion, |
| 3. Banga, I. (Ed) | - | The City in Indian History : Urban Demography,
Society and Politics. |
| 4. A.L Basham | - | The Wonder that was India. |
| 5. Sachin Shekhar Biswas | - | Protecting the Cultural Heritage |
| 6. N.K Bose | - | “Culture Zones of India” in culture and Society in India. |
| 7. S.Narayan | - | Indian Classical Dances. |
| 8. Gokulsing, K. Moti | - | Popular Culture in a Globalized India, |
| 9. Bhanu Shankar Mehta | - | Ramlila Varied Respective |
| 10. Rangacharya | - | The Natya shastra, English translation with critical
Notes. |

Pedagogy

Knowledge: The student should acquire knowledge of terms, concepts, facts, events, symbols, ideas, conventions, problems, trends, personalities, chronology and generalizations, etc., related to the study of history. The student should be able to: recall, recognize, show and read.

Understanding: The student should develop understanding of terms, facts, principal events, trends, etc., related to the study of history. The student should be able to: classify facts, illustrate events, compare and contrast events, explain events, discriminate, identify, arrange facts, detect errors, interpret and extract.

Critical Thinking: The subject should enable the students to develop critical thinking. The student should be able to: identify, analyse, collect, select, draw and verify.

Practical Skills: The subject enables the students to develop practical skills helpful in the study and understanding of historical facts. The student should be able to: draw maps, charts, diagrams and prepare models, etc.,

Interests: The subject should enable the students to develop interest in the study of history. The student, on his own, should be able to: collect coins and other historical materials, participate in historical dramas and mock sessions of historical events, visit places of historical interest, archaeological sites, museums and archives, read historical documents, maps and charts, write articles on historical and other related topics.

Learning Outcome:

This course enables students to explore various aspects of cultural heritage and cultural diversity in historical perspective that discusses numerous cultural practices that have evolved over centuries. They will acquire knowledge of changing socio-cultural scenarios of India.

As well as they can gather knowledge about the cultural heritage, cultural forms and cultural expressions performing arts, fairs and festivals.

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/ Field study/ Seminar/	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajanna

BA

Semester 1

Course Title: Cultural History of Karnataka (CE 3-CE 10) Part-I	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Cultural History of Karnataka (CE 3-CE 10) Part-I

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Provide an insight about the cultural development of Karnataka.
- ☐ Familiarize Karnataka history and culture.
- ☐ Expertize to analyze further development of culture of Karnataka.
- ☐ Analyze the factors responsible for origin and decline of dynasties.
- ☐ Provide the opportunity to understand the process of cultural diversities.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X’ in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 1

Title of the Course: Cultural History of Karnataka (CE 3-CE 10) Part-I

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Language and culture of Coastal Karnataka and Kodagu	03
Chapter No. 2 Alupa Land Grants	05
Chapter No. 3 Agriculture and Emergence of Agraharas – Education	06
Unit – 2 Social Conditions	13/14
Chapter No. 4. Caste Structure	06
Chapter No. 5. Conditions of Women	08
Unit – 3 Religion and Art	13/14
Chapter No. 6 Jainism and Buddhism in Karnataka.	04
Chapter No. 7. Saivism and Vaishnavism.	05
Chapter No. 9 Art and Architecture of Coastal Karnataka.	05

Books for Reference

- | | | |
|----------------------------|---|--|
| 1. S. Settar | - | “Halagannada – Lipi, Lipikara, Lipi Vyavasaya” |
| 2. K.R Basavaraja | - | “History and Culture of Karnataka” |
| 3. R. Rajanna & A.C Nagesh | - | “Karnatakada Charithre” Volume I |
| 4. P.B. Desai | - | “A History of Karnataka” |
| 5. A. Sundara (Ed) | - | “Karnataka Charitre” Volume I |
| 6. B. Surendra Rao (Ed.) | - | “Karnataka Charitre” Volume II |
| 7. S. Settar | - | “ Halagannada; Bhashe, Bhasha Vikasa, Bhasha Bandhavaya” |
| 8. M. Chidananda Murthy | - | “Karnataka Shasanagala Samskrutika Adhyayana” |
| 9. S. Rajashekara | - | “ Karnataka Architecture” |
| 10. K.A. Nilakanta Sastri | - | “A History of South India” |

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Learning Through Project work
- ☐ Collaborative learning strategies
- ☐ Use of Learning Recourses like
as Audio – Visual aids
Films
Documentaries
Visit to historical sites

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/ Seminar/ Project study/ Labpractice	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajann

BA Semester 1

Course Title: Introduction to Archaeology	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Introduction to Archaeology

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Understand the concept of Archaeology as an ancillary for study of history
- ☐ Help to study features of Archaeology in understanding history
- ☐ Familiarize the students to know about scope of Archaeology.
- ☐ Understand the various tools and techniques imbibed in Archaeology
- ☐ Study various schools of disciplines of Archaeology.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X” in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 1

Title of the Course: Introduction to Archaeology

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Definition – Scope – Nature	03
Chapter No. 2 Concepts – Artifacts – Assemblage – Industry – Culture -Layer	05
Chapter No. 3 Kinds of Archaeology – Ethno, Marine and Salvage	06
Unit – 2 Archaeology by Period	13/14
Chapter No. 4. Lower Paleolithic – Middle Paleolithic – Upper Paleolithic- Mesolithic – Chalcolithic – Bronze age – Iron Age	05
Chapter No. 5. Development in the Global Context – From Antiquarians to Scientific Archaeology – Finders Petrie- Pitt Riveres – Leonard Wooly.	05
Chapter No. 6. Archaeology in India – William Jones to Wheeler – The Allchins – S.R. Rao – Archaeological Survey of India – Department of Archaeology Government of Karnataka	04
Unit – 3 Exploration, Excavation and Analysis	13/14
Chapter No. 7 Identification of a site – field survey – sampling techniques – Application of scientific methods.	05
Chapter No. 8. Methods of Excavation – vertical and horizontal – Trenching – Gridding	05
Chapter No. 9 Excavation of burial mounds – Open Stripping – Quadrant method – Excavation of pits – Excavation of a typical site	04

Books for Reference

- | | | |
|---|---|--|
| 1. Agrawal D.P | - | Archaeology in India |
| 2. Aiken M.J | - | Science based dating in archaeology |
| 3. Allchin Bridget
And Raymond Allchin | - | Rise of Civilisation in India and Pakistan |
| 4. Atkinson RJC | - | Field Archaeology |
| 5. Basker .P | - | Techniques of Archaeological Excavation |
| 6. Chakrabartha D.K | - | A History of Indian Archaeology from the beginning to 1947 |
| 7. Chakrabartha D.K | - | Theoreftical Perspectives in Indian Archaeology |
| 8. Gosha .A | - | Encyclopaedia of Indian Archaeology |

- | | | |
|---------------------------|---|---------------------------------------|
| 9. Rajan .K | - | Archaeology, Principles and Methods |
| 10. Raman K.V | - | Principles and Methods in Archaeology |
| 11. Dr.Srinivas V Padigar | - | Principles of Archaeology. |
| 12. Dr Srinivas V Padigar | - | Puratattva Parichaya-(Kan) |

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Visit to Archaeological sites
- ☐ Learn techniques of excavations
- ☐ Collaborative learning strategies
- ☐ Learning about digging, Trenching and Exploration
- ☐ Collection and Preservation of Artifacts

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/ Seminar/ Project/Field study /Lab Practice	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson-

Prof. R Rajanna

BA

Semester 2

Course Title: Political History of Karnataka (CE11- 1750 AD)	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Political History of Karnataka (C11- 1799 AD)

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Understand the rise and fall of Political dynasties in Karnataka.
- ☐ Familiarize with the patterns of administration.
- ☐ Analyze the traditional values and ethos of political development.
- ☐ Understand the rise and fall of regional variations.
- ☐ Study the complexities involved in polity of the time.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X” in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 2

Title of the Course: Political History of Karnataka (CE11- 1799 AD)

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 The Hoysalas - Vishnuvardhana	07
Chapter No. 2 Medieval Alupas	07
Unit – 2 Medieval Karnataka	13/14
Chapter No. 3. Vijayanagar – Dynasties	06
Chapter No. 4. The Bahamani States	05
Chapter No. 5. Regional Kingdoms during Vijayanagar.	03
Unit – 3 Post Vijayanagar	13/14
Chapter No. 6 Wodeyars of Mysore – Nayakas of Chithradurga – Nayakas of Keladi	05
Chapter No. 7. Minor Chieftains-Local Chieftains - Chowtas	03
Chapter No.8. Hyder Ali and Tippu Sulthan.	05
Chapter No.9.Map: The Vijayanagar empire. Places- Hampi, Tanjavur, Mangalore, Barkur, Penukonda, Tirupati	01

Books for Reference

- | | | |
|-----------------------|---|--|
| 1. K.R Basavaraja | - | “History and Culture of Karnataka” |
| 2. P.B. Desai | - | “A History of Karnataka” |
| 3. Burton Stein | - | “ Vijayanagara” |
| 4. B. Sheik Ali(Ed.) | - | “Karnataka Samagra Charitre” Volume IV. |
| 5. B. Vivek Rai (Ed.) | - | “Pravasi Kanda Vijayanagara” |
| 6. G. Yazdani | - | “History of the Deccan” |
| 7. K. Satyanarayana | - | “History of the Wodeyars of Mysore” |
| 8. Mohibul Hasan | - | “History of Tipu Sulthan” |
| 9. T.V Mahalingam | - | “ Administration and Social Life Under Vijayanagara” |
| 10. K.V Ramesh | - | “History of South Kenara ” |

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Visit to Archaeological sites
- ☐ Learn techniques of excavations
- ☐ Collaborative learning strategies
- ☐ Learning about digging, Trenching and Exploration
- ☐ Collection and Preservation of Artifacts

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/Seminar/Field study/Lab Practice	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajanna

BA

Semester 2

Course Title: Cultural Heritage of Karnataka	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Cultural Heritage of Karnataka

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Understand the concept of cultural heritage of Karnataka
- ☐ Study various cultural factors which influence the flow of culture
- ☐ Familiarize the factors which influenced in influencing culture and society
- ☐ Analyze the factors responsible for formation of pluralistic society
- ☐ Understand the concept “Unity in diversity”.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X” in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 2

Title of the Course: Cultural Heritage of Karnataka

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Meaning, Definition and Concepts	07
Chapter No. 2 Characteristic features of Coastal Karnataka and Kodagu	07
Unit – 2 Fairs, Festivals and Rituals-Daivaradhane	13/14
Chapter No. 3. Significance – Festivals - Fairs	09
Chapter No. 4. Legends and Narratives- Paddanas	05
Unit – 3 Performing Arts	13/14
Chapter No.5. Folk Dances and theatre- Yakshagana	07
Chapter No. 6 Architecture and Built Heritage	07

Books for Reference

- | | | |
|--------------------------|---|---|
| 1. K.T Achaya | - | Indian food Historical Companion |
| 2. Sachin Shekhar Biswas | - | Protecting the Cultural Heritage |
| 3. N.K Bose | - | Culture Zones of India in culture and Society in India. |
| 4. S. Narayan | - | Indian Classical Dances |
| 5. Prakash, H.S Shiva | - | Traditional Theatres |
| 6. Krishna N. Reddy | - | Cultural Heritage of South India |
| 7. Dr. A. Murageppa | - | Dakshin Bhartiya Jaanpad Kosh. Vol-I II |
| 8. Dr. Suryanath Kamat | - | Karnataka Sankshipt Itihas |
| 9. Shrinivas T | - | Bhartiya Itihas Mattu Parampare |
| 10. K.R. Basavaraj | - | Karnataka History and Culture |

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Visit to Archaeological sites
- ☐ Learn techniques of excavations
- ☐ Collaborative learning strategies
- ☐ Learning about digging, Trenching and Exploration
- ☐ Collection and Preservation of Artifacts

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/Map study	10	
Viva Voice	15	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajanna

BA

Semester 2

Course Title: Cultural History of Karnataka (11 AD to 1750 AD)	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Cultural History of Karnataka (11 AD to 1750 AD)

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Understand the concept of cultural heritage of Karnataka
- ☐ Study various cultural factors which influence the flow of culture
- ☐ Familiarize the factors which influenced in influencing culture and society
- ☐ Analyze the factors responsible for formation of pluralistic society
- ☐ Understand the concept “Unity in diversity”.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 2

Title of the Course: Cultural History of Karnataka (11 AD to 1750 AD)

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Administration – Central and Provincial	05
Chapter No. 2 Kingship – Duties of King – Governors - Warfare	04
Chapter No. 3 Local Self Government – Village Administration	05
Unit – 2 Society and Economy	13/14
Chapter No. 4. Social Conditions – Society – Rituals and Customs	05
Chapter No. 5. Economic Conditions – Agriculture	04
Chapter No. 6. Trade and Commerce	05
Unit – 3 Religion and Art	13/14
Chapter No. 7 Bhakti Saints -Teaching and Philosophy – Sufism	05
Chapter No. 8. Temple Architecture – Islamic Architecture	04
Chapter No. 9 Painting	05

Books for Reference

- | | | |
|-----------------------------|---|---------------------------------------|
| 1. P.B Desai | - | History of Karnataka |
| 2. K.R Basavaraja | - | History and Culture of Karnataka |
| 3. B.R Hiremath | - | Karnataka Shasanagalalli Vartakaru |
| 4. Rahamat Tarikere | - | Karnataka Sufigalu |
| 5. Rajaram Hegde & M.V Vasu | - | Dakshina Karnataka Arasu Manethangalu |
| 6. R.R Diwakar | - | Karnatka Through the Ages |
| 7. Suryanath U. Kamath | - | A History of Karnataka |
| 8. H.K Sherwani | - | The Bahamani's of the Deccan |
| 9. Dept. of Archaeology | - | Vijayanagar Adhayayana |
| 10. Baragur Ramachandrappa | - | Karnataka Sangathi |

Pedagogy

- ☐ Lecture Method – Class Room Teaching
- ☐ Visit to historical sites
- ☐ Group Discussion
- ☐ Visit to cultural sites
- ☐ Preparation of charts

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/Map study	10	
Viva Voice	15	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Dr. R Rajanna

BA

Semester 2

Course Title: Manuscriptology	
Total Contact Hours: 39 to 42	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 60
Model Syllabus Authors:	Summative Assessment Marks:

Course Pre-requisite(s): Manuscriptology

Course Outcomes (COs):

At the end of the course the student should be able to:

- ☐ Understand the importance of manuscripts
- ☐ Study manuscripts as an ancillary for study of history
- ☐ Understand the concept of cataloguing of manuscripts
- ☐ Practice the science of conservation and preservation of manuscripts
- ☐ Visit libraries and Archives to study conservation and preservation

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	DSC1	DSC2	DSC3	DSC4	DSC5	DSC6	OE1	OE2	SEC1	SEC2
Disciplinary Knowledge	x	x	x	x	x	x	x	x		
Communication Skills	x	x	x	x	x	x	x	x		
Critical Thinking	x	x	x	x	x	x	x	x	x	x
Problem Solving			x	x	x	x	x	x	x	x
Analytical Reasoning	x	x	x	x	x	x	x	x		
Cooperation and Team Work		x	x	x		x	x	x		x
Reflective Thinking		x	x	x	x	x	x	x	x	x
Self-motivated Learning			x	x	x	x	x	x	x	x
Diversity Management and Inclusive Approach	x	x	x	x		x	x	x		
Moral and Ethical Awareness Reasoning	x	x	x	x	x	x	x	x		x
Lifelong Learning		x		x	x	x	x	x		x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark „X” in the intersection cell if a course outcome addresses a particular program outcome.

BA
BA Semester 2

Title of the Course: Manuscriptology

Course 1		Course 2	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	39 or 42	3	39 or 42

Content of Course 1	39/42 Hrs
Unit – 1 Introduction	13/14
Chapter No. 1 Meaning – Definition – Character	04
Chapter No. 2 Scope and importance	05
Chapter No. 3 Types of Manuscripts - Methods of Study	04
Unit – 2 Collection	13/14
Chapter No. 4. History of Manuscriptology	05
Chapter No. 5. Indian Manuscriptology	04
Chapter No. 6. Manuscripts in Kannada, Tigalari, Samskrit, Pali, Tamil/Grantha,Tulu, Nandinagari and Modi	05
Unit – 3 Editing	13/14
Chapter No. 7 Collection of Manuscripts	03
Chapter No. 8. Process of Editing	05
Chapter No. 9 Preservation of Manuscripts	06

Books for Reference

- | | | |
|---|---|--|
| 1. Chinthahar Chakravathi | - | Study of Manuscriptology |
| 2. M.V Seetharamiah & M. Chidanada murthy | - | Hastiprati Sastra |
| 3. N. Geethacharya | - | Hastiprati Sastra Adhyayana |
| 4. Sitharam Jahagirdar | - | Kannada Grantha Sampadhana Sastra Parichaya |
| 5. S. Jagannath | - | Grantha Sampadana Shastra |
| 6. Devarakondareddy | - | Lipiya Huttu mattu Belavanige |
| 7. Madhava Na Katti | - | Lipishastra Pravesha |
| 8. B.S Sanaya | - | Kannada Hasta Prathigala Micro film Soochi |
| 9. T.V Venkatalachala Sastri | - | Halaya Honnu |
| 10. A.K Sasthri | - | Sringeri Kadathagalu |

Pedagogy

- Class room teaching
- Visit to repositories, Archives and institutions.
- Learn in repositories the techniques of preservation
- Learn conservative method
- Study and classify manuscripts in different languages

Assessment:

Weightage for assessments (in percentage)

Formative Assessment		
	Internal Assessment	Theory Part Semester End Examination
Internal Test	15	60
Assignments/ Field study /Seminar /Lab practice	15	
Viva Voice	10	
Total	40	
Grand Total		100

Date:13.09.2021

Course Co-ordinator

Subject Committee Chairperson

Prof. R Rajanna

Course Matrix for B.A. (History-Hons): 5 Years (10 Semesters)
for Academic Year 2021-22
[As per NEP-2020 Guidelines]

FIRST SEMESTER

Paper No.	Course	Title of the Course	Instruction Hours per week	Exam Duration	Marks			Credits
					IA	ETE	Total	
1.1	DSC-1	Political history of Karnataka (BCE-3 to 10 CE) Part-1	4	3	40	60	100	3
1.2	DSC-2	Cultural Heritage of India	4	3	40	60	100	3
1.3	OE-1	Cultural History of Karnataka (CE 3-CE 10) Part-I OR Introduction to Archaeology	4	3	40	60	100	3
Total Credits								9

SECOND SEMESTER

Paper No.	Course	Title of the Course	Instruction Hours per week	Exam Duration	Marks			Credits
					IA	ETE	Total	
2.1	DSC-3	Political History of Karnataka (CE11-1799 AD)	4	3	40	60	100	3
2.2	DSC -4	Cultural Heritage of Karnataka	4	3	40	60	100	3
2.3	OE-2	Cultural History of Karnataka (11 AD to 1750 AD) OR Manuscriptology	4	3	40	60	100	3
Total Credits								9

ಮಂಗಳೂರು
MANGALORE



ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
UNIVERSITY

ಕ್ರಮಾಂಕ/ No. : MU/ACC/CR.40/2021-22/A8

ಕುಲಸಚಿವರ ಕಛೇರಿ

ಮಂಗಳಗಂಗೋತ್ರಿ - 574 199

Office of the Registrar
Mangalagangothri - 574 199

ದಿನಾಂಕ/Date: 31/12/2021

NOTIFICATION

Sub: Modified Syllabus of Journalism for B.A degree
Programme implemented as per NEP 2020-reg.

Ref: Decision of the Academic Council meeting dated: 17.12.2021.

Pursuant to the above, the modified Syllabus of Journalism for I and II semester B.A degree programme prepared as per model curriculum of NEP 2020 is hereby notified for implementation with effect from the academic year 2021-22.

Copy of the Syllabus shall be downloaded from the Mangalore University website. www.mangaloreuniversity.ac.in


REGISTRAR.
✓

To:

- 1) The Principals of the Colleges concerned.
- 2) The Registrar (Evaluation), Mangalore University.
- 3) Prof. Kishori Nayak K., Chairperson, UG BOS in Mass Communication and Journalism and Chairperson, Dept. of English, Mangalore University.
- 4) The Assistant Registrar/The Superintendent, Academic Section, O/o the Registrar, Mangalore University.
- 5) The Director, DUIMS, Mangalore University - with a request to publish in the Website.
- 6) Guard File.



MANGALORE UNIVERSITY

CHOICE BASED CREDIT SYSTEM

BOS Designed Syllabus for UG Program (NEP 2021)

Syllabus for I & II Semester **BA IN JOURNALISM**

Programme: Four-year Programme in Journalism to be introduced under NEP

Programme Objectives:

- Four-year Course in Journalism would aim to familiarize students with all aspects of the field of Journalism. They become more proficient in both theory and practical skills of the media in general.
- The programme would prepare the students 'ready-to-be recruited by media, advertising & corporate houses. The content of the programme is designed to be dynamic and incorporate changes to meet requirements of the industry.

Learning Outcome:

- The programme aims to churn out responsible media professionals who would contribute positively to the society.
- The programme aims to facilitate better career opportunities for all those students of this course and get them ready to tackle challenges in the professional setup.
- The programme aims to strike a balance between the dynamic working environment and professional ethics in the field of Journalism.

Need for Curriculum Development:

NEP 2020 initiative is intended to formulate a curriculum to bring about uniformity among the students studying in different Universities/Institutes. The need for the curriculum development in Journalism emerges due to the following reasons:

Changing Media Scenario: The curriculum has been designed keeping with the industry requirements and includes subjects such as Multimedia, Photojournalism, Short Film Making, Creating Blogs and Vlogs, Mobile Journalism, Writing for Media, Producing News Bulletins for Radio and TV, Advertising and Corporate Communications, among several others. The rapid growth in media industry demands highly skilled human resource.

Credit transfer: Credit transfer is approved by the UGC and the Government that allows the students to transfer course from their existing university to a new UGC approved university.

The same number of credits in all the Universities in Karnataka is the first step towards the credit transfer from University to University.

Skill Enhancement: The new curriculum focuses more on hands on training, internship and thereby enhancing the skills of the students. It not only aims at producing responsible communication professionals but also citizens with a humane approach in day-to-day life. The papers like Writing for Media, Photojournalism, Computer Applications for Media etc., further helps in skill development of students.

Pedagogy:

The goal of Journalism pedagogy is offered with an objective to train and prepare professionally skilled media persons and communication experts. It lends exposure to a wide range of meticulously framed syllabi.

Importance to Theory and Practical's and its application: The Journalism curriculum focuses on innovative components in theory and practice, which in turn equips students to be full-fledged media men. It is suggested that students be divided in to batches of not more than 10 each under a teacher to enable effectiveness of teaching in practicals.

Utilisation of ICT: The global media industry is in anticipation of ICT trained communication experts. To enhance critical and creative thinking amongst students, ICT tools are incorporated into the teaching methods which include research-led teaching, via presentations through smart classrooms, and practical productions.

Research-based and research-led teaching: The Research Projects are introduced in the curriculum to strengthen the research concepts among the budding researchers. The students are introduced to various facets of Journalism research such as print, electronic and new media research, global, health and political communication research, folk media, intercultural communication and research on development issues and so on in accordance to the relevance of the profession. The students will be required to do research project on a topic of their choice under the supervision of a research guide.

Brain Storming Approach: Students will be involved in groups and individual discussions. This will help the students to develop and involve in the process of critical thinking and

analysing. It further helps them in decision making and crisis management and also boosts self-confidence.

Exit Options and Credit Requirements:

A Certificate / Diploma/ Bachelor Degree or Bachelor Degree with Honours in Journalism is awarded at the completion of every progressive year.

Exit Option with	Certificate/Diploma/Degree/ Honors
Successful completion of First year (two semesters) of the Four years multidisciplinary undergraduate Degree programme.	Certificate in Journalism
Successful completion of Second year (four semesters) of the four years multidisciplinary undergraduate Degree programme	Diploma in Journalism
Successful completion of Three year (six semesters) of the four years multidisciplinary undergraduate degree Programme	BA Degree in Journalism
Successful completion of Four year (eight semesters) of the four years multidisciplinary undergraduate degree Programme	BA Degree with Honors in Journalism
Successful completion of Five year (Ten semesters) of the Four years multidisciplinary degree programme	Master of Arts Degree with Honors in Journalism & Mass Communication

A student will be allowed to enter/re-enter only after the odd semester and they can only exit after even semester. Re-entry at various as lateral academic programmes based on the above mentioned earned proficiency test records. The validity of the earned credit will be for a maximum period year or as specified by the academic bank of credits (ABC).

Acronyms Expanded	
AECC	Ability Enhancement Compulsory Course
DSCC	Discipline Specific Core Course
SEC/SB/VB	Skill Enhancement Course- Skill Based/Value Based

OEC	Open Elective Course
DSE	Discipline Specific Elective

Continuous Internal Evaluation and Semester End Examination:

Total marks for each course shall be based on continuous assessments and term end examinations. As per the decision of the Karnataka State Higher Education Council, it is necessary to have uniform pattern of Class Internal Assessment and Semester End examinations respectively, among all the Universities, their affiliated and autonomous colleges. The state level committee deliberated on the same and suggested the following pattern for the CIE Marks. The BOS has also approved to follow the same pattern.

DSCC 1: INTRODUCTION TO JOURNALISM

Course Title and Code	DSC 1-Introduction to Journalism		
Programme Title	BA in Journalism		
Credits	06	Semester	I
Course Type	Core	Academic Year	2021-22

Pedagogy: Theory: 4hrs/week

Practical: 4hrs/week

Total: 6 credits

Theory Marks – 100 = 60 T + 40 IA

Practical Marks 50 = 25 T + 25 PR

Total Marks = 150

Course objectives:

- To introduce the concept of media and mass communication in general and journalism in particular
- To familiarize the students with different facets of journalism
- To educate about the role of journalism in society and development

Learning Outcome :

Students will be able to

1. Understand and appreciate various dimensions of mass communication
2. Develop an understanding of the fundamental concepts of Journalism
3. Analyse the scope and various dimensions in Journalism
4. Discuss the recent trends in Mass Media

Padagogy:

Direct Method, ICT, Digital Resources, Collaborative and cooperative learning, Experimental Learning, Flipped Classroom

Unit I

Communication, Definitions, Process and functions, Types, Levels of Communication - Intrapersonal - Interpersonal - Group - Mass Communication - Art of Communication - Journalism - Definitions - Nature and Scope - Types - Print - Broadcast - Online **16 Hrs**

Unit II

History of Journalism: Origin and Growth of Journalism in India - History of Kannada Journalism - Development of Coastal Journalism - History of Media Education in Karnataka. **12 Hrs**

Unit III

Modern Journalism: Citizen Journalism - Advocacy Journalism - Yellow Journalism - Mobile Journalism - Use of Social Media as a Part of Journalism : Facebook, Youtube , Instagram - Journalism Ethics. **12 Hrs**

Unit IV

Photo Journalism : Importance , Scope , Types of Photography , Caption Writing - Importance of Language in Journalism - Journalistic Writing. **12 Hrs**

Exercises / Assignments

1. Reading of newspapers in the class particularly the front page and the local news.
2. Prepare questions for a specific interview
3. Rewriting news stories from newspapers converting them for magazine.
4. Filing report on the basis of mock press conference.
5. Filing report after attending one press conference after going to the field.
6. Preparing minimum 3 speech reports
7. Writing minimum 2 Letters to the Editor

Practical Syllabus
Journalistic Writing Skills

Total Hours: 40

Hours/Week: 4

Max Marks: 50

Credits: 2

1. Caption writing for Photographs
2. Letters to the Editor (2 Letters)
3. Review of content of Newspapers / Magazines
4. Reporting of any 5 different kinds of College Level incidents.
5. Translation of 5 newspaper reports
6. Preparing 2 social Media content

Reference Books

- Theory and Practice of Journalism - B N Ahuja
- Professional Journalism - M V Kamath
- Mass Communication & Journalism in India - Keval J Kumar
- Adhunik Bharathiya Parthrikodhaya - Shree L Bhandarkar
- Professional Journalist John Hohenberg
- Mass Communication & Journalism in India - Mehta
- Eradu Dadagala Nadhuve – Niranjana Vanalli
- Pathrikodyama - Ranganath Rao
- Indian Journalism - Nadig Krishnamurthy
- Journalism in India- R.Parthasarathy
- New History of Indian Journalism - G N S Raghavan

- Berlo, D. K. (1960). The process of communication: An introduction to theory and practice. Holt, Rinehart and Winston.
- Schramm, W.L. Ed). (1960). Mass Communications: a book of readings selected and ed. for the Institute of communications research in the Univ. of Illinois. University of Illinois Press.
- McQuail, D. (2010). McQuail's mass communication theory. Sage publications..
- Uma, N. (2011). Mass Communication Theory and Practice. New Delhi, Har-Anad publication Pvt Ltd.
- Kumar, Keval J. (2020) Mass Communication in India- (5th Revised Edition), Jaico Publishing house, Mumbai. Singh, C. P. (Ed.). (2004). Dictionary of Media and Journalism: TV, Radio, Print and Internet. IK International Pvt..
- Jeffery, R. (2000) India's Newspaper Revolution. Oxford University Press, New Delhi.
- Mehta, D.S. (2014) Mass Communication and Journalism in India. Allied Publications, New Delhi.
- Natarajan, J. (2000) History Of Indian Journalism: Part II Of The Report Of The Press Commission. Publications Division.
- Krishnamurthy, N. (1969) Indian Journalism, Mysore University Press.

DSCC 2: COMPUTER APPLICATIONS FOR MEDIA

Course Title and Code	DSE 2- Computer Applications for Media		
Programme Title	BA in Journalism		
Credits	06	Semester	II
Course Type	Core	Academic Year	2021-22

Pedagogy: Theory: 4hrs/week

Practical: 4hrs/week

Total: 6 credits

Theory Marks – 100 = 60 T + 40 IA

Practical Marks 50 = 25 T + 25 PR

Total Marks = 150

Course Objectives:

- To introduce students to the basics of computer
- To familiarize the students to the applications of computers in print and electronic journalism
- To facilitate the students to learn the practical applications of computers at different levels in media
- To expose the students to the world of internet and its extensive use for interactivity
- To familiarize the students with web-based broadcasting

Learning Outcome:

Students will be able to

- Understand the basic concepts of computer
- Develop an understanding of the applications of computers in print and electronic journalism

- Get acquainted with internet applications
- Apply information technology skills in print and broadcast projects
- Demonstrate web-based broadcasting skills

Pedagogy

Direct Method, ICT, Digital Resources, Collaborative and Cooperative Learning, Experimental Learning, Flipped Classroom

Unit I

Introduction to Internet – Origin and development - Software for Newspaper and TV Production: Page Maker, Adobe InDesign, Adobe Premier, Edius, Photoshop. **12 Hrs**

Unit II

Media Convergence – News Composing, Uploading write-ups to Websites. Transferring reports and stories to Media - File Transfer Protocol (FTP) – Backpack – Facebook and Youtube Live **12 Hrs**

Unit III

MS Office – Word, Power Point , Photo editing, uploading images, visuals and text - Nudi software. **12 Hrs**

Unit IV

Fundamentals of Multimedia – Definition, Elements of multimedia – Fundamentals of visual communication – Video Conferencing. Blogs, Vlogs and Email – OTT Platform **14 Hrs**

PRACTICALS

Create your own Email ID, Facebook, Twitter and Instagram Accounts

Submission of Visual Stories (Minimum 2)

Publish minimum 2 Facebook Stories

Compare any two news / sports portals of your choice.

Preparations of a lab journal of at least two pages by each individual.

PRACTICAL SYLLABUS
BASIC MULTIMEDIA SKILLS

Total Hours : 40

Hours/Week: 4

Max Marks: 50

Credits: 2

1. Creating Power Points Presentation using Multimedia tools
2. Designing an e-paper page using InDesign / Quark Xpress
3. Creating social media content
4. Creating blog

Reference Books

1. Sunder, R, 2000. *Computers Today* Ed.2, John Wiley
2. Benedict, M, *Cyberspace: First steps*, ed. Cambridge, MA. MIT Press
3. Chapman and Chapman, *Digital Multimedia*, Wiley Publication.
4. James C. Foust, *Online Journalism: Principles and Practices of News for the Web.3* Scottsdale, AZ: Holcomb Hathaway.
5. Janet H. Murray, *Hamlet on the Holodeck :The Future of Narrative in Cyberspace in New York*: Free Press, 1997.
6. Macintosh, *Advanced Adobe Photoshop*, Adobe Publishers.
7. Satyanarayana, R., *Information Technology and its Facets*, Delhi, manak 2005.
8. Smith, Gene, *Tagging: People Powered Meta data for the Social Web*, Indianapolis, Indiana: New Riders Press, 2008.

DSE (OE) 1: WRITING FOR MEDIA

Course Title and Code	OE 1-Writing for Media		
Programme Title	BA in Journalism		
Credits	03	Semester	I
Course Type	Core	Academic Year	2021-22

Pedagogy: Theory: 3hrs/week

Total: 3 credits

Theory Marks – 100 = 60 T + 40 IA

Total Marks = 100

Course Objectives:

1. To make them familiar with writing for media and develop interest in writing
2. Introduce the students to cultivating of sources
3. Equip the students with new trends in media writing

Learning Outcome:

- Learning various writing techniques for different media
- Creating content for various social media platforms
- Students become industry-ready

Unit - I

Writing for print media, Role and responsibilities of a Journalist, Forms of Journalistic writing - News, Feature, Editorial, Letter to the Editor, Press Releases.

15 Hrs

Unit - II

Writing for Radio, Importance of language and grammar, Techniques of TV writing, writing different types of TV scripts.

15 Hrs

Unit - III

New Media, Writing for social media (Facebook, Twitter, and Instagram),
Introduction to Blogging and Vlogging, Current Trends in Web Journalism.

15 Hrs

Practical Exercise:

1. Letters to Editor - 02
2. Writing Headlines – 05
3. Preparing caption writing - 05
4. Preparing Scripts for a Radio Talk and Jingles of 02 Minutes Each- 02
5. Preparing Package story using Mobile – 1
6. Create your own E-mail address, Facebook, Twitter, LinkedIn, Instagram accounts.
7. Creating Blog/Vlog

Reference Books:

1. Berger, Arther Asa (2009) *Scripts: Writing for Radio and TV*, SAGE Publications.
2. Craig Richard (2004). *Online Journalism Report Writing and Editing for New Media*, Belmont Thomson, Wadsworth Publishing Company, USA.
3. Ellen Sandler. *The TV writer's Work Book – A creative Approach to TV scripts*, Delta Publications (2007 Edition).
4. Gupta and Jasra AS (2007). *Information Technology on Journalism*, Kanishka Publishers, New Delhi.
5. Lyndra Felder (2011). *Writing for the Web Creating, Compelling Web Content Using Words, Pictures and Sound*, New Riders, Denmark.
6. Ravindra R.K (1999). *Handbook of Reporting and Editing*, Anmol Publications, New Delhi.
7. Roy Barun (2004). *Beginners Guide to Journalism*, Pusthak Mahal, Delhi.
8. Shrivastava KM (2015). *News Reporting and Editing*, Sterling Publishers, New Delhi.

DSE (OE) 2: PHOTO JOURNALISM

Course Title and Code	OE-2 Photo Journalism		
Programme Title	BA in Journalism		
Credits	03	Semester	II
Course Type	Core	Academic Year	2021-22

Pedagogy: Theory: 3hrs/week

Total: 3 credits

Theory Marks – 100 = 60 T + 40 IA

Total Marks = 100

Course Objectives:

- To attract students towards photo journalism
- To familiarize the students to techniques of photography and photo journalism
- To give a practical knowledge in the field of photography

Learning Outcome:

Students will be able to

- Students will get hands on experience on visual communication
- Students will learn the significance of pictures in various media
- Students will upgrade their knowledge on various photos - editing software

Unit - I

Evolution of Photography, Different Types of Cameras--Manual, Digital and Phone Cameras, Types of Photography – Portrait, Landscape, Street Photography, Wildlife, News Photography.

15 Hrs

Unit - II

Photo Journalism, Role and Responsibilities of Photo Journalists, Photo

Features, Techniques of Photo Editing, Caption Writing.

15 Hrs

Unit - III

Mobile Journalism - Using Smartphones for News Reporting, Photo Editing, Publishing News Content using Smartphones on Digital Platforms.

15 Hrs

Practical

- Students to shoot and submit nature photos (5), news photos (5) portraits (5) Human interest photos (5)
- Students to edit at least 10 photographs
- Caption Writing (10 captions)

Books for Reference:

1. Ang, T. (2013). *Digital Photography Masterclass*. Dorling Kindersley Ltd.
2. Beaumont Newhall(1982). *The History of photography*, The Museum of Modern Art, New York
3. Brenda Tharp (2010). *Creative Nature and Outdoor Photography*, Amphok Books, New York.
4. Erickson B and Romano. F (1999). *Professional Digital Photography*, Hall International, London.
5. Feinberg, M. (1970). *Techniques of Photojournalism: Available Light and the 35mm camera* (vol.15). wiley.
6. JonaiWabwire (2014). *Photo Journalism Distinguished From Other Branches Of Photography*, Lam Lambert Academic Publishing Germany.
7. Kenneth Kobre (2008). *Photo journalism. The professional Apporach*, Focal Press, Massachu setts.
8. Rothstein A(1980). *Photo Journalism. The History of Photography*,The museum of Modern Art, New York.

QUESTION PAPER PATTERN

Duration of the Examination- 2 Hours

Max Marks: 60 marks

Question Paper Pattern

For Both Core and Open Elective

I. Answer any 5 questions of the following.

5x10=50

1.

2.

3.

4.

5.

6.

7.

8.

II. Answer any two of the following

5x2=10

9

10

11.

12.

Mangalore University
Mangalagangothri -574 199



SYLLABUS

B.A./B.Sc. (Hons) Mathematics,
B.A./B.Sc. with Mathematics as a Major/Minor Subject
(ACCORDING TO NATIONAL EDUCATION POLICY 2020)

2021

Name of the Degree Program : B.A./B.Sc.
Discipline Course : Mathematics
Starting Year of Implementation : 2021-22

Programme Outcomes (PO):

By the end of the program it is expected that the students will be benefited by the following:

PO 1	Disciplinary Knowledge: Bachelor degree in Mathematics is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas such as computer science and other allied subjects
PO 2	Communication Skills: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will lead to the proficiency in analytical reasoning which can be used for modeling and solving of real life problems.
PO 3	Critical thinking and analytical reasoning: The students undergoing the programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.
PO 4	Problem Solving: The Mathematical knowledge gained by the students through the programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students overall development and also equip them with mathematical modelling ability, problem solving skills.
PO 5	Research related skills: Student completing the program will develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.
PO 6	Information/digital Literacy: The completion of the programme will enable the learner to use appropriate softwares to solve system of algebraic equation and differential equations.
PO 7	Self – directed learning: Student completing the program will develop an ability of working independently and to make an in-depth study of various notions of Mathematics.
PO 8	Moral and ethical awareness/reasoning: The student completing the program will develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life, in general and Mathematical studies, in particular.
PO 9	Lifelong learning: The programme provides self-directed learning and lifelong learning skills. The programme helps the learner to think independently and develop algorithms and computational skills for solving real word problems.
PO 10	Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

Assessment

Weightage for the Assessments (in percentage)

Type of Course	Formative Assessment/ I.A.	Summative Assessment (S.A.)
Theory	40%	60 %
Practical	50%	50 %
Projects	40%	60 %
Experiential Learning (Internship etc.)	--	--

**Contents of Courses for B.A./B.Sc. with Mathematics as Major Subject &
B.A./B.Sc. (Hons) Mathematics
(Model IIA suggested by the Karnataka State Higher Education Council)**

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
I	MATDSCT1.1	Theory	4	Number Theory-I, Algebra-I and Calculus-I	60	40
	MATDSCP1.1	Practical	2	Theory based Practicals on Number Theory-I, Algebra-I and Calculus-I	25	25
	MATOET1.1	Theory	3	(A) Mathematics - I (B) Business Mathematics - I	60	40
II	MATDSCT2.1	Theory	4	Number Theory-II, Algebra - II and Calculus - II	60	40
	MATDSCP2.1	Practical	2	Theory based Practicals on Number Theory-II, Algebra - II and Calculus - II	25	25
	MATOET2.1	Theory	3	(A) Mathematics - II (B) Business Mathematics-II	60	40
Exit Option with Certificate						
III	MATDSCT3.1	Theory	4	Ordinary Differential Equations and Algebra - III	60	40
	MATDSCP3.1	Practical	2	Theory based Practicals on Ordinary Differential Equations and Algebra - III	25	25
	MATOET3.1	Theory	3	(A) Ordinary Differential Equations (B) Mathematical Logic	60	40
IV	MATDSCT4.1	Theory	4	Partial Differential Equations and Integral Transforms	60	40
	MATDSCP4.1	Practical	2	Theory based Practicals on Partial Differential Equations and Integral Transforms	25	25
	MATOET4.1	Theory	3	(A) Partial Differential Equations (B) Mathematical Finance	60	40
Exit Option with Diploma						
V	MATDSCT5.1	Theory	3	Real and Complex Analysis	60	40
	MATDSCP5.1	Practical	2	Theory based Practicals on Real and Complex Analysis	25	25
	MATDSCT5.2	Theory	3	Modern Algebra - I	60	40
	MATDSCP5.2	Practical	2	Theory based Practicals Modern Algebra - I	25	25
	MATDSET5.1	Theory	3	Any ONE of the following electives: a) Vector Calculus b) Elementary Graph Theory c) Discrete Mathematics	60	40
VI	MATDSCT6.1	Theory	3	Linear Algebra - I	60	40
	MATDSCP6.1	Practical	2	Theory based Practicals on Linear Algebra - I	25	25
	MATDSCT6.2	Theory	3	Numerical Analysis	60	40

	MATDSCP6.2	Practical	2	Theory based Practicals on Numerical Analysis	25	25
	MATDSET6.1	Theory	3	Any ONE of the following electives: a) Analytical Geometry in 3D b) Linear Programming c) Special Functions d) Fourier Series and Fourier Transforms	60	40
Exit Option with Bachelor of Arts (B.A.)/ Bachelor of Science(B.Sc.) Degree						
VII	MATDSCT7.1	Theory	3	Linear Algebra -II	60	40
	MATDSCP7.1	Practical	2	Theory based Practicals on Linear Algebra -II	25	25
	MATDSCT7.2	Theory	3	Advanced Ordinary Differential Equations	60	40
	MATDSCP7.2	Practical	2	Theory based Practicals on Advanced Ordinary Differential Equations	25	25
	MATDSCT7.3	Theory	4	Advanced Real Analysis	60	40
	MATDSET 7.1	Theory	3	Any ONE of the following electives: a) Graph Theory b) Advanced Number Theory c) Mathematical Statistics d) Advanced Numerical Analysis	60	40
	MATDSET 7.2	Theory	3	Research Methodology in Mathematics	60	40
VIII	MATDSCT8.1	Theory	4	Advanced Complex Analysis	60	40
	MATDSCT8.2	Theory	4	Abstract Algebra	60	40
	MATDSCT8.3	Theory	3	General Topology	60	40
	MATDSET 8.1	Theory	3	Any ONE of the following electives: a) Operations Research b) Lattice theory c) Mathematical Modelling d) Advanced Discrete Mathematics	60	40
	MATDSET 8.2	Research Project	6 (3 + 3)	Research Project OR Any TWO of the following electives a) Theory of Modules b) Theory of Partitions c) Cryptography d) Finite Element Methods	120 OR 60 60	80 OR 40 40
Award of Bachelor of Arts Honours (B.A. Hons)/ Bachelor of Science Honours (B.Sc. Hons) Degree in Mathematics						

Abbreviation for MATDSCTx.y/MATDSCPx.y/MATDSETx.y/MATOETx.y

MAT – Mathematics;

DSC – Discipline Core; **DSE** – Discipline Elective; **OE** – Discipline Elective;

T – Theory, **P** – Practical;

x.y – xth Semester, Course y

MATOETx.y(A) - For students of Science stream who have not chosen Mathematics as one of Core subjects

MATOETx.y(B) - For Students of other than Science Stream

CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE PROGRAM

Name of the Degree Program : B.A. / B.Sc. (Honors)

Discipline/Subject : Mathematics

Starting Year of Implementation: 2021-22

PROGRAM ARTICULATION MATRIX

Semester	Course No.	Programme Outcomes that the Course Addresses	Pre-Requisite Course(s)	Pedagogy*	Assessment**
I	MATDSCT1.1	PO 1, PO 2, PO 3	PU level Mathematics	MOOC	CLASS TESTS SEMINAR QUIZ ASSIGNMENT TERM EXAM END VIVA-VOCE
II	MATDSCT2.1	PO 1, PO 2, PO 3, PO 8	MATDSCT1.1	PROBLEM SOLVING	
III	MATDSCT3.1	PO 1, PO 4, PO7, PO 8	MATDSCT2.1	SEMINAR	
IV	MATDSCT4.1	PO 1, PO 4, PO7, PO 8	MATDSCT3.1	PROJECT BASED LEARNING	
V	MATDSCT5.1	PO 1, PO 2, PO 3, PO 5	----	ASSIGNMENTS	
V	MATDSCT5.2	PO 3, PO 4, PO 7, PO10	MATDSCT2.1 MATDSCT3.1	GROUP DISCUSSION	
VI	MATDSCT6.1	PO 6, PO 7, PO 10.	MATDSCT5.2		
VI	MATDSCT6.2	PO 5, PO 8, PO 9, PO 10.	MATDSCT5.1		
VII	MATDSCT7.1	PO 3, PO 4, PO5, PO 7, PO 9.	MATDSCT6.1		
VII	MATDSCT7.2	PO 2, PO 4, PO 5, PO 10	MATDSCT3.1		
VII	MATDSCT7.3	PO 2, PO 4, PO 5, PO 10	MATDSCT5.1		
VIII	MATDSCT8.1	PO 2, PO 4, PO 5, PO 10	MATDSCT5.1		
VIII	MATDSCT8.2	PO 2, PO 4, PO 5, PO 10	MATDSCT5.2		
VIII	MATDSCT8.3	PO 2, PO 4, PO 5, PO 10	MATDSCT5.1		

*Pedagogy for student engagement is predominantly Lecture. However, other pedagogies enhancing better student engagement to be recommended for each course. This list includes active learning/ course projects / Problem based or Project based Learning / Case Studies / Self Study like Seminar, Term Paper or MOOC.

**Every Course needs to include assessment for higher order thinking skills (Applying/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for Learning).

B.A./B.Sc. with Mathematics as a Minor in the 3rd Year

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
V	MATDSCMT5.1	Theory	3	Complex Analysis	60	40
	MATDSCMP5.1	Practical	2	Theory based Practicals on Complex Analysis	25	25
VI	MATDSCMT6.1	Theory	3	Numerical Analysis	60	40
	MATDSCMP6.1	Practical	2	Theory based Practicals on Numerical Analysis	25	25

Abbreviation for MATDSCMT5.1 / MATDSCMP5.1

MAT – Mathematics; DSC – Discipline Core; M – Minor; T – Theory /P – Practical;
5 – Fifth Semester; .1 – Course 1

Credit Distribution for B.A./B.Sc.(Honors) with Mathematics as Major in the 3rd Year (Model IIA suggested by the Karnataka State Higher Education Council)

Subject	Semester	Major/ Minor in the 3 rd Year	Credits					Total Credi ts
			Discipline Specific Core (DSC)	Open Elective (OE)	Discipline Specific Elective (DSE)	AECC & Languages	Skill Enhanceme nt Courses (SEC)	
Mathematics	I - IV	Major	4 Courses (4+2)x 4=24	4 Courses 3 x 4 = 12	---	(4+4=8) Courses 8x(3+1)=32	2 Courses 2x(1+1)= 4	72
Other Subject		Minor	24	--	--	--	--	24
96								
Mathematics	V & VI	Major	4 Courses 4x(3+2)=20	-----	2 Courses 2 x 3 = 06	---	2 Courses 2 x 2 = 4	30
Other Subject		Minor	10	--	--	--	--	10
(96+40)=136								
Mathematics	VII & VIII	Major	2 Courses 2x(3+2)=10 3 Courses 3 x 4 = 12 1 Course 1 x 3 = 3 Total=25	-----	2 Courses 2 x 3 = 6 Res.Meth 1 x 3 = 3 2 Courses 2 x 3 = 6 Total= 15	----	-----	40
Total No. of Courses			14	04	07	08	04	
136+40=176								

**Syllabus for B.A./B.Sc. with Mathematics as Major Subject &
B.A./B.Sc. (Hons.) Mathematics**

SEMESTER – I

MATDSCT1.1: Number Theory-I, Algebra-I and Calculus-I	
Teaching Hours : 4 Hours/Week	Credits: 4
Total Teaching Hours: 56 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Understand the elementary concepts of Number Theory.
- Solve the system of homogeneous and non-homogeneous m linear equations in n variables.
- Sketch curves in Cartesian and polar co-ordinates.
- Identify and apply intermediate value theorem, mean value theorems and L'Hospital rule.

Unit-I: Number Theory: Division Algorithm, The Greatest Common Divisor (g.c.d), Euclidean Algorithm, Diophantine Equations, Fundamental Theorem of Arithmetic. The Theory of Congruences, Basic Properties of Congruences, Binary and Decimal Representation of Integers. Linear Congruences and The Chinese Remainder Theorem.

14 Hours

Unit-II: Matrices: Recapitulation of Symmetric and Skew Symmetric matrices, Cayley-Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof). Algebra of Matrices, Row and column reduction to Echelon form. Rank of a matrix, Inverse of a matrix by elementary operations, Solution of system of linear equations, Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations.

14 Hours

Unit-III: Polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature, asymptotes, Tracing of curves (standard curves).

14 Hours

Unit-IV: Differential Calculus: Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L' Hospital rule. Leibnitz theorem and its applications.

14 Hours

Reference Books:

- [1] David M. Burton., Elementary Number Theory, 7th Ed., McGraw Hill, 2011.
- [2] Gareth A. Jones and J. Marry Jones, Elementary Number Theory, Springer, 1998.
- [3] N. S Gopalakrishnan, University Algebra, 3rd Ed., New Age International Publications, 2015.
- [4] B. S. Vatssa, Theory of Matrices, New Age International Publishers, New Delhi, 2005.

- [5] A. R. Vasishtha and A. K. Vasishtha, Matrices, Krishna Prakashana Media (P) Ltd., 2008.
- [6] Shanti Narayan and P.K. Mittal, Text book of Matrices, 5th Ed., S Chand and Co. Pvt. Ltd., New Delhi, 2013.
- [7] Shanthi Narayan and P.K. Mittal, Differential Calculus, Reprint. S Chand and Co. Pvt. Ltd., New Delhi, 2014.
- [8] Debasish Sengupta, Applications of Calculus, Books and Allied (P) Ltd., 2019.
- [9] George B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, Addison-Wesley, 1992.
- [10] Louis Leithold, Calculus with Analytic Geometry, 5th Ed., Harper and Row International, 1986.
- [11] Maurice D. Weir, George B. Thomas, Jr., Joel Hass and Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.
- [12] S. Narayanan and T. K. Manicavachogam Pillay, Calculus, Vol. I & II, S. Viswanathan Pvt. Ltd., 1996.

MATDSCP1.1: Practicals on Number Theory-I, Algebra-I and Calculus-I	
Practical Hours : 4 Hours/Week	Credits: 2
Total Practical Hours: 56 Hours	Max. Marks: 50 (S.A.-25 + I.A. – 25)

Course Learning Outcomes: This course will enable the students to

- Learn *Free and Open Source Software (FOSS)* tools for computer programming.
- Solve problems on Number theory, Algebra and Calculus studied in **MATDSCP 1.1** by using FOSS softwares.
- Acquire knowledge of applications of algebra and calculus through FOSS.

Practical/Lab Work to be performed in Computer Lab (FOSS)

Suggested Softwares: Maxima/Scilab/Python.

1. Introduction to the software and commands related to the topic.
2. Program for Euclidean Algorithm.
3. Program for Divisibility tests.
4. Programs for Binary and Decimal Representation of Integers.
5. Program to solve Simultaneous Congruences involving Chinese Remainder Theorem.
6. Computation of addition and subtraction of matrices.
7. Computation of Multiplication of matrices.
8. Computation of Trace and Transpose of Matrix.
9. Computation of Rank and Row reduced Echelon form of a matrix.
10. Computation of Inverse of an invertible Matrix using Cayley-Hamilton theorem.
11. Solving systems of homogeneous and non-homogeneous linear algebraic equations.
12. Tracing of standard curves (Cartesian form).
13. Tracing of standard curves (Polar form).
14. Taylor's and Maclaurin's expansions of the given functions.

Open Elective Course

(For students of Science stream who have not chosen Mathematics as one of Core subjects)

MATOET1.1 (A): Mathematics - I	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Understand the elementary concepts of Number Theory.
- Solve the system of homogeneous and non-homogeneous m linear equations in n variables.
- Identify and apply intermediate value theorem, mean value theorems and L'Hospital rule.

Unit-I: Number Theory: Division Algorithm, The Greatest Common Divisor (g.c.d), Euclidean Algorithm, Diophantine Equations, Fundamental Theorem of Arithmetic. Theory of Congruences, Basic Properties of Congruences, Binary and Decimal Representation of Integers. Linear Congruences and The Chinese Remainder Theorem. **14 Hours**

Unit-II: Matrices: Recapitulation of Symmetric and Skew Symmetric matrices, Cayley-Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof). Algebra of Matrices, Row and column reduction to Echelon form. Rank of a matrix, Inverse of a matrix by elementary operations, Solution of system of linear equations, Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. **14 Hours**

Unit-III: Differential Calculus: Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L' Hospital rule. Leibnitz theorem and its applications. **14 Hours**

Reference Books:

- [1] David M. Burton., Elementary Number Theory, 7th Ed., McGraw Hill, 2011.
- [2] Gareth A. Jones and J. Marry Jones, Elementary Number Theory, Springer, 1998.
- [3] N. S Gopalakrishnan, University Algebra, 3rd Ed., New Age International Publications, 2015.
- [4] B. S. Vatssa, Theory of Matrices, New Age International Publishers, New Delhi, 2005.
- [5] A. R. Vasishtha and A. K. Vasishtha, Matrices, Krishna Prakashana Media (P) Ltd., 2008.
- [6] Shanti Narayan and P.K. Mittal, Text book of Matrices, 5th Ed., S Chand and Co. Pvt. Ltd., New Delhi, 2013.
- [7] Shanthi Narayan and P.K. Mittal, Differential Calculus, Reprint. S Chand and Co. Pvt. Ltd., New Delhi, 2014.
- [8] Debasish Sengupta, Applications of Calculus, Books and Allied (P) Ltd., 2019.
- [9] George B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, Addison-Wesley, 1992.

[10] Maurice D. Weir, George B. Thomas, Jr., Joel Hass and Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.

[11] S. Narayanan and T. K. Manicavachogam Pillay, Calculus, Vol. I & II, S. Viswanathan Pvt. Ltd., 1996.

Open Elective

(For Students of other than Science Stream)

MATOET1.1 (B): Business Mathematics-I	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Solve the system of homogeneous and non-homogeneous m linear equations in n variables.
- Translate the real world problems through appropriate mathematical modeling.
- Explain the concepts and use equations, formulae and mathematical expressions in a variety of context.
- Find the extreme values of functions.
- Analyze and demonstrate the mathematical skill required in mathematically intensive areas such as economics, business etc.

Unit-I: Matrices: Definition of a matrix, types of matrices, algebra of matrices. Properties of determinants; calculations of values of determinants up to third order, Adjoint of a matrix, elementary row and column operations, solution of a system of linear equations having unique solution and involving not more than three variables. Examples on commercial mathematics.

14 Hours

Unit-II: Straight line and Conics: Straight line in economics, Break-Even point, System of straight lines, Effect of a Tax or Subsidy. Parabola in economics, The non-linear model. Rectangular hyperbola: Rectangular hyperbola in economics. Circle in economics. Inequalities and absolute values: Properties of inequalities, Linear inequality in one variable, Absolute values. Applications in economics.

14 Hours

Unit-III: Derivatives of functions: Economic applications, Demand function, Price demand, income demand, Cross demand, Law of supply, Revenue functions, Short-run production function, Short-run cost function, Relation between marginal product and marginal cost. The maxima and minima of functions: Applications of maxima and minima of functions in economics and business.

14 Hours

Reference Books:

- [1] B. S. Vatsa, Theory of Matrices, New Age International Publishers, New Delhi, 2005.
- [2] A. R. Vasishtha and A. K. Vasishtha, Matrices, Krishna Prakashana Media (P) Ltd., 2008.
- [3] Shanti Narayan and P.K. Mittal, Text book of Matrices, 5th Ed., S. Chand and Co. Pvt. Ltd., New Delhi, 2013.

- [4] E.T. Dowling, Mathematics for Economics, Schaum's Outline, 3rd Ed., McGraw Hill, London, 2011.
- [5] R.G.D. Allen, Basic Mathematics, Macmillan, UK, 1968.
- [6] N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill, New Delhi, 2007.
- [7] R. S. Soni, Business Mathematics with Applications in Business and Economics, Pitambar Publishing, India 1996.
- [8] Maurice D. Weir, George B. Thomas, Jr., Joel Hass and Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.

SEMESTER – II

MATDSCT 2.1: Number Theory-II, Algebra-II and Calculus-II	
Teaching Hours : 4 Hours/Week	Credits: 4
Total Teaching Hours: 56 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Understand the Euler's ϕ -function and finite continued fractions.
- Recognize the mathematical objects called Groups.
- Identify cyclic and non-cyclic groups
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Understand the concept of partial derivatives of functions of several variables.
- Find the Taylor's and Maclaurin's series of functions of two variables.
- Find the extreme values of functions of two variables.
- Understand the concepts of line integrals, multiple integrals and their applications.

Unit-I: Number Theory: Fermat's Theorem, Wilson's Theorem, Quadratic Congruence. Euler's ϕ -function, definition and properties, Euler's theorem and corollaries, finite continued fractions. **14 hours**

Unit-II: Groups: Binary Operations, Associativity, Commutativity, Examples for Binary Operations, Definition of a Group, Examples, Right inverse, Left inverse, Some properties, Abelian and Non-abelian groups, Laws of exponents, Subgroups, Intersection of subgroups, Centralizer of an element, Normalizer of a subgroup, Product of subgroups, Order of products of subgroups, Cyclic groups, Properties, Number of generators. **14 hours**

Unit-III: Partial Derivatives: Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima-Minima of functions of two variables. **14 hours**

Unit-IV: Integral Calculus: Recapitulation of definite integrals and its properties. *Line integral:* Definition of line integral and basic properties, examples on evaluation of line

integrals. *Double integral*: Definition of Double integrals and its conversion to iterated integrals. Evaluation of double integrals by changing the order of integration and change of variables. Computation of plane surface areas, volume underneath a surface of revolution using double integral. *Triple integral*: Definition of triple integrals and evaluation-change of variables, volume as triple integral. Differentiation under the integral sign by Leibnitz rule.

14 hours

Reference Books:

- [1] David M. Burton., Elementary Number Theory, 7th Ed., McGraw Hill, 2011.
- [2] Gareth A. Jones and J. Marry Jones, Elementary Number Theory, Springer, 1998.
- [3] N. S Gopalakrishnan, University Algebra, 3rd Ed., New Age International Publications, 2015.
- [4] I. N. Herstein, Topics in Algebra, 2nd Ed., Wiley Publishers, 1975.
- [5] A. R. Vasishtha and A. K. Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, U.P., 2008.
- [6] Bernald and Child, Higher Algebra, Arihant Publication India Limited, India, 2016.
- [7] Vijay K Khanna and S K Bhambri, A Course in Abstract Algebra, 5th Ed., Vikas Publishing House, India, 2016.
- [8] Shanthi Narayan and P. K. Mittal, Differential Calculus, Reprint, S. Chand and Co. Pvt. Ltd., New Delhi, 2014.
- [9] Shanti Narayan and P. K. Mittal, Integral Calculus. S. Chand Ltd., India, 2005.
- [10] George B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, Addison-Wesley, 1992.
- [11] Maurice D. Weir, George B. Thomas, Jr., Joel Hass and Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.
- [12] S. Arora and S. C. Malik, Mathematical analysis, Wiley, India, 1992.

MATDSCP2.1: Practicals on Number Theory-II, Algebra-II and Calculus-II	
Practical Hours : 4 Hours/Week	Credits: 2
Total Practical Hours: 56 Hours	Max. Marks: 50 (S.A.-25 + I.A. – 25)

Course Learning Outcomes: This course will enable the students to

- Learn *Free and Open Source Software (FOSS)* tools for computer programming.
- Solve problems on Number Theory, Algebra and Calculus by using FOSS softwares.
- Acquire knowledge of applications of algebra and calculus through FOSS.

Practical/Lab Work to be performed in Computer Lab

Suggested Softwares: Maxima/Scilab/Python.

1. Program to compute Euler's ϕ -function values for positive integers.
2. Program to write rational numbers as finite continued fractions.
3. Program to find the rational numbers corresponding to given finite continued fractions.
4. Program for verification of binary operations.
5. Programs: (i) To find identity element of a group. (ii) To find inverse of an element in a group.

6. Program to construct Cayley's table and test abelian for given finite set.
7. Program to find generators and corresponding possible subgroups of a cyclic group.
8. Finding all possible subgroups of a finite group.
9. Obtaining partial derivative of some standard functions.
10. Solutions of optimization problems.
11. Programs to develop Maclaurin's expansion for functions of two variables.
12. Program to evaluate the line integrals.
13. Program to evaluate the Double integrals with constant and variable limits.
14. Program to evaluate the Triple integrals with constant and variable limits.

Open Elective

(For students of Science stream who have not chosen Mathematics as one of the Core subjects)

MATOET2.1(A): Mathematics – II	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Recognize the mathematical objects called Groups.
- Identify cyclic and non-cyclic groups
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Find the extreme values of functions of two variables.
- Understand the concepts of line integrals, multiple integrals and their applications.

Unit-I: Groups: Binary Operations, Associativity, Commutativity, Examples for Binary Operations, Definition of a Group, Examples, Right inverse, Left inverse, Some properties, Abelian and Non-abelian groups, Laws of exponents, Subgroups, Intersection of subgroups, Centralizer of an element, Normalizer of a subgroup, Product of subgroups, Order of products of subgroups, Cyclic groups, Properties, Number of generators. **14 hours**

Unit-II: Partial Derivatives: Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima-Minima of functions of two variables. **14 hours**

Unit-III: Integral Calculus: Recapitulation of definite integrals and its properties. *Line integral:* Definition of line integral and basic properties, examples on evaluation of line integrals. *Double integral:* Definition of Double integrals and its conversion to iterated integrals. Evaluation of double integrals by changing the order of integration and change of variables. Computation of plane surface areas, volume underneath a surface of revolution using double integral. *Triple integral:* Definition of triple integrals and evaluation-change of variables, volume as triple integral. Differentiation under the integral sign by Leibnitz rule. **14 hours**

Reference Books:

- [1] N. S. Gopalakrishnan, University Algebra, 3rd Ed., New Age International Publications, 2015.
- [2] I. N. Herstein, Topics in Algebra, 2nd Ed., Wiley Publishers, 1975.
- [3] A. R. Vasishtha and A. K. Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, U.P., 2008.
- [4] Bernald and Child, Higher Algebra, Arihant Publication India Limited, India, 2016.
- [5] Vijay K Khanna and S K Bhambri, A Course in Abstract Algebra, 5th Ed., Vikas Publishing House, India, 2016.
- [6] Shanthi Narayan and P. K. Mittal, Differential Calculus, Reprint, S Chand and Co. Pvt. Ltd., New Delhi, 2014.
- [7] Shanti Narayan and P. K. Mittal, Integral Calculus. S. Chand Ltd., India, 2005.
- [8] George B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, Addison-Wesley, 1992.
- [9] Maurice D. Weir, George B. Thomas, Jr., Joel Hass and Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.
- [10] S. Arora and S .C. Malik, Mathematical analysis, Wiley, India, 1992.

Open Elective

(For Students of other than science stream)

MATOET2.1(B): Business Mathematics-II	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to

- Integrate concepts in international business with functioning global trade.
- Evaluate the legal, social and economic environment of business.
- To learn different techniques of simplification of real number system
- To enable student to answer competitive examinations
- Will be able to apply knowledge of business concepts and functions in an integrated manner.

Unit-I: Commercial Arithmetic: Interest: Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems Annuity: Ordinary Annuity, Sinking Fund, Annuity due, Present Value and Future Value of Annuity, Equated Monthly Instalments (EMI) by Interest of Reducing Balance and Flat Interest methods, Examples and Problems. **14 Hours**

Unit II: Techniques of solving problems involving number system and decimal fraction to calculate share of profit, simplification of equations involving cost and expenditure, Average, Profit and loss. **14 Hours**

Unit III: Percentage, Ratio and proportion, Partnership, Time and work, Situations in Boats and Streams, Simple problems on trains and other moving objects, different types of problems in Calendar, number of days and dates to calculate period of payments, Stocks and shares and Problems related clock.

14 Hours

Reference Books:

- [1] R. S. Agarwal, Quantitative Aptitude, S. Chand & company Pvt. Ltd., 2014.
- [2] S. A. Bari, Practical Business Mathematics, New Literature Publishing Company, Bombay, 1971.
- [3] K. Selvakumar, Mathematics for Commerce, Notion Press, Chennai, 2014.
- [4] Dinesh Khattar and S. R. Arora, Business Mathematics with Applications, S. Chand Publishing, New Delhi, 2001.
- [5] M. K. Bhowal, Fundamentals of Business Mathematics, Asian Books Pvt. Ltd., New Delhi, 2009
- [6] Martin Anthony and Norman Biggs, Mathematics for Economics and Finance: Methods and Modelling, Cambridge University Press, Cambridge, 1996.
- [7] Ahmad Nazri and Wahidudin, Financial Mathematics and its Applications, Ventus Publishing, APS, Denmark, 2011.

MODEL CURRICULUM

Name of the Degree Program	:	BSc
(Basic/Hons.) Discipline Core	:	Microbiology
Total Credits for the Program	:	B.Sc. Basic - 136 and B.Sc. Hons. –176
Starting year of implementation	:	2021-22

Program Outcomes:

Competencies need to be acquired by the candidate securing B.Sc.(Basic) or B.Sc.(Hons)

By the end of the program the students will be able to:

1. Knowledge and understanding of concepts of microbiology and its application in **pharma, food, agriculture, beverages, nutraceutical industries.**
2. Understand the distribution, morphology and physiology of microorganisms and demonstrate the skills in aseptic handling of microbes including isolation, identification and maintenance.
3. Competent to apply the knowledge gained for conserving the environment and resolving the environmental related issues.
4. Learning and practicing professional skills in handling microbes and contaminants in laboratories and production sectors.
5. Exploring the microbial world and analyzing the specific benefits and challenges.
6. Applying the knowledge acquired to undertake studies and identify specific remedial measures for the challenges in health, agriculture, and food sectors.
7. Thorough knowledge and application of good laboratory and good manufacturing practices in microbial quality control.
8. Understanding biochemical and physiological aspects of microbes and developing broader perspective to identify innovative solutions for present and future challenges posed by microbes.
9. Understanding and application of microbial principles in forensic and working knowledge about clinical microbiology.
10. Demonstrate the ability to identify ethical issues related to recombinant DNA technology, GMOs, intellectual property rights, biosafety and biohazards.
11. Demonstrate the ability to identify key questions in microbiological research, optimize research methods, and analyze outcomes by adopting scientific methods, thereby improving the employability.
12. Enhance and demonstrate analytical skills and apply basic computational and statistical techniques in the field of microbiology.

Assessment:**Weightage for assessments (in percentage)**

Type of Course	Formative Assessment /IA	Summative Assessment
Theory	40%	60%
Practical	40%	60%
Projects	40%	60%
Experiential Learning (Internships/MOO/ Swayametc.)	40%	60%

**Curriculum Structure for the Undergraduate Degree Program
BSc (Basic /Hons.)**

Total Credits for the Program : 176
Starting year of implementation : 2021-22
Name of the Degree Program : B.Sc. (Basic/Hons.)

Microbiology Program Articulation Matrix:

Se mes ter	Title /Name Of the course	Program outcomes that the course addresses (not more than 3per course)	Pre- requisi te course (s)	Pedagogy##	Assessment\$
1	DSC-1T MBL101 General Microbiology 4Credits 100Marks	1.Knowledge and Understanding of Concepts of microbiology. 2.Learningand practicing Professionals kills In handling microbes. 3.Thorough Knowledge and Application of Good laboratory And good manufacturing Practices in	PUC or +2 (Life Sciences as One of the core discipline s)	The general pedagogy to Be followed for theory And practicals are as under. Lecturing, Tutorials, Group/Individual Discussions, Seminars, Assignments, Counseling, Remedial Coaching. Field/Institution/Indust rial visits, Hands on training, Case observations, Models/charts preparations, Problem Solving mechanism, Demonstrations, Project	LSSSDC (NSDC) assessment and certification For lab Technician or Lab assistant Job role

		Microbial quality control.		presentations, Experiential Documentation and Innovative methods.	
	DSC-1P MBL101 General Microbiology 2Credits 50Marks				
2	DSC-2TMBL102 Microbial Biochemistry and Physiology 4Credits 100Marks	Thorough knowledge and understanding of concepts of microbiology and its application in different microbiological industries.		The general pedagogy to be followed for theory and practicals are as under. Lecturing, Tutorials, Group/Individual Discussions, Seminars, Assignments, Counseling, Remedial Coaching. Field/Institution/Industrial	LSSSDC(NS DC) Assessment and certification for lab technician or Lab assistant job role
				visits, Hands on training, Case observations, Models/charts preparations, Problem solving mechanism, Demonstrations, Project presentations, Experiential documentation and Innovative methods.	
	DSC-2PMBL 102 Microbial Biochemistry and Physiology 2Credits 50Marks				
3	DSC-3T MBL103 Microbial diversity 4Credits 100Marks				
	DSC-3P				

	MBL103 Microbial diversity 2Credits 50Marks				
4	DSC-4T MBL104 Microbial Enzymology and Metabolism 4Credits 100Marks				
	DSC-4P MBL104 Microbial Enzymology and Metabolism 2Credits 50Marks				
5	DSC-5T MBL105 Microbial Genetics and Molecular biology 3Credits 100Marks				
	DSC-5P MBL105 Microbial Genetics and Molecular biology 2Credits 50Marks				
	DSC-6T MBL106 Immunology and Medical microbiology 3Credits 100Marks				
	DSC-6P MBL106 Immunology				

	and Medical microbiology 2Credits 50Marks				
6	DSC - 7TM BL1 07 Food and Dairy Microbiol ogy 3Credits 100Marks				
	DSC- 7PMBL107 Food and Dairy Microbiolog y 2Credits 50Marks				
	DSC- 8TMBL108 Industrial Microbiolog y and Bioprocess Technology 3Credits 100Marks				
	DSC- 8PMBL108 Industrial Microbiolog y and Bioprocess Technology 2Credits 50Marks				
	DSC- 9TMBL109 Microbial Genetic Engineering 3Credits 100Marks				

7	DSC-9PMBL109 Microbial Genetic Engineering 2Credits 50Marks				
	DSC-10TMBL110 Environmental and Agricultural Microbiology 3Credits 100Marks				
	DSC-10PMBL110 Environmental and Agricultural Microbiology 2Credits 50Marks				
	DSC-11TMBL111 Pharmaceutical and Forensic Microbiology 4Credits 100Marks				
8	DSC-12TMBL 112 Biosafety, Bioethics & IRP 4Credits 100Marks				
	DSC-13TMBL 113 Genomics, Proteomics and Metabolomics 4Credits 100Marks				

	DSC-14T MBL 114 Aquatic Microbiology 3Credits 100Marks				
	DSC-15T MBL 115 Microbial Genetic Engineering 3Credits 100Marks				
9	DSC-15P MBL 115 Microbial Genetic Engineering 2Credits 50Marks				
	DSC-16T MBL 116 Environmental and Agricultural				
	Microbiolo gy 3 Credits 100Marks				
	DSC- 16PMBL116 Environment alandAgricul turalMicrobi ology2 Credits 50Marks				

	DSC-17TMBL117 Pharmaceutic aland ForensicMicr obiology 4Credits 100Marks				
	DSC-18TMBL118 Emerging MicrobialT echnologie s 4 Credits 100Marks				
10	DSC-19TMBL119 Extremophy lic Microbes andExtremo lytes 4 Credits 100Marks				
	DSC-20TMBL120 Molecular Diagnosis, Drug Designing and Advanced Vaccines 3 Credits 100Marks				

Note:

##Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. The list includes active learning/ course projects/ problem or project based learning/ case studies/self-study like seminar, term paper or MOOC.

\$ Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/Evaluating/Creating).However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

B. Sc., Microbiology (Basic / Hons.) Semester 1

Course Title: DSC-1T, MBL101, General Microbiology	
Total Contact Hours: 56	Course Credits: 4+2
Formative Assessment Marks: 40%	Duration of ESA/Exam: 3Hrs
Model Syllabus Authors: Curriculum Committee	Summative Assessment Marks: 60%

Course Pre-requisite(s): *Mention only course titles from the curriculum that are needed to be taken by the students before registering for this course.*

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and value acquired in this course)

- 1. Thorough knowledge and understanding of concepts of microbiology.**
- 2. Learning and practicing professional skills in handling microbes.**
- 3. Thorough knowledge and application of good laboratory and good manufacturing practices in microbial quality control.**

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) /Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
1. Thorough knowledge and understanding of concepts of microbiology	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>								
2. Learning and practicing professional skills in handling microbes		<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>					
3. Thorough knowledge and application of good laboratory and good manufacturing practices in microbial quality control.		<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>					

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

B.Sc., Microbiology (Basic/ Hons.)Semester 1

Title of the Courses:

Course1:DSC-1T,MBL101,General Microbiology

Course2:OE1T,MBL301, Microorganisms for Human Welfare

Course3:SEC1T,MBL701,Microbiological Methods and Analytical Techniques

Course1:DSC-1T, MBL101, General Microbiology		Course 2: OE1T,MBL301, Microorganisms for Human Welfare		Course 3: SEC1T,MBL701, Microbiological Methods and Analytical Techniques	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
4	56	3	42	1	14

Content of Course1: Theory: DSC-1T, MBL101, General Microbiology	56Hrs
Unit – 1: Historical development of microbiology	14Hrs
<p>Historical development of microbiology-Theory of spontaneous generation, Biogenesis and Abiogenesis. Contributions of Anton Von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister and Edward Jenner, Alexander Fleming, Martinus Beijerinck, Sergei Winogradsky, Elei Metchnikoff. Contributions of Indian scientists in the field of Microbiology. Scope of Microbiology.</p> <p>Fossil evidences of microorganisms. Origin of life, primitive cells and evolution of microorganisms.</p> <p>Microcopy- working principle, construction and operation of simple and compound microscopes.</p>	
Unit –2: Staining, sterilization and preservation of microorganisms	14Hrs
<p>Staining: Nature of strains, principles, mechanism, methods and types of staining- Simple, Differential-Gram staining, Acid fast staining, staining of capsule, cell wall, endospore.</p> <p>Sterilization: Principles, types and techniques, Physical, chemical, radiation and mechanical.</p> <p>Preservation of microorganisms: Definition, importance, methods of preservation of microorganism –slant culture, stab culture, soil culture, mineral oil overlaying, glycerol preservation, lyophilization, cryopreservation.</p>	

Unit–3:Prokaryotic microorganisms:	14Hrs
Overview of prokaryotic cell structure: Size, shape, arrangement. Ultra structure of prokaryotic cell: Bacterial and Archaeal-cell wall and cell membrane. Components external to cell wall- capsule, slime, s-layer, pili, fimbriae, flagella; structure, motility, chemotaxis. Cytoplasmic matrix- Cytoskeleton, ribosome, inclusion granules: Composition and function. Nuclear Materials – Bacterial structure (its differences with the Eukaryotic chromosome); Extra Chromosomal material. Bacterial Endospore - Examples of spore forming organisms, habitats, function, formation and germination. Reproduction in bacteria.	
Unit–4:Eukaryotic microorganisms	14Hrs
Overview of eukaryotic cell: Types of cells; Structure and function of organelles- Cell wall, cell membrane, cytoplasmic matrix, cytoskeleton, endoplasmic reticulum, golgi complex, peroxisomes, lysosomes, vesicles, ribosomes, mitochondria chloroplast and nucleus. Structure and functions of flagella. Reproduction in eukaryotes: A brief account of vegetative, asexual and sexual methods of reproduction	

Course1:Practical: DSC-1P,MBL101,General Microbiology

1. Microbiological laboratory standards and safety protocols.
2. Operation and working principles of Light/Compound microscope.
3. Working principles and operations of basic equipments of microbiological laboratory (Laminar Air Flow Chamber, Autoclave, Hot air Oven, Incubator, pH meter, Spectrophotometer, Colorimeter, vortex, magnetic stirrer etc).
4. Demonstration and observations of microorganisms from natural sources under light microscope (Algae, Yeast and Protozoa).
5. Study of bacterial motility by hanging drop method.
6. Simple staining and negative staining technique
7. Differential staining- Gram staining.
8. Acid fast staining.
9. Structural staining - Flagella and capsule.
10. Bacterial endospore staining.
11. Staining of reserved food materials (granular).
12. Staining of fungi by lactophenol cotton blue.

Suggested Readings:

1. A Textbook of Microbiology, R. C. Dubey and D. K. Maheshwari, 1st edition, 1999, S. Chand & Company Ltd.
2. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. 2002. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore. 869 pp.
3. Atlas, R.M. 1984. Basic and practical microbiology. Mac Millan Publishers, USA. 987pp.
4. Black, J.G. 2008. Microbiology principles and explorations. 7edn. John Wiley and Sons Inc., New Jersey 846 pp.
5. Brock Biology of Microorganisms, M.T.Madigan, J.M.Martinko, P. V. Dunlap, D. P. Clark- 12th edition, Pearson International edition 2009, Pearson Benjamin Cummings.
6. Foundations in Microbiology, K. P. Talaro, 7th International edition 2009, McGraw Hill.
7. General Microbiology, Stanier, Ingraham et al, 4th and 5th edition 1987, Macmillan education limited.
8. Microbiology – An Introduction, G. J.Tortora, B. R.Funke, C. L. Case, 10th ed. 2008, Pearson Education.
9. Microbiology- Concepts and Applications, PelczarJr,Chan, Krieg, International ed, McGraw Hill.
10. Pommerville, J.C. Alcamo's Fundamentals of Microbiology. Jones and Bartlett
11. Prescott, Harley, Klein's Microbiology, J.M. Willey, L.M. Sherwood, C.J. Pub.Sudbury, 835 pp.
12. Schlegel, H.G. 1995.General Microbiology. Cambridge University Press, Cambridge, 655 pp.
13. Tortora, G.J., Funke, B.R. and Case, C.L. 2007. Microbiology 9th ed. Pearson Education Pte. Ltd., San Francisco. 958pp.Woolverton, 7th International, edition 2008, McGraw Hill.

Course2:Theory: OE1T, MBL301, Microorganisms for Human Welfare

Course2:OE1T,MBL 301,Microorganisms for Human Welfare	42Hrs
Unit–1:Food and Fermentation Technology	14Hrs
Fermented Foods–Types, Nutritional Values, Advantages and Health Benefits Prebiotics, Probiotics, Synbiotics and Nutraceuticals Fermented Products: Alcoholic-Beer and whisky; nonalcoholic beverages-coffee and tea; fermented dairy products-yoghurt and cheese; fermented fruit drinks-wine	
Unit–2:Agriculture	14Hrs
Bio-fertilizers and bio-pesticides - types and applications, beneficial microorganisms in agriculture, AM fungi, Mushroom cultivation, Biogas production.	
Unit –3:Biopharmaceuticals	14Hrs
Microbial Drugs–Introduction, Discovery, Antibiotics –Definition, characteristics, Types, Functions. Antibiotic Therapy and Development of Drug Resistance Vaccines–Types, Properties, Functions and Schedules	

Course 3: Theory: SEC 1T, MBL 701, Microbiological Methods and Analytical Techniques**LEARNING OUTCOMES**

- Demonstrate skills as per National Occupational Standards(NOS) of “Lab Technician/Assistant” Qualification Pack issued by Life Sciences Sector Skill Development Council-LFS/Q0509,Level3.
 - Perform microbiology and analytical techniques. Knowledge about environment ,health, and safety (EHS), good laboratory practices (GLP), good manufacturing practices (GMP) and standard operating procedures(SOP)
 - Demonstrate professional skills at work, such as decision making, planning, and organizing, Problem solving, analytical thinking ,critical thinking, and documentation.
1. Principles which underlies sterilization of culture media, glassware and plastic ware to be used for microbiological work.
 2. Principles of a number of analytical instruments which the students have to useduringthestudyandalsolaterasmicrobiologistsforperformingvariouslaboratorymanipulations.
 3. Handling and use of microscopes for the study of microorganisms which are among the basic skills expected from a practicing microbiologist. They also get introduced to a variety of modifications in the microscopes for specialized viewing.
 4. Several separation techniques which may be required to be handled later as microbiologists.

**Course 3:Theory: SEC 1T,MBL701,
Microbiological Methods and Analytical Techniques**

SEC1T,MBL701,Microbiological Methods and Analytical Techniques	14Hrs
<p>DIGITALSKILLS: The components of digital skills provided by KSHEC, will be followed accordingly. Microbiological Skills Microbiological culture media: Composition, Preparation, Application and storage; Ingredients of media. Types- natural and synthetic media, chemically defined media, complex media, selective, differential, indicator, enriched and enrichment media. Isolation and cultivation of microorganisms: Collection of samples, processing of samples, serial dilution, technique, Inoculation of samples, incubation and observations of microbial colonies. Morphological characterization of microorganisms-Colony characteristics, Microscopic characters, biochemical / physiological tests or properties and identification. Sub-culturing of microorganisms and pure culture techniques. Preservation of microorganisms. Advanced Microscopic Skills: Different types of microscopes - Phase contrast,BrightField,DarkField,Fluorescent,ScanningandTransmissionElectron Microscopy Analytical Skills Centrifugation, Chromatography and Spectroscopy, Electrophoresis: Principles, Types, Instrumentation, Operation and applications.</p>	

Course 3: Practicals: SEC 1P, MBL 701, Microbiological Methods and Analytical Techniques

1. Methods and practices in Microbiology lab: MSDS (Material Safety and Data Sheet),Good Clinical Practices (GCP),Standard Operating Procedure(SOP),Good Laboratory Practices(GLP),Good Manufacturing Practices (GMP).
2. Usage and maintenance of basic equipments of microbiology lab: Principles, calibrations, and SOPs of balances, pH meter, autoclave, incubators, laminar air flow (LAF) and biosafety cabinets, microscopes, homogenizers,s tirrers.
3. Preparation of bacterial culture media
4. Preparation of fungal culture media
5. Preparation of algal culture media
6. Isolation and cultivation of bacteria, actinobacteria, fungi and algae
7. Identification and characterization of bacteria, actinobacteria, fungi and algae.
8. Biochemical and physiological tests for identification of bacteria
9. Separation of biomolecules by paper / thin layer chromatography.
10. Demonstration of column chromatography.
11. Preparation of permanent slides (bacteria, fungi and algae).
12. Procedures for documentation, lab maintenance, repair reporting.

Pedagogy:

The general pedagogy to be followed for theory and practicals are as under. Lecturing, Tutorials, Group/Individual Discussions, Seminars, Assignments, Counseling, Remedial Coaching, Field/Institution/Industrial visits, Hands on training, Case observations, Models/charts preparations, Problem solving mechanism, Demonstrations, Project presentations, Experiential documentation and Innovative methods.

Active learning as per LSSSDC (NSDC) LFS/Q0509 guidelines, at skill training Level 3. Case studies about application of microbial biomolecules in various industries. Seminar on topics of microbial biochemistry.

Formative Assessment: 40%	
Assessment Occasion/type	Weightage in Marks
IA(2 Tests)	20%:20 Marks
Assignments/Visits	10%:10 Marks
Seminars/Group Discussion	10%:10 Marks
Total	40%:40 Marks

Date
14.09.2021

Course Co-ordinator
Special Officer, KSHEC

(Dr. Prasannakumar)

Subject Committee Chairperson
Vice Chancellor, Gulbarga University

(Prof. Dayanand Agsar)

B. Sc., Microbiology (Basic / Hons.)Semester 2

Title of the Courses:

Course 1: DSC-2T, MBL 102, Microbial Biochemistry and Physiology

Course2: OE-2T,MBL302, Environmental Microbiology and Human Health

Course1: DSC-2T,MBL102, Microbial Biochemistry and Physiology		Course 2: OE-2T,MBL 302, Environmental Microbiology and Human Health	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
4	56	3	42

Content of Course:DSC-2T,MBL102, Microbial Biochemistry and Physiology	56Hrs
Unit-1Biochemical Concepts	14Hrs
Basic Biochemical Concepts: Major elements of life and their primary characteristics, atomic bonds and molecules – bonding properties of carbon, chemical bonds- covalent and non covalent, Hydrogen bonds and Vander Waal Forces. Biological Solvents: Structure and properties of water molecule, Water as an universal solvent, polarity, hydrophilic and hydrophobic interactions, properties of water, Acids, bases, electrolytes, hydrogen ion concentration, pH, buffers and physiological buffer system, Handerson–Hasselbatch equation.	
Unit- 2 Macromolecules	14Hrs
Carbohydrates: Definition, classification, structure and properties. Amino acids and proteins: Definition, structure, classification and properties Lipids and Fats: Definition, classification, structure, properties and importance of lipids; fatty acids: types and classification, Vitamins, Definition, structure, properties and importance of chlorophyll, cytochromes and hemoglobin.	
Unit–3Microbial growth and nutrition	14Hrs
Microbial Growth: Definition of growth, Growth curve, phases of growth, Influence of environmental factors on growth, generation time and specific growth rate. Synchronous growth, Continuous growth (chemostat and turbidostat), Diauxic growth.	

<p>Measurement of Growth: Direct Microscopic count - Haemocytometer; Viable count, Membrane filtration; Electronic Coulter Counting method; Measurement of cell mass; Turbidity measurements- Nephelometer and spectrophotometer techniques. Growth Yield (definition of terms).</p> <p>Microbial Nutrition: Microbial nutrients, macro and micronutrients, classification of organisms based on nutritional requirements.</p> <p>Membrane Transport: Structure and organization of biological membranes, Types of cellular transport - passive, facilitated, active, group translocation, membrane bound protein transport system, carrier models, liposomes, ion channels, Na^+K^+-ATPase.</p>	
Unit-4: Bioenergetics, Respiration and Photosynthesis	14Hrs
<p>Bioenergetics: Free energy, Enthalpy, Entropy, Classification of high energy compounds, Oxidation reduction reactions, equilibrium constant, Redox potential, Laws of thermodynamics, Energy coupling reactions, Exothermic and Endothermic reactions.</p> <p>Respiration: Glycolysis, TCA cycle and electron transport chain, oxidative and substrate level phosphorylation. Anaerobic respiration, Fermentation(homo and heterolactic fermentation)</p> <p>Microbial Photosynthesis: Photosynthetic pigments in prokaryotes. Types of Bacterial photosynthesis- Oxygenic and Anoxygenic: Photophosphorylation- Cyclic and Non- cyclic Light reaction, Dark Reaction (CO_2 fixation pathways)- Calvin cycle.</p>	

Course 1: Practicals: DSC-2P, MBL 102, Microbial Biochemistry and Physiology

1. Preparation of normal and molar solutions
2. Calibration of pH meter and determination of pH of natural samples
3. Preparation of buffer solutions (any 4)
4. Qualitative analysis of carbohydrates
5. Qualitative analysis of amino acids and proteins
6. Qualitative analysis of lipids
7. Estimation of reducing sugars by DNS method
8. Estimation of protein by Lowry's/Biuret method
9. Determination of saponification values and iodine number of lipids/fatty acids
10. Determination of bacterial growth by turbidometric method
11. Effect of pH, temperature and salt concentration on bacterial growth
12. Demonstration of aerobic and anaerobic respiration in microbes

Text Books/References

1. Boyer R. (2002), Concepts in Biochemistry 2nd Edition, Brook/Cole, Australia.
2. Caldwell, D. R. (1995) – Microbial Physiology and Metabolism. Brown Publishers.
3. Felix Franks, 1993; Protein Biotechnology, Humana Press, New Jersey.
4. Harper, 1999; Biochemistry, McGraw Hill, New York.
5. Lodish H, T. Baltimore, A. Berck B. L. Zipursky, P. Mastsydaire and J. Darnell. (2004) –
6. Moat A. G., Foster J. W. Spector. (2004), Microbial Physiology 4th Edition Panama Book Distributors.
Molecular Cell Biology, Scientific American Books, Inc. New York.
7. Nelson and Cox, 2000; Lehninger Principles of Biochemistry, Elsevier Publ.
8. Palmer T. (2001), Biochemistry, Biotechnology and Clinical Chemistry, Harwood Publication, Chichester.
9. Stryer L, 1995; Biochemistry, Freeman and Company, New York.
10. Voet & Voet, 1995; Biochemistry, John Wiley and Sons, New York.

Course 2: Theory: OE- 2T, MBL 302, Environmental Microbiology and Human Health

Course 2 :Theory: OE- 2T, MBL 302, Environmental Microbiology and Human Health	42Hrs
Unit–1: Soil and Air Microbiology	14 Hrs
Soil and Air as a major component of environment. Types and properties of soil. Distribution of microorganisms in soil and air. Major types of beneficial and harmful microorganisms in soil and air.	
Unit –2: Water Microbiology	14 Hrs
Water as a major component of environment. Types and uses of water. Microorganisms in different water bodies. Standard qualities and analysis of drinking water	
Unit –3: Microbial Diseases and Control	14 Hrs
Public health hygiene and communicable diseases. General Account of Microbial infections - Airborne, water borne and Food borne- Source, Mode of Transmission, Symptoms, Prevention and control. Surveillance of microbial infections.	

Text Books/References

1. A Textbook of Microbiology, R.C. Dubey and D.K. Maheshwari, 1st edition, 1999, S. Chand & Company Ltd.
2. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. 2002. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore. 869 pp.
3. Atlas, R.M. 1984. Basic and practical microbiology. MacMillan Publishers, USA. 987 pp.
4. Black, J.G. 2008. Microbiology principles and explorations. 7th edn. John Wiley and Sons Inc., New Jersey 846 pp.
5. Brock Biology of Microorganisms, M.T. Madigan, J.M. Martinko, P.V. Dunlap, D.P. Clark-12th edition, Pearson International edition 2009, Pearson Benjamin Cummings.
6. Foundations in Microbiology, K.P. Talaro, 7th International edition 2009, McGraw Hill.
7. General Microbiology, Stanier, Ingraham et al, 4th and 5th edition 1987, Macmillan education limited. International, edition 2008, McGraw Hill.
8. Microbiology – An Introduction, G.J. Tortora, B.R. Funke, C.L. Case, 10th ed. 2008, Pearson Education.
9. Microbiology- Concepts and Applications, Pelczar Jr, Chan, Krieg, International ed, McGraw Hill.
10. Pommerville, J.C. Alcamo's Fundamentals of Microbiology. Jones and Bartlett
11. Prescott, Harley, Klein's Microbiology, J.M. Willey, L.M. Sherwood, C.J. Woolverton, 7th Pub.. Sudbury, 835 pp.
12. Schlegel, H.G. 1995. General Microbiology. Cambridge University Press Cambridge, 655 pp.
13. Tortora, G.J., Funke, B.R. and Case, C.L. 2007. Microbiology 9th ed. Pearson Education Pvt. Ltd., San Francisco. 958 pp.

Pedagogy:

The general pedagogy to be followed for theory and practicals are as under.

Lecturing, Tutorials, Group/Individual Discussions, Seminars, Assignments, Counseling, Remedial Coaching. Field/Institution/Industrial visits, Hands on training, Case observations, Models/charts preparations, Problem solving mechanism, Demonstrations, Project presentations, Experimental documentation and Innovative methods.

Formative Assessment: 40%	
Assessment Occasion/type	Weightage in Marks
IA (2 Tests)	20%: 20 Marks
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Total	40%: 40 Marks

Date
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Course Co-ordinator
Special Officer, KSHEC
(Dr. Prasanna kumar)

Subject Committee Chairperson
Vice Chancellor, Gulbarga University
(Prof. Dayanand Agsar)

Programme Structure for Bachelor of Science (Basic/Hons.) (Physics) Programme (Subjects with Practical)

Sem.	Discipline Core(DSC) (Credits)	Discipline Elective(DSE) /Open Elective (OE) (Credits)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P)		Skill Enhancement Courses (SEC)			Total Credits
					Skill based (Credits) (L+T+P)	Value based (Credits) (L+T+P)		
I	DSC A1(4+2) DSC B1(4+2)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs. each)		SEC-1: (2) (1+0+2)	Yoga (1) (0+0+2)	Health &Wellness (1) (0+0+2)	25
II	DSC A2(4+2) DSC B2(4+2)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs. each)	Environmental Studies (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
Exit option with Certificate (48 credits)								
III	DSC A3(4+2) DSC B3(4+2)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs. each)		SEC-2: (2)(1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
IV	DSC A4(4+2) DSC B4(4+2)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs. each)	Constitution of India (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
Exit option with Diploma in a particular Discipline (96 credits)								
V	DSC A5(3+2) DSC A6(3+2) DSC B5(3+2) DSC B6(3+2)				SEC-3: SEC (2) (1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	24
VI	DSC A7(3+2) DSC A8(3+2) DSC B7(3+2) DSC B8(3+2)				SEC-4: Professional Communication (2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	24
Exit with Bachelor of Degree in a particular Discipline (140 credits)								
VII	DSC A/B9(3+2) DSC A/B10(3+2) DSC A/B11(3)	DSC A/B E-1 (3) DSC A/B E-2 (3) Res. Methodology (3)						22
VIII	DSC A/B12(3) DSC A/B13(3) DSC A/B14(3)	DSC A/B E-3 (3) DSC A/B E-4 (3) Research Project (6)*						21
Award of Bachelor of Degree with Honours, B.Sc (Hons.) 180 credits)								

*In lieu of the research Project, two additional elective papers/ Internship may be offered.

Note: 1) Instruction hours per week: DSC-4 hrs; Practical-4 hrs; OE-3 hrs.

2) Max marks: DSC - 100 (IA 40+Exam 60); Practical – 50 (IA 25+Exam 25);
OE – 100 (IA 40+Exam 60).

3) The theory IA will be based on (i) Average of 2 tests: 20 marks, (ii) activity/ seminars/ projects :20 marks.

4) The practical IA will be based on (i) Regular performance:15 marks,
(ii) test/seminars: 10 marks.

5) Duration of Annual Examination: Theory-2hrs; Practical-4hrs.

Curriculum Structure-Physics

(Core and Electives)

Semesters- I to X

SEM	DSC	Core Papers
Sem-1	A1	Mechanics and Properties of Matter
Sem-2	A2	Electricity and Magnetism
Sem-3	A3	Wave Motion and Optics
Sem-4	A4	Thermal Physics and Electronics
Sem-5	A5 A6	1. Classical Mechanics and Quantum Mechanics- I 2. Elements of Atomic, Molecular Physics
Sem-6	A7 A8	1. Elements of Nuclear Physics and Nuclear Instruments 2. Elements of Condensed Matter Physics
Sem-7	A9 A10 A11	1. Mathematical Methods of Physics – I 2. Classical Electrodynamics. 3. Experimental methods of Physics 4. Research Methodology (Select Two DSE subjects from the Pool B-I shown below)
Sem-8	A12 A13 A14	1. Classical Mechanics and Quantum Mechanics-II 2. Statistical Mechanics 3. Astrophysics & Astronomy 4. Research Project* (Select Two DSE subjects from the Pool B-II shown below) *In lieu of the research Project, two additional elective papers/ Internship may be offered.
Sem-9	A15	1. Mathematical Methods of Physics – II (Select One DSE subjects from the Pool B-III shown below) 2. Research Project
Sem-10	A17	1. Quantum Mechanics – III (Select One DSE subjects from the Pool B-IV shown below) 2. Research Project

* The Courses of 3rd Semester and above need to be revisited.

Open Electives for 1st and 2nd Semester

Sem.	Courses
1.	Energy Sources
2.	Astronomy and Space Mission

Discipline Specific Electives for 7th to 10th Semesters

	7th Sem Electives Pool B-I (Select any two)		8th Sem Electives Pool B-II (Select any two)
A.	Condensed Matter Physics-1	A.	Atomic & Molecular Physics-1
B.	Nuclear and Particle Physics	B.	Materials Physics & Nano materials
C.	Theoretical and Computational Physics-I	C.	Lasers and non-linear optics
D.	Biophysics	D.	Plasma Physics
E.	Astronomy and Astrophysics	E.	Physics of Semiconductor devices

	9th Sem Electives (Specialization papers) Pool B-III		10th Sem Electives (Specialization papers) Pool B-IV
A.	Condensed Matter Physics-2	A.	Condensed Matter Physics-3
B.	Nuclear and Particle Physics-2	B.	Nuclear and Particle Physics-3
C.	Atomic & Molecular spectroscopy-1	C.	Atomic & Molecular spectroscopy-2
D.	Materials Physics & Nanophysics –1	D.	Materials Physics & Nanophysics -2
E.	Theoretical and Computational Physics-I	E.	Theoretical and Computational Physics-2
F.	Astronomy and Astrophysics-1	F.	Astronomy and Astrophysics-2

Detailed Syllabus for Semesters I & II

B.Sc., Physics

Detailed Syllabus for Semesters I & II

Semester – I

Mechanics and Properties of Matter

Programme Outcomes (POs)

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Program Outcomes (POs)

Course Outcomes (COs) (UGC guidelines)	1	2	3	4	5	6
CO-1: Will learn fixing units, tabulation of observations, analysis of data (graphical/analytical)	x	x				x
CO-2: Will learn about accuracy of measurement and sources of errors, importance of significant figures.	x	x				
CO-3: Will know how g can be determined experimentally and derive satisfaction.	x					
CO-4: Will see the difference between simple and torsional pendulum and their use in the determination of various physical parameters.	x			x	x	x
CO-5: Will come to know how various elastic moduli can be determined.	x				x	x
CO-6: Will measure surface tension and viscosity and appreciate the methods adopted.	x	x				
CO-7: Will get hands on experience of different equipment.	x	x	x		x	x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course are Marked 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Mechanics & Properties of Matter		Hrs
Credit : 4+2	Unit – 1	Theory : 4 hours /Week
Chapter No. 1	Units and measurements: System of units (CGS and SI), dimensions of physical quantities, dimensional formulae. Minimum deviation, errors and error analysis Vectors: Instantaneous velocity and acceleration, Derivative of planar vector of constant magnitude but changing direction. Arbitrary planar motion, radial and transverse component of velocity and acceleration, deduction of the results of uniform circular motion.	(13)
Chapter No. 2	Momentum and Energy: Work and energy, Conservation of linear and angular momentum. Conservation of energy with examples. Motion of rockets. Problems	
Chapter No. 3	Special Theory of Relativity: Inertial and non-inertial frames of reference, Galilean transformation equation, Galilean principle of relativity. Search for absolute frame of reference, Ether concept, Null result of Michelson Morley experiment, Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Twin paradox, Relativistic addition of velocities, Einstein's mass energy relation-photon box experiment. Problems	
Topics for self study	Self Study Units and measurements: Measurement of length, mass and time. Laws of Motion: Newton's Laws of motion. Dynamics of single and a system of particles. Centre of mass.	
	Suggested Activities	
Activity No. 1	i). Students can measure diameters of small balls of different size and estimate their volumes. ii). Students can measure lengths of nails of different size. iii). Students can measure volume of a liquid. iv). Students can measure distances and put the result both in CGS and SI units in 2, 3 and 4 significant figures. Ask them to mention the precession of the measurement. v). students can estimate standard deviations wherever possible.	
Activity No. 2	Students can try and understand conservation of energy in every day examples. For example: i) What happens in solar conservation panels ii) Pushing an object on the table it moves iii) Moving car hits a parked car causes parked car to move. In these cases, energy is conserved. How? Understand and verify if possible. Students can try and understand conservation of momentum with help of coins and balls by referring to websites. Reference: https://www.youtube.com/	

Unit – 2		
Chapter No. 4.	Laws of Motion: Conservative and non-conservative forces. Deduction of conservation of energy in conservative force field. Centre of mass. Simple harmonic motion – vertical oscillations of the light loaded spring, expression for force constant and determination of acceleration due to gravity, Problems	(3)
Chapter No. 5.	Dynamics of Rigid bodies: Rotational motion about an axis, Relation between torque and angular momentum, Rotational energy. Moment of inertia: Theorem of perpendicular axis and Theorem of parallel axes, Moment of Inertia of a rectangular Lamina, Circular disc and ring and solid cylinders. Flywheel, theory of compound pendulum and determination of 'g'. Problems	(7)
Chapter No. 6.	Gravitation: Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's laws (statements). Satellite in a circular orbit. Problems	(3)
Topics for self study (If any) Chapter 7	Escape velocity, Geosynchronous orbits. Basic idea of global positioning system (GPS).	
	Suggested Activities	
Activity No. 3	<p>Activity:</p> <p>Moment of inertia is an abstract concept. It simply gives a measure of rotational inertia of a rigid body and it is proportional to the product of the square of radius, r of the body and its mass, m. Students by Referring to websites, students can construct and perform simple experiments to verify that $MI \propto mr^2$.</p> <p>Students can try to understand law of inertial with the help of coins and balloons by referring to websites.</p> <p>Reference : www.khanacademy.org, www.pinterest.com, www.serc.cerleton.edn, https://www.youtube.com</p>	
Activity No. 4	<p>Activity:</p> <p>Prepare suitable charts and give seminar talks related to moment of inertia, gravitation and planetary motion.</p>	
Activity No. 5	<p>(i) Rolling of different disc and cylinders on inclined plane to understand the moment of inertia.</p> <p>(ii) Listing and discussing the moment of inertia of bodies come across in daily life.</p>	

Unit - 3		
Chapter No. 8	<p>Elasticity: Hooke's law - Stress-strain diagram, elastic moduli-relation between elastic constants, Poisson's Ratio-expression for Poisson's ratio in terms of elastic constants.</p> <p>Work done in stretching and work done in twisting a wire-Twisting couple on a cylinder.</p> <p>Torsional pendulum-Determination of rigidity modulus and moment of inertia - η and σ by Searle's method</p> <p>Bending moment of beams, Cantilever bending and uniform bending, I - section of girders. Problems.</p>	(13)
	Suggested Activities	
Activity No. 6	<p>Activity:</p> <p>Arrange a steel spring with its top fixed with a rigid support on a wall and a meter scale alongside. Add 100 g load at a time on the bottom of the hanger in steps. This means that while putting each 100g load, we are increasing the stretching force by 1N. Measure the extension for loads up to 500g. Plot a graph of extension versus load. Shape of the graph should be a straight line indicating that the ratio of load to extension is constant. Go for higher loads and find out elastic limit of the material.</p>	
Activity No.7	<p>Activity:</p> <p>Repeat the above experiment with rubber and other materials and find out what happens after exceeding elastic limit. Plot and interpret.</p>	
Activity No 8	<p>Activity: Classifying different materials in to elastic and plastic materials. Studying the bending magnitudes of different shape and material rods.</p>	

Unit - 4		
Chapter No. 9	<p>Surface tension: Definition of surface tension. Surface energy, relation between surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop, angle of contact., Surface tension by drop weight method, Interfacial surface tension, Problems.</p>	(13)
Chapter No. 10	<p>Viscosity: Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poissulle's method, Stoke's method. Problems.</p>	
Topics for self study (If any)	<p>Variation of surface tension with temperature, Surface tension by Capillarity rise, Application of viscosity.</p>	

Suggested Activities		
Activity No.9	<p>1. Measure surface tension of water and other common liquids and compare and learn</p> <p>i) Why water has high ST? think of reasons.</p> <p>ii) Check whether ST is a function of temperature? You can do it by heating the water to different temperatures and measure ST.</p> <p>iii) Plot ST versus T and learn how it behaves.</p> <p>Mix some quantity of kerosene or any oil to water and measure ST. Check whether ST for the mixture is more or less than pure water. List the reasons.</p>	
Activity No. 10	<p>Activity:</p> <p>2. Collect a set of different liquids and measure their viscosity.</p> <p>i) Find out whether sticky or non-sticky liquids are most viscous. List the reasons.</p> <p>ii) Mix non sticky liquid to the sticky liquid in defined quantities and measure viscosity. Find out viscosity is increasing or decreasing with increase of non-sticky liquid concentration.</p> <p>iii) Do the above experiment by mixing sticky liquid to the non-sticky liquid. Find out change in viscosity with increase of concentration of sticky liquid.</p> <p>List the applications where concept of Viscosity plays a dominant role</p>	

Text Books:

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Mechanics by, New Edition	D. S. Mathur	S.Chand & Co.	2000
2	Mechanics and Relativity by 3 rd Edition,	Vidwan Singh Soni,	PHI Learning Pvt. Ltd.	2013
3	Mechanics Berkeley Physics Course, Vol.1:	Charles Kittel, et.al.	Tata McGraw-Hill	2007
4	Properties of Matter	Brijlal & Subramanyam.	S.Chand & Co	2014
5	Physics for Degree Students	CL Aurora & PS Hemne	S.Chand & Co	2010
6	Mechanics	J C Upadhyaya	Himalaya	2016

References Books

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Principles of Physics 9 th Edn,	Resnick, Halliday & Walker,	Wiley	2013
2	Conceptual Physics, 10 th Edn	Paul G Hewit	Pearson	2012
3	Introduction to Special Theory of Relativity	Robert Resnick	Wiley Student Edition	2014
4	Physics for Scientists and Engineers	Jewett & Serway	Cengage learning India Pvt Ltd, Delhi	2012
5	The Feynman Lectures on Physics – Vol 1	Richard P Feynman, Robert B Leighton, Mathew Sands	Narosa Publishing House	1986
6	Physics – (International Student Edition)	Marcelo Alonso & Edward J Finn	Addison – Wesley	1999
7	Concepts of Modern Physics	Arthur Beiser	Tata Mcggraw Hill	1998
8	Modern Physics	Kenneth Krane	Wiley	2012
9	Newtonian Mechanics	AP French	Viva Books	2017
10	Modern Physics	G Aruldas & P Rajgopal	PHI Learning Pvt. Ltd.	2009

List of Experiments to be performed in the Laboratory:

1.	Determination of g using bar pendulum (two hole method and L versus T graphs).
2.	Determination of moment of inertia of a Fly Wheel.
3.	Determination of rigidity modulus using torsional pendulum.
4.	Modulus of rigidity of a rod – Static torsion method.
5.	Determination of elastic constants of a wire by Searle's method.
6.	Young's modulus by Koenig's method.
7.	Viscosity by Stokes' method.
8.	Verification of Hooke's law by stretching and determination of Young's Modulus.
9.	Determination of surface tension of a liquid by drop weight method.
10.	Study of motion of spring and to calculate the spring constant, g and unknown mass.
11.	Determination of Young's modulus of a bar by the single cantilever method.
12.	Determination of Young's modulus of a bar by uniform bending method.
13.	Radius of capillary tube by mercury pellet method.
14.	Verification of parallel and perpendicular axis theorems.
15.	Determination of interfacial tension between two liquids using drop weight method.
16.	Determination of viscosity of liquids by Poiseuille's method.

(Minimum EIGHT experiments have to be carried out).

Reference Book for Laboratory Experiments

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Advanced Practical Physics for students	B.L. Flint and H.T. Worsnop	Asia Publishing House.	1971
2	A Text Book of Practical Physics	I. Prakash & Ramakrishna	Kitab Mahal, 11 th Edition	2011
3	Advanced level Physics Practicals	Michael Nelson and Jon M. Ogborn	Heinemann Educational Publishers, 4 th Edition	1985
4	A Laboratory Manual of Physics for undergraduate classes	D.P.Khandelwal	Vani Publications.	1985
5	BSc Practical Physics Revised Ed	CL Arora	S.Chand & Co	2007
6	An advanced course in practical physics	D. Chatopadhyay, PC Rakshit, B.Saha	New Central Book Agency Pvt Ltd	2002

Semester – II

Electricity & Magnetism

Programme Outcomes

PO - 1 Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO - 2 Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO - 3 Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO - 4 Ethics: Apply the professional ethics and norms in respective discipline.

PO - 5 Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO - 6 Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Program Outcomes (POs)

Course Outcomes (COs)	1	2	3	4	5	6
i. Will demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.	x	x				
ii. Will explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.	x					
iii. Will be able to apply Gauss's law of electrostatics to solve a variety of problems.	x	x			x	
iv. Will describe the magnetic field produced by magnetic dipoles and electric currents.	x					
v. Will be able to explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.	x					
vi. Will be in position to describe how magnetism is produced and list examples where its effects are observed.	x				x	x
vii. Will be able to apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations	x	x			x	x

of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.						
viii. Will understand and able to apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, • Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.	x	x			x	x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Electricity & Magnetism		Hrs
Unit – 1		
Chapter No. 1	Topics to be covered: Electric charge and field Coulomb's law, electric field strength, electric field lines, point charge in an electric field and electric dipole, work done by a charge (derivation of the expression for potential energy), Problems.	3
Chapter No. 2	Topics to be Covered Gauss's law and its applications (electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge).	3
Chapter No. 3	Topics to be Covered Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and distribution of charges (Examples: potential associated with a spherical charge distribution, infinite line charge distribution, infinite plane sheet of charges). Constant potential surfaces, Potential due to a dipole and electric quadrupole. Problems	7
Topics for self study(If any)	Constant potential surfaces - for self learning Work out problems listed in the reference	
	Suggested Activities	
Activity No. 1	1. Learn the difference between and DC and AC electricity and their characteristics. Voltage and line frequency standards in different countries. 2. A small project report on production of electricity as a source of energy: Different methods	

	3. With the help of glass rod, plastic rod, silk, and fur demonstrate the generation of charge and electrostatic attraction and repulsion.	
Activity No. 2	1. Learn to use a multimeter (analog and digital) to measure voltage, current and resistance. Continuity testing of a wire. 2. Learn about household electrical connection terminals: Live, neutral and ground and voltage between the terminals. Role of earthing and safety measures	
Unit – 2		
Chapter No. 4.	Topics to be covered Conductors in electrostatic field Conductors and insulators, conductors in electric field. Capacitance and capacitors, calculating capacitance in a parallel plate capacitor, parallel plate capacitor with dielectric, dielectrics: an atomic view. Energy stored in a capacitor, Dielectric and Gauss's law, Problems.	6
Chapter No. 5.	Topics to be covered Electric currents and current density. Electrical conductivity and Ohm's law. Physics of electrical conduction, conduction in metals and semiconductors, circuits and circuit elements: Variable currents in capacitor circuits, Resistor, inductor and capacitor and their combination, charging and discharging of capacitor. Force on a moving charge. Problems.	7
Topics for self study(If any)	Currents and voltage in combination of R, L and C circuits, Kirchoff's laws of voltage & Current	
	Suggested Activities	
Activity No. 3	1. Learn about electrical appliances which work with AC and DC electricity 2. Learn about types of resistors and their colour codes and types of capacitors(electrolytic and non-electrolytic)	
Activity No. 4	1. Learn about power transmission: 3-phase electricity, voltage and phase 2. Visit a nearby electrical power station. Interact with line men, Electrical engineers and managers. Discuss about power loss in transmission. How to reduce it? 3. Prepare a small project report on street lighting and types of electrical bulbs.	

Unit – 3		
Chapter No.6	Topics to be covered Magnetism Definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor, Hall effect. Electromagnetic induction, conducting rod moving in a magnetic field, law of induction and mutual inductance, self inductance and energy stored in a magnetic field. Problems.	5
Chapter No. 7	Topics to be covered Alternating current circuits: Resonant circuit, alternating current, quality factor, RL, RC, LC, LCR circuits, admittance and impedance, power and energy in AC circuits. Filters – High and Low and band pass filters (qualitative), Problems.	8
Topics for self study(If any)	Force acting on a moving charge in electric and magnetic fields – Lorentz force, Magnetic dipole moment – torque on a magnetic dipole.	
Suggested Activities		
Activity No. 5	Activity: 1. Prepare a small project report on street lighting and types of electrical bulbs. 2. Learn the measurement of electric current using tangent galvanometer.	
Activity No.6	Activity: Build a small coil with insulated copper wire. Connect an ammeter micro/milli ammeter. Verify magnetic induction using a powerful bar magnet.	
Unit - 4		
Chapter No. 8	Electromagnetic waves: Scalar and vector fields, operator grad, the gradient of a scalar function, integration theorems – line integral, surface integral, volume integral, divergence and curl of a vector, Gauss and Stokes theorems (qualitative), Equation of continuity, Maxwell's equations, displacement current, electromagnetic wave, energy transported by electromagnetic waves. Electromagnetic waves in different frames of reference, the field of a current loop, magnetic moment, Electric current in atoms, electron spin and magnetic moment, magnetization and magnetic susceptibility.	10
Chapter No. 9	Topics to be covered: Types of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials. B-H hysteresis curves.	3
Topics for self study(If any)	B-H curves and its characteristics Ferrites	

Suggested Activities		
Activity No.7	1. Prepare a small project report on production of magnetic field: Permanent magnets, electromagnets and superconducting magnets. 2. Learn the principle of working of a Gauss meter to measure magnetic field	
Activity No. 8	1. Model the earth's magnetic field with a diagram. Explain the effect of tilt of the earth's axis and reasons for the change in the tilt of the earth's axis over thousands of years.	
Activity No 9	Identifying the magnetic meridian of the earth and measuring the magnetic dip at a place using the magnetic pointer. Discussion on magnetic equator	

Text Books:

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Physics for Degree Students Volume 1	CL Aurora & PS Hemne	S.Chand & Co	2010
2	Fundamentals of Magnetism and Electricity	DN Vasudeva	S Chand & Co	2011
3	Electricity and Magnetism	R Murugesan	S Chand & Co	2019
4	Electricity and Magnetism	D C Tayal	Himalaya	1989

References Books:

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Physics-Part-II,	David Halliday and Robert Resnick	Wiley Eastern Limited	2001
2	Berkeley Physics Course, Vol-2, Electricity and Magnetism, Special Edition	Edward M Purcell	Tata Mc Graw-Hill Publishing Company Ltd, New Delhi	2008
3	The Feynman Lectures on Physics – Vol II	Richard P Feynman, Robert B Leighton, Mathew Sands	Narosa Publishing House	1986
4	Physics for Scientists and Engineers	Jewett & Serway	Cengage learning India Pvt Ltd, Delhi	2012
6	Physics – (International Student Edition)	Marcelo Alonso & Edward J Finn	Addison – Wesley	1999

List of Experiments to be performed in the Laboratory

1.	Experiments on tracing of electric and magnetic flux lines for standard configuration.
2.	Verification of Maximum Power Transfer Theorem.
3.	Analysis of Phasor diagram.
4.	Determination of capacitance of a condenser using B.G.
5.	Determination of mutual inductance using BG.
6.	Charging and discharging of a capacitor (energy dissipated during charging and time constant measurements).
7.	Series and parallel resonance circuits (LCR circuits).
8.	Impedance of series RC circuits- determination of frequency of AC.
9.	Study the characteristics of a series RC and RL Circuit.
10.	Determination of self inductance of a coil.
11.	Verification of laws of combination of capacitances and determination of unknown capacitance using de - Sauty bridge.
12.	Determination of B_H using Helmholtz double coil galvanometer and potentiometer.
13.	Low pass and high pass filters.
14.	Charge sensitiveness of BG.
15.	Field along the axis of a coil.
16.	Low resistance by potentiometer .

(Minimum EIGHT experiments have to be carried out).

Reference Book for Laboratory Experiments

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Advanced Practical Physics for students	B.L. Flint and H.T. Worsnop	Asia Publishing House.	1971
2	A Text Book of Practical Physics	I. Prakash & Ramakrishna	Kitab Mahal, 11 th Edition	2011
3	Advanced level Physics Practicals	Michael Nelson and Jon M. Ogborn	Heinemann Educational Publishers, 4 th Edition	1985
4	A Laboratory Manual of Physics for undergraduate classes	D.P.Khandelwal	Vani Publications.	1985
5	BSc Practical Physics Revised Ed	CL Arora	S.Chand & Co	2007
6	An advanced course in practical physics	D. Chatopadhyay, PC Rakshit, B.Saha	New Central Book Agency Pvt Ltd	2002

Question paper pattern for I and II Semester Examinations

Max. marks: 60

Part A

Answer any FOUR out of six questions. Each questions carry 2 marks. $4 \times 2 = 8$

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Part B

$4 \times 10 = 40$

Answer **All** questions.

7a) One question from Unit I for 4 marks.

b) One question from Unit I for 6 marks.

OR

8a) One question from Unit I for 4 marks.

b) One question from Unit I for 6 marks.

9a) One question from Unit II for 4 marks.

b) One question from Unit II for 6 marks.

OR

10a) One question from Unit II for 4 marks.

b) One question from Unit II for 6 marks.

11a) One question from Unit III for 4 marks.

b) One question from Unit III for 6 marks.

OR

12 a) One question from Unit III for 4 marks.

b) One question from Unit III for 6 marks.

13a) One question from Unit IV for 4 marks.

b) One question from Unit IV for 6 marks.

OR

14a) One question from Unit IV for 4 marks.

b) One question from Unit IV for 6 marks.

Part C

Answer any THREE out of four questions (one PROBLEM from each unit). Each questions carry 4 marks. $3 \times 4 = 12$

- 15 (a)
(b)
(c)
(d)

Total Marks

= 60

Scheme of practical final examination (I and II semester)

Instructions:

- i) Minimum 8 experiments should be done (otherwise student is not allowed to sit for semester examination)
- ii) Knowledge of the experiment:-
 - Student knowledge is judged based on the performance of the handling equipments & recognising suitable devices used in the experiment. Questions must be asked to test basic knowledge of concerned the experiment only.

Marks allotment for practical

Allotment of marks	I & II semesters
Record book	8
Formula	3
Diagram/circuit, Exptal set up	3
Observation & trails	6
Knowledge of the experiment	3
Result & accuracy	2
Total marks	25

OPEN ELECTIVES

(SEM I to II)

Open Elective 1

ENERGY SOURCES

Programme Outcomes

PO - 1 Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO - 2 Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO - 3 Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO - 4 Ethics: Apply the professional ethics and norms in respective discipline.

PO - 5 Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO - 6 Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Program Outcomes (POs)

Course Outcomes (COs)	1	2	3	4	5	6
CO - 1: Will be able to comprehend the varieties of energy sources and differentiate between the renewable and non-renewable sources of energy	x	x				
CO - 2: Will know the significance of solar energy and the different techniques to harness the solar energy	x	x				
CO - 3: Will gain the idea of the formation of waves and standing wave pattern, analysis of longitudinal and transverse waves.	x	x			x	
CO - 4: Will acquire the knowledge of wind energy and the methods to tap the energy from the blowing wind to generate electrical power.	x	x		x		
CO - 5: Will come to know about the conventional energy sources and its impact on the climate	x	x			x	

CO - 6: Will acquire the skill to set up a model to show the production of energy from different energy sources	x				x	x
CO - 7: Will be able to explain the different energy sources and how they are beneficial for the development of Technology.	x	x			x	x
CO - 8: Will be able to understand the problems of global warming and other climatic impact of the reckless usage of energy resources	x			x	x	x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

ENERGY SOURCES

		No. of lectures
Unit-I	Non-Renewable energy sources	
	Chapter-1: Introduction	
	Energy concept-sources in general, its significance & necessity. Classification of energy sources: Primary and Secondary energy, Commercial and Non-commercial energy, Renewable and Non-renewable energy, Conventional and Non-conventional energy, Based on Origin-Examples and limitations. Importance of Non-commercial energy resources.	04
	Chapter-2: Conventional energy sources	
	Fossil fuels & Nuclear energy- production & extraction, usage rate and limitations. Impact on environment and their issues& challenges. Overview of Indian & world energy scenario with latest statistics- consumption & necessity. Need of eco-friendly & green energy & their related technology.	09
	Total	13
Unit-II	Renewable energy sources	
	Chapter-1: Introduction:	
	Need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.	05
	Chapter 2 : Solar energy:	
	Solar Energy-Key features, its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell -brief discussion of each. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.	08
	Total	13

Unit-III	Chapter-3: Wind and Tidal Energy harvesting:	
	Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy.	07
	Chapter-4 : Geothermal and hydro energy	
	Geothermal Resources, Geothermal Technologies.	02
	Hydropower resources, hydropower technologies, environmental impact of hydro power sources.	03
	Carbon captured technologies, cell, batteries, power consumption.	01
	Total	13
	Activity <ol style="list-style-type: none"> 1. Demonstration of on Solar energy and wind energy using training modules at Labs. 2. Conversion of vibration to voltage using piezoelectric materials. 3. Conversion of thermal energy into voltage using thermoelectric (using thermocouples or heat sensors) modules. 4. Project report on Solar energy scenario in India 5. Project report on Hydro energy scenario in India 6. Project report on wind energy scenario in India 7. Field trip to nearby Hydroelectric stations. 8. Field trip to wind energy stations like Chitradurga, Hospet and Gadag. 9. Field trip to solar energy parks like Yeramaras near Raichur. 10. Videos on solar energy, hydro energy and wind energy. 	
	Reference Books: <ol style="list-style-type: none"> 1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi 2. Solar energy - M P Agarwal - S Chand and Co. Ltd. 3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd. 4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University. 5. Dr. P Jayakumar, Solar Energy: Resource Assessment Handbook, 2009 6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA). 7. http://en.wikipedia.org/wiki/Renewable_energy 	

Astronomy & Space Mission

Programme Outcomes

PO - 1 Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO - 2 Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO - 3 Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO - 4 Ethics: Apply the professional ethics and norms in respective discipline.

PO - 5 Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO - 6 Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Program Outcomes (POs)

Course Outcomes (COs)	1	2	3	4	5	6
CO – 1 : Will come to know the historical growth of Astronomy and the accumulation of knowledge.	x	x				
CO – 2 : Will be able to understand the basic principle of optical instruments such as telescope, binoculars.	x	x				
CO – 3 : Will acquire the skills to set up the telescope and recognize the star clusters and also the planets and satellites.	x	x			x	
CO- 4 : Will acquire the knowledge of wind energy and the methods to tap the energy from the blowing wind to generate electrical power.	x	x	x			
CO – 5 : Will come to know about the conventional energy sources and its impact on the climate	x	x			x	
CO-6 : Will be able to explain the stellar evolution and evolution of the universe.	x				x	x

CO- 7 : Will be able to explain the principle of Rocket launching and other space machines. .	x	x			x	x
CO-7 : Will know the Indian Space program and its contribution for the nation building.	x			x	x	x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Astronomy & Space Mission

Topic	Hours
Unit 1: History & Introduction	13
Ancient Astronomy Vedic Astronomy, Ancient Astronomy – Aryabhata, Varahamihira, Bhaskara Greek, Sumerian, Mayan, Egyptian, Arabic and Chinese Observations	3
Medieval Astronomy: Geocentric Model, Heliocentric Model Observations by Tycho Brahe, Kepler, Galileo, Herschel and others.	3
Tools for Astronomy: Invention of Telescopes Pin Hole, Binoculars, Telescopes & Imaging.	3
Modern Astronomy Hubble's discovery, Stellar Evolution (Brief), Microwave, Radio Telescopes	2
Observational Terminologies Cardinal Directions, Azimuth, Altitude, Measurements using Compass and Hand. Equatorial Co-ordinates, Light years, Magnitude, Colors.	2
Unit 2: Observational Astronomy	13
The Sun Ecliptic and the Orientation of the Earth, Seasons - Solstices and Equinox, Observations of the Sun from Earth during seasons. Zero-shadow day Sunspots.	2
The Moon Earth-Moon system – Phases, Lunar Eclipses, Ecliptic and Lunar Orbital Plane – Nodes, Lunar Month, Full Moon Names.	2

<p>Inner Planets: Mercury & Venus Observational History, Observational Windows, Appearance, Apparitions, Elongations, Superior Conjunctions, Inferior Conjunctions, Transits.</p> <p>Outer Planets: Mars, Jupiter & Saturn Observational History, Observational Windows, Appearance, Frequency of Oppositions, Conjunctions, Galilean Moons, Saturn's Rings</p> <p>Distant or Minute Objects: Uranus, Neptune & Asteroids Observational History, Observational Windows, Asteroid Belt, Prominent Asteroids.</p>	5
<p>Comets & Meteors Origin, Orbital Nature, Historical Observations, Prominent Comets and Asteroids., Meteors, Origins and Showers</p>	2
<p>Occultations, Transits and Eclipses Definitions, Prominent Occultations and Transits, Eclipses – Types and prominent occurrences. Famous Eclipses in the past.</p>	2
Unit 3: Space Missions	13
<p>Introduction to Space Missions: Rockets, types and their applications, Different types of orbits, Artificial satellites – basic idea and their applications, Introduction to Space Missions, Beginning of Space Missions - World and India, Applications of Space Research, Space crafts, Launching Vehicles.</p> <p>Topics for Self-study: Major Space Centres in the World (at least 10) – brief idea about their location, establishment, capabilities and achievements. People behind space programs – at least 2 from India. Successful Missions (Any Five).</p>	6
<p>Indian Space Research Organisation (ISRO): About ISRO and its Goals, History of Creation.</p> <p>General Satellite Programmes: The IRS series, The INSAT series. Gagan Satellite Navigation System, Navigation with Indian Constellation (NavIC), Other satellites.</p> <p>Launch vehicles: Satellite Launch Vehicle (SLV), Augmented Satellite Launch Vehicle (ASLV), Polar Satellite Launch Vehicle (PSLV), Geosynchronous Satellite Launch Vehicle (GSLV).</p> <p>Experimental Satellites: Details and applications (Any Five)</p> <p>Earth Observation Satellites: Details and applications (Any Five)</p> <p>Communication satellites: Details and applications (Any Five)</p> <p>Topics for Self study: Chandrayaan 1: Details and applications. Mars Orbiter Mission: Details and applications.</p>	7

References:

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	The Amateur Astronomer	Sir Patrick Moore	Springer	2006
2	Handbook of Practical Astronomy	Gunter D. Routh	Springer	2009
3	Fundamental Astronomy	Hannu Karttunen	Springer	2007
4	Guide to Night Sky	P. Shankar	KRVP	2007
5	The Complete Idiot's Guide to Astronomy	Christopher De Pree and Alan Axelrod	Pearson	2001
6	The story of Astronomy In India	Chander mohan	Research Gate	2015
7	Trigonometry	-	Inc. BarCharts	
8.	Stargazing for Dummies	Steve Owens	John Wiley & Sons	2013
9.	A Skywatcher's Year	Jeff Kanipe	Cambridge University Press	1999
10.	The Casual Sky Observer's Guide	Rony De Laet	Springer	2012
11.	https://www.isro.gov.in/			

Question paper pattern for Open Elective for I and II Semester

Internal Assessment: 40 marks

Semester Examination: 60 marks

UNIT I, II & III Internal choice for each unit

Questions carrying $1 \times 8 = 8$

$1 \times 7 = 7$

$1 \times 5 = 5$

Total $20 \times 3 = 60$

MANGALORE UNIVERSITY
POLITICAL SCIENCE

BA Political Science Programme offered from the Academic year 2021-22

Programme Structure

First Semester

Course Code	Course Title	Credits	Teaching Hrs/Week	Total Marks/ Assessment*
DSC-1	Basic Concepts in Political Science	3	3	100 (60+40)
DSC-2	Political Theory	3	3	100 (60+40)
OE-1	Human Rights	3	3	100 (60+40)

Second Semester

DSC-3	Western Political Thought	3	3	100 (60+40)
DSC-4	Indian National Movement and Constitutional Development	3	3	100 (60+40)
OE-2	Indian Polity: Issues and Concerns	3	3	100 (60+40)

* Total marks for each course is 100. This would consist of an internal assessment for 40 marks and end semester examination for 60 marks.

Programme Objectives:

- 1.To familiarize the students with the basic ideas, thoughts, institutions and processes of the political system and enable them to grasp the principles and forces at work.
- 2.To inculcate among students the value and spirit of citizenship, universal brotherhood and democracy for a humane, vibrant and inclusive social and political order.
- 3.To acquaint students with the national and international political settings and prepare them to explore different career options including that of civil services and for responsible positions at different levels.
- 4.To equip students with the necessary skills and knowledge for meaningful political participation and to critically reflect on issues related to governance.

Programme Outcomes:

At the end of the successful completion of the course, students will have -

- 1.A nuanced understanding of the theoretical perspectives and basic aspects related to the political system and comprehend its dynamics.
- 2.Acquired and internalized the socially relevant values of harmony, democracy, citizenship for national progress, and contribute to the public good with responsibility and sensitivity.
- 3.An ability to analytically reflect on national and international processes and have the necessary skill, confidence and knowledge for making appropriate career choices including that of civil services and politics, and to shoulder responsibilities at different levels.
- 4.Necessary skills and knowledge to critically analyse and participate constructively in the political process, face the societal reality and challenges with knowledge and confidence, and offer insightful suggestions for the public good.

DSC-1: BASIC CONCEPTS IN POLITICAL SCIENCE

Course Title: BASIC CONCEPTS IN POLITICAL SCIENCE	
Course Code: DSC-1	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3 Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) + 40 (IA) =100

Course Objective:

1. To introduce students to the concepts, categories, theories, and constructs of Political Science
2. To inculcate among students values and essentials of responsible and active citizenship.
3. To enable students to comprehend the values and principles underlying political order and to reflect constructively on the issues of governance.
4. To enable students to understand the interface between politics and society, and the complexities in political choices.

Learning Outcome:

At the end of the course, the students will -

1. Have an understanding of the fundamental concepts and aspects related to Political Science.
2. Have an appreciation and internalisation of the values of responsible and active citizenry.
3. Be prepared for constructive engagement with the political system with an awareness of the core values and principles of sound political order.
4. Have a nuanced understanding of the dimensions of politics - society linkages, and the priorities and concerns essential in complex political choices.

Pedagogy: Lectures/Tutorials/Interactive Sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/ Seminars/Group discussions and counselling.

DSC-1: BASIC CONCEPTS IN POLITICAL SCIENCE

Unit 1	15 hours
1.1 Meaning of Politics; Nature, Scope and Importance of Political Science; Approaches to the study of Political Science (Philosophical, Behavioural and Marxian); Emergence of the idea of Political Domain. 1.2 Meaning, Definitions and Elements of State; Difference between State and Government, State and Society, State and Association; Theories of State -Idealist, Liberal, Neo-Liberal, Marxist and Gandhian. 1.3 Civil Society- Meaning and Importance.	
Unit 2	15 hours
2.1 Emergence, Meaning and Characteristics of Sovereignty 2.2 Kinds of Sovereignty; Theories of Sovereignty- Monistic, Pluralistic, Historical, Philosophical 2.3 Pluralistic Critique of Austin's Concept of Sovereignty; Challenges to the State Sovereignty in the Age of Globalization	
Unit 3	15 hours
3.1 Liberty: Meaning and Kinds; Positive and Negative Liberty 3.2 Equality: Meaning and Kinds (Social, Economic and Political) 3.3 Power and Justice- Meaning and Kinds; Political Obligation- Meaning and Significance	

Exercise:

- ✓ List out the priorities and concerns of politics.
- ✓ List out the modern elements of State.
- ✓ List out the countries and identify the issues related to equality.
- ✓ Identify an issue and discuss the role of civil society.

Basic readings:

1. Anup Chand Kapur, *Principles of Political Science*, Delhi; S Chand & Co Ltd, 2010
2. Amal Ray and Mohit Bhattacharya, *Political Theory Ideas & Institutions*, Kolkatta; The World Press Pvt. Ltd., 2013
3. M.J. Vinod and Meena Deshpande, *Contemporary Political Theory*, Delhi: PHI Learning, 2013
4. S. Ramaswamy, *Political Theory: Ideas & Concepts*, Delhi; Macmillan, 2002.
5. Atlantic Research Division, *Understanding Political Theory*, New Delhi; Atlantic Pub., 2021

Suggested Readings:

1. S. P. Verma, *Modern Political Theory*, New Delhi, Vikas, 1983.
2. N.N. Agarwal, Vidya Bhushan, Vishnoo Bhawan, R., *Principles of Political Science*, New Delhi; S. Chand & Co., 1998.
3. Atlantic Research Division, *Political Theory Concepts and Debates*, New Delhi; Atlantic Pub., 2021
4. S.C Pant, *Political Science Theory*, Prakashan Kendra, Lucknow, 1998.
5. S. N Dubey, *Political Science Theory*, Lakshmi Narain Agarwal, Agra, 2002.
6. J C Johari, *Principle of Modern Political Science*, New York, Greater Noida: Sterling Pub., 2009.
7. Anup Chand Kapur, *Principles of Political Science*, Delhi; S Chand & Co Ltd, 2010
8. O.P. Gauba, *An Introduction to Political Theory*, Delhi; National Publishing House, 2019
9. Eddy Asirvatham and K K Misra, *Political Theory*, Delhi; S. Chand & Co., 2010

DSC-2: POLITICAL THEORY

Course Title: POLITICAL THEORY	
Course Code: DSC-2	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) +40 (IA) =100

Course Objectives:

1. To introduce the students to the concepts and constructs in political theory.
2. To enable students to evolve a comparative perspective on ideas and ideologies.
3. To help students understand the politico-normative issues with conceptual clarity and to apply it in practice.
4. To equip students to handle complex and abstract arguments in political theory.

Learning Outcomes

At the end of the course, the students will-

1. Have a nuanced understanding of the aspects and constructs of Political Theory.
2. Develop a conceptual framework and a capacity to grasp political ideas and issues from a normative perspective.
3. Comprehend the logic, ideological foundations and implications of the political ideas and issues backed by theoretical insights and apply the insights in practice.
4. Have an ability to formulate and construct logical arguments with an awareness of the ontological premises of the argument.

Pedagogy: Lectures/Tutorials/Interactive sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/Seminars/Group discussions and counselling.

DSC-2: POLITICAL THEORY

Unit 1	15 hours
1.1	Meaning, Nature and Importance of Theory and Political Theory; Traditional Approaches to Political Theory- Normative, Historical, Philosophical, Institutional
1.2	Modern Approaches-Behavioural, Post-Behavioural, David Easton's Political System and Marxian
1.3	Relevance of Political Theory; Decline and Resurgence of Political Theory
Unit 2	15 hours
2.1	Liberalism: J.S Mill
2.2	Neo-Liberalism: Rawls
2.3	Libertarianism: Nozick
Unit 3	15 hours
3.1	Communitarianism and Multiculturalism-Meaning and Indian perspectives; Post Colonialism, and its Limitations
3.2	Proponents of Secularism: Nehru, Gandhi, Rajiv Bhargav
3.3	Critics of Secularism: Ashish Nandy, T.N. Madan, S.N. Balagangadhara

Exercise:

- ✓ Write about the Myth and Reality of Communitarianism in India
- ✓ Compare the concept of Liberty, Equality and Justice in the Modern world
- ✓ Write the understanding of secularism in India

Essential Readings:

1. M.J. Vinod and Meena Deshpande, *Contemporary Political Theory*, Delhi: PHI Learning, 2013
2. Michael Dusche, *Identity politics in India and Europe*, New Delhi; Sage, 2010
3. Andrew Heywood, *Political Theory An Introduction*, Palgrave Macmillan, 2015
4. Rajeev Bhargava and Ashok Acharya, eds., *Political Theory An Introduction*, New Delhi: Pearson Longman, 2008
5. John S. Dryzek, et al., *Oxford Handbook of Political Theory*, Oxford; OUP, 2006
6. Balagangadhara, S.N., and Jakob De Roover, "The Secular State and "Religious Conflict: Liberal neutrality and the Indian Case of Pluralism". *The Journal of Political Philosophy* 15, no. 1: 67-92, 2007.
7. Rajeev Bhargava, ed. *Secularism and Its Critics*, Oxford University Press, New Delhi, 1998.

Suggested Readings:

1. Sushila Ramaswamy, *Political Theory Ideas and Concepts*, Delhi; PHI Learning, 2015
2. Ashcroft. B, *The Post-Colonial Studies Reader*, Rout ledge London, 1995
3. Bhikhu Parekh, *Rethinking Multiculturalism: Cultural Diversity and Political Theory*, London: Macmillan, 2000
4. N. Manu Chakravarthy, ed., *Selected writings by K.V. Subbanna, Along with Interviews and Tributes*, Shimoga: AksharaPrakashana, 2009
5. Ahmed. V, *Theory: Classes, Nations Literatures*, Verso, London, 1992.
6. G.N. Devy, *After Amnesia Tradition and Change in Indian Literary criticism*, Hyderabad; Orient Longman, 1995
7. Christopher Butler, *Postmodernism: A Very Short Introduction*, OUP Oxford, 2002.
8. H. Arendt., *On Revolution*, Viking, New York, 1963
5. V. Bryson, *Feminist political Theory*, Macmillan, London, 1992.
6. Norris Christopher, *The Truth about Postmodernism*, Wiley- Blackwell, New Jersey, 1993.
7. W. Connolly, *Identity/Difference: Democratic Negotiations*, Cornell University Press, NY, 1991.
8. Edward Said, *Orientalism*, Pantheon Books, New York, 1978.
9. Elshtain. J. B, *Public Man, Private Man: women in Social and Political Thought*, Princeton University Press, Princeton NJ, 1981.

10. Fanon. F., *Black skin, White Masks*, translated by C. L. Markham, Grove Press, New York, 1967.
11. Jean Francis Lyotard. *The Postmodern Condition- A report on Knowledge*. Parris: Minuit, 1979.
12. Veena Das, Dipankar Gupta and Patricia. eds., *Tradition, Pluralism and Identity*, New Delhi, Uberoi, 1999.
13. Jawaharlal Nehru, *The Discovery of India*, Jawaharlal Nehru Memorial Fund, Oxford University Press, New Delhi, 1988.
14. Rochana Bajpai, "The conceptual vocabularies of secularism and minority rights in India", *Journal of Political Ideologies*, 2002.
15. ರಾಜೇಂದ್ರ ಚೆನ್ನಿ, ದೇಶೀವಾದ, ಬೆಂಗಳೂರು; ಅಭಿನವ, 2017.
16. ರಾಜಾರಾಮ ಹೆಗಡೆ ಮತ್ತು ಸದಾನಂದಜಿ.ಎಸ್. (ಸಂ) "ಪೂರ್ವಾವಲೋಕನ", ವಸಂತಪ್ರಕಾಶನ, ಬೆಂಗಳೂರು, 2016

OE-1: HUMAN RIGHTS

(Open

Course Title: HUMAN RIGHTS	
Course Code: OE-1	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) +40 (IA) =100

Elective)

Course objectives

1. To enable students to understand the significance and foundations of the idea of human rights.
2. To familiarise students with the major texts and provisions governing human rights and mechanisms for monitoring and enforcing human rights.
3. To equip students with the responsibility to respect, defend and promote human rights.
4. To make students comprehend, sensitise and analyze the trends and contemporary challenges to human rights.

Learning Outcomes

At the end of the course, the students will-

1. Understand and appreciate the value and basis of human rights.
2. Have necessary knowledge of the legal provisions and requirements for effective implementation of human rights as well as mechanisms available for implementation of human rights.
3. Be able to identify, contextualise and use knowledge about human rights in a given situation.
4. Have the knowledge and skill to analyse the trends and challenges to human rights, and to apply human rights standards to societal issues with a solution to overcome the problem.

Pedagogy: Lectures/Tutorials/Interactive sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/Seminars/Group discussions and counselling.

OE-1: HUMAN RIGHTS

Unit 1	15 hours
1.1	Meaning, nature, scope and classification of Human Rights
1.2	The Human Rights of First generation (Civil and Political Rights), Second generation (Economic, Social and Cultural Rights), Third generation (Collective Rights) and Fourth generation (Subjective Rights)
1.3	Universal Declaration of Human Rights
Unit 2	15 hours
2.1	Human Rights and Fundamental Rights, Fundamental Rights and Fundamental Duties in India
2.2	National Human Rights Commission (NHRC) – Composition and functions
2.3	Karnataka State Human Rights Commission (KSHRC) – Composition and functions
Unit 3	15 hours
3.1	National Commission and Committees for SCs/STs; National Commission for Minorities; National Commission for Women.
3.2	Major issues and Concerns of Human Rights – Discrimination and violence against women, children, Dalits and Minorities, Trafficking, Child Labour and Bonded Labour
3.3	Challenges to Human Rights

Exercise:

- ✓ Group Discussion on Human Rights and its types (comparison of Western and Eastern concept of Human Rights).
- ✓ Students can be asked to do collage making and present the same.
- ✓ Find out the different types of complaints received by NHRC and bring out the results on any one of such cases.
- ✓ To make it more participatory learning, the students are required to visit the website of NHRC (www.nhrc.nic.in), wherein at the left-hand side, a link is provided to the instructions. After going through the guidelines issued by NHRC's, briefly explain the guidelines on– Custodial death/rape, Encounter death, and Guidelines on the arrest.

Essential Readings:

1. Aftab Alam, ed., *Human Rights in India: Issues and Challenges*, Delhi; Raj Publications, 2012.
2. S.M. Begum, ed., *Human Rights in India: Issues and Perspectives*, New Delhi: APH, 2000.
3. Andrew Clapham, *Human Rights A Very Short Introduction*, Oxford; OUP, 2015.
4. Upendra Baxi (ed.), *The Right to be Human*, Lancer International, Crawford, New Delhi, 1987.
5. Darren J. O'Byrne, *Human Rights An Introduction*, New York; Routledge, 2013.

Suggested Readings

1. James (ed.), *The Rights of People*, Oxford, New York, 1988.
2. Craston, M. *What are Human Rights*, Bodely Head, London, 1973.
3. Rhonda L. Callaway & Julie Harrelson-Stephens, "International Human Rights", Viva books, New Delhi, 2010.
4. Janusz Symonides, *Human Rights Concept and Standards*, Rawat, New Delhi, 2019.
5. Asish Kumar Das and Prasant Kumar Mohanty, *Human Rights in India*, New Delhi; Sarup & Sons, 2007.
6. "Protect Human Rights", <http://www.un.org/en/sections/what-we-do/protect-human-rights/index.html>
7. K.S. Pavithran, *Human Rights in India: Discourses and Contestations*, New Delhi; Gyan Pub., 2018.
8. Sunil Deshta and Kiran Deshta, *Fundamental Human Rights*, Deep and Deep, New Delhi, 2011.
9. Jack Donnelly and Rhoda Howard (ed.), *International Handbook of Human Rights*, Westport, Connecticut: Greenwood Press, 1987.
10. Jack Donnelly, *Universal Human Rights in Theory and Practice*, New Delhi, Manas, 2005.

11. Tapan Biswal, *Human Rights Gender and Environment*, Viva Books, New Delhi 2006.
12. Satya.P. Kanan, *Human Rights Evolution and Development*, Wisdom Press, New Delhi 2012.
13. Gerwith, *Human Rights: Essays on Justification and Application*, University of Chicago Press, Chicago, 1982.
14. Khan, Mumtaz Ali, *Human Rights and the Dalits*, Uppal Publishing House, New Delhi, 1995.
15. V.T. Patil, *Human Rights Developments in South Asia*, Authors Press Publishers, Delhi 2003.
16. S.K. Gupta, *State-wise Comprehensive Information on Human Right Violation*, ALP Books, Delhi. 2009
17. B.C. Acharya, *A Handbook of Women's Human Rights*, Wisdom Press, New Delhi, 2011.
18. South Asia Human Rights Documentation Centre, *Introducing Human Rights*, Oxford, New Delhi, 2006.
19. Lillich, R. *International Human Rights: Law Policy and Practice*, Boston: Little Brown and Co., 1991
20. ಅರ್ಜುನ್ ದೇವ್, ಇಂದಿರಾ ಅರ್ಜುನ್ ದೇವ್, ಸುಪ್ರಾ ದಾಸ್ ಸಂಪಾದಕರು, ಅನುವಾದಕರು ಕೆ. ಎಚ್. ಶ್ರೀನಿವಾಸ್, *ಮಾನವ ಹಕ್ಕುಗಳು: ಒಂದು ಆಕರ ಗ್ರಂಥ*, ನ್ಯಾಷನಲ್ ಬುಕ್ ಟ್ರಸ್ಟ್, ಇಂಡಿಯಾ.
21. ಡಾ. ಕಮಲಾಕ್ಷಿ ತಡಸದ, *ಮಾನವ ಹಕ್ಕುಗಳ ಚಾರಿತ್ರಿಕ ದರ್ಶನ ಹಾಗೂ ಸಿದ್ಧಾಂತಗಳು*, ಪ್ರಸಾರಾಂಗ, ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ 2015.

Course Title: WESTERN POLITICAL THOUGHT	
Course Code: DSC-3	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) + 40 (IA) =100

DSC-3: WESTERN POLITICAL THOUGHT

Course Objectives:

1. To familiarise students with western foundations of political thought and critically engage with the rational and/or material universe of the west.
2. To identify and evaluate the changes and continuity in western political thought
3. T
o expose students to the divergent perspectives on politics, state and its arrangements within the western political tradition
4. T
o create an understanding among students on western engagements with issues of governance and political order

Learning Outcomes:

At the end of the course, the students will –

1. Have an understanding of the distinct features and diverse intellectual traditions of the west.
2. Identify the main currents in western political thought and their impact on the shaping of western political values
3. Grasp the society-state-politics interface and institutional arrangements in western political tradition and its implications.
4. Develop a critical perspective on the western political thought on governance and political order

Pedagogy: Lectures/Tutorials/Interactive sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/Seminars/Group discussions and counselling.

DSC-3: WESTERN POLITICAL THOUGHT**Unit 1****15 Hours**

- 1.1 Salient Features of the Greek Political Thought; Plato: Theory of Justice, Philosopher King; Aristotle: State and Its Classification, Citizenship
- 1.2 Salient Features of Medieval - Political Thought
- 1.3 St. Thomas Aquinas: Church v/s State; St. Augustine: Theory of Two Swords; Machiavelli: On Politics and State Craft

Unit 2**15 Hours**

- 2.1 Hobbes: Social contract and State Sovereignty; Locke: Social Contract and Theory of Government, Tolerance; Rousseau: Social Contract and General Will
- 2.2 Bentham: Theory of Utilitarianism
- 2.3 J.S. Mill: Views on Liberty and representative government

Unit 3**15 Hours**

- 3.1 Hegel –Dialectical Materialism; Karl Marx- Capitalism and Communism
- 3.2 Jurgen Habermas- Communicative action, Public Sphere, Theory of truth and knowledge
- 3.3 Hannah Arendt- Theory of Action, Modernity, Conception of Citizenship

Exercise:

- ✓ Compare Greek State with the Roman state and makepoints
- ✓ Reflect on separation of religion and politics
- ✓ Analyse the relevance of social contract theory in contemporary times
- ✓ Can we have a classless society in the modern world? Comment

Essential Readings:

1. G.H. Sabine. *A History of Political Theory*, 4th edn., New Delhi: Oxford and IBH, 2019.
2. William Ebenstein, *Great Political Thinkers Plato to the Present*, New Delhi: Oxford, 1970
3. Subrato Mukherjee and Susheela Ramaswamy, *History of Political Thought: Plato to Marx*, PHI Publishers, New Delhi, 2014
4. Sukhbir Singh, *History of Political Thought*, Vol 1 & 2, Meerut; Rastogi Pub., 2006
5. Boucher, D., and Kely, P., ed., *Political Thinkers From Socrates to the Present*, Oxford: Oxford University Press, 2009
6. Coleman J., *A History of Political Thought*, Oxford: Blackwell, 2000
7. <https://plato.stanford.edu/>

Suggested Readings:

1. A. Hacker, *Political Theory: Philosophy, Ideology, Science* New York, Macmillan, 1961.
2. C.L. Wayper. *Political Thought*, Bombay: B.I. Publications, 1977.
3. Quentin Skinner, *The Foundations of Modern Political Thought*, Cambridge: OUP, 1978
4. Ernest Barker, *Greek Political Theory: Plato and his Predecessors*. London: Methuen & Co., 1970.
5. M.J. Vinod and Meena Deshpande, *Contemporary Political Theory*, Delhi: PHI Learning, 2013
6. M. Butterfield, *The State Craft of Machiavelli*, New York: The Macmillan Company, 1956.
7. O.P. Bakshi; *Politics and Prejudice: Notes on Aristotle's Political Theory*. Delhi: The Delhi University Press, 1975.
8. M.A. Shepard, "Sovereignty at the Crossroads: A Study of Bodin", *Political Science Quarterly* XLV, pp.580-603.
9. L. Colleti. *From Rousseau to Lenin*, New Delhi: Oxford University Press, 1969.
10. Colin Farrelly, *Introduction to Contemporary Political Theory*, London, Sage, 2004
11. Robert E. Goodin, Philip Pettit and Thomas Pogge, eds., *Companion to Contemporary Political Philosophy*, Oxford, Blackwell, 2007
12. J. Coleman, *A History of Political Thought: From Ancient Greece to Early Christianity*, Oxford, Blackwell Publishers, 2000.

DSC-4: INDIAN NATIONAL MOVEMENT AND CONSTITUTIONAL DEVELOPMENT

Course Title: INDIAN NATIONAL MOVEMENT AND CONSTITUTIONAL DEVELOPMENT	
Course Code: DSC-4	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3 Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) + 40 (IA) =100

Course Objectives

1. To endow students with a historical perspective on the rise and growth of nationalism and the making of the Indian Constitution.
2. To enable students to comprehend the influence of diverse perspectives and values articulated during the national movement that influenced the making of the Indian political system.
3. To enable students to understand the milestones, contestations and settings that shaped the Indian political system.
4. To help students to understand the motives and visions of Constitution-makers in the incorporation of novel aspects in the Indian Constitution.

Learning outcomes

At the end of the course, the students will –

1. Be able to reflect on the nature of Indian nationalism and the Constitution with historical perspectives and insights
2. Understand and appreciate the values and design of the Indian Constitution resulting from the diverse intellectual traditions, ideas, and concerns of freedom fighters
3. Have a nuanced understanding of the stages and settings in which Constitutional measures and reforms were initiated, contested and modified culminating in the making of the Indian Constitution
4. Have a lucid understanding of the intentions and visions of Constitution makers in the design and inclusion of distinct aspects in the Indian Constitution

Pedagogy: Lectures/Tutorials/Interactive sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/Seminars/Group discussions and counselling.

DSC-4: INDIAN NATIONAL MOVEMENT AND CONSTITUTIONAL DEVELOPMENT

Unit 1 15 Hours

- 1.1 Indian National Movement- Features; The Liberal, The Extremist and Revolutionary Phase
- 1.2 The Gandhian Phase: Non-Cooperation movement
- 1.3 Civil Disobedience Movement and the Quit India movement

Unit 2 15 Hours

- 2.1 Morley-Minto Reform Act of 1909; Montague Chelmsford Act of 1919: Main provisions and Dyarchy; The Nehru Report and Jinnah's 14-point Formula
- 2.2 Simon Commission, Round Table Conferences; Government of India Act of 1935- Main provisions, Provincial Autonomy and federal system
- 2.3 Cabinet Mission Plan; Indian Independence Act of 1947- Main provisions

Unit 3 15 Hours

Constituent Assembly Debates on -

- 3.1 Citizenship, State Structure
- 3.2 Minority Rights, Uniform Civil Code (UCC) v/s Personal Law
- 3.3 Language and Union of States

(The above three should be discussed in the context of Constituent Assembly Debates)

Exercise:

- ✓ Identify any two political and socio-economic conditions in India that are present and two that are not present in Indian democracy
- ✓ List out in a table giving some democratic roles of a citizen, explore yourself how democratic you are.
- ✓ Identify the good qualities of a citizen

Essential Reading

1. Peter Heehs, *India's Freedom Struggle 1857-1947 A Short History*, New Delhi: OUP, 1988
2. Udit Bhatia, *The Indian Constituent Assembly Deliberations on Democracy*, Oxfordshire: Taylor & Francis, 2019
3. Bipin Chandra et al., *India's Struggle for Independence 1857-1947*, New Delhi; Penguin, 2016
4. Bipin Chandra, *Nationalism and Colonialism in Modern India*, Hyderabad: Orient Blackswan, 1984
5. Austin Granville, *The Indian Constitution: Cornerstone of a nation*, New Delhi; OUP, 2014
6. S. Sarkar, *Modern India (1885-1947)*. New Delhi: Macmillan, 1983.
7. S. Bandopadhyay, *From Plassey to Partition: A History of Modern India*. New Delhi: Orient Longman, 2004

Suggested Reading

1. https://www.constitutionofindia.net/constitution_assembly_debates
2. Parliament of India, Lok Sabha Digital Library, *Constituent Assembly Draft making debates*, <https://eparlib.nic.in/handle/123456789/760448>
3. Romila Thapar, *India Another Millennium*, New Delhi; Penguin, 2000
4. Rajiv Bhargava, *Politics and Ethics of the Indian Constitution*, New Delhi; OUP, 2015
5. Durga Das Basu, *Introduction to the Constitution of India*, Nagpur; LexisNexis, 2015
6. R. Thapar, 'Interpretations of Colonial History: Colonial, Nationalist, Post-colonial', in P.R. DeSouza, (ed.) *Contemporary India: Transitions*. New Delhi: Sage Publications, 2000.
7. A. Jalal and S. Bose, *Modern South Asia: History, Culture, and Political Economy*. New Delhi: Oxford University Press, 1997.
8. A.D. Smith, *Nationalism*. Cambridge: Polity Press, 2001.
9. M.P. Jain, *Outlines of Indian Legal and Constitutional History*, Nagpur; LexisNexis, 2014
10. S. Islam, 'The Origins of Indian Nationalism', in *Religious Dimensions of Indian Nationalism*. New Delhi: Media House, 2004.
11. P. Chatterjee, 'A Brief History of Subaltern Studies', in Partha Chatterjee, *Empire & Nation: Essential Writings (1985-2005)*. New Delhi: Permanent Black, 2010.

12. Mani, B.R. *Debrahmanising History, Dominance and Resistance in Indian Society*. New Delhi: Manohar, 2005.

OE-2: INDIAN POLITY: ISSUES AND CONCERNS(Open
Electi
ve)

Course Title: INDIAN POLITY: ISSUES AND CONCERNS	
Course Code: OE-2	Course Credits: 3
No. of Teaching Hours/Week: 3	Duration of End Sem. Exam: 3 Hours
Total Contact Hours: 45	Assessment (Marks): 60 (Theory) + 40 (IA) =100

Course Objectives

1. To enable students to grasp the complex relationship/ linkages between politics and society.
2. To comprehend the dynamics and forces at work in shaping the political process.
3. To enable students to recognize the nature and trends in Indian politics.
4. To enable students to identify and critically reflect on the major issues confronting Indian politics.

Learning outcomes

At the end of the course, the students will –

1. Have perceptive thinking on the interconnectedness between politics and society, and its larger implications.
2. Grasp the dynamics and forces that influence the polity.
3. Be able to identify and critically reflect on the nature and trends in Indian politics.
4. Have a concerned and critical understanding of the major issues of Indian polity with insights for solutions.

Pedagogy: Lectures/Tutorials/Interactive sessions/Open Educational Resources (as reference materials), practical exercises/Assignments/Seminars/Group discussions and counselling.

OE-2: INDIAN POLITY: ISSUES AND CONCERNS**Unit 1****15 Hours**

- 1.1 National Integration and Social Harmony- Meaning and Need; Suggesting for securing National Integration.
- 1.2 Society and Politics in India: Caste and its social impact; Problems in understanding caste system as a social system; Role of caste and its impact on Indian Polity.
- 1.3 Language – Role and Constitutional provisions, Issues.

Unit 2**15 Hours**

- 2.1 Religion and Local Traditions – Role and Constitutional provisions.
- 2.2 Development and Inclusiveness: Issues and concerns.
- 2.3 Regionalism – Forms and Reasons for its growth.

Unit 3**15 Hours**

- 3.1 Corruption – Causes and Measures.
- 3.2 Terrorism- Types, Causes and Measures.
- 3.3 Celebrating Diversity – Consensus and Challenges.

Exercise:

- ✓ Classify the major factors which impede National Integration and give your suggestions.
- ✓ Analyse the forms and impact of Terrorism.
- ✓ Make a point on the 2011 Anti-Corruption movement in India.

Essential Readings:

1. Atul Kohli, ed., *The Success of India's Democracy*, Cambridge: CUP, 2001.
2. Atul Kohli, *Democracy and Discontent: India's growing crisis of governability*, Cambridge: CUP, 1991.
3. Nirja Gopal Jayal and Pratap Bhanu Mehta, *The Oxford Companion to Politics in India*, New Delhi; OUP, 2012
4. T.V. Sathiyamurthy, *Social Change and Political Discourse in India: Structures of Power, Movements of Resistance*, Vol. 4, Oxford: OUP, 1996.
5. Myron Weiner, *The Indian Paradox: Essays in Indian Politics*, New Delhi: Sage, 1989.
6. Partha Chatterjee, (ed.) *State and Politics in India*, New Delhi: OUP, 1998.
7. James Manor, *Politics and State-society Relations in India*, London: Hurst, 2017
8. M.P. Singh, & R. Saxena, *Indian Politics: Contemporary Issues and Concerns*. New Delhi: PHI Learning, 2008.

Suggested Readings

1. M. Galanter, 'The Long Half-Life of Reservations', in Z. Hasan, E. Sridharan and R. Sudarshan (eds.) *India's Living Constitution: Ideas, Practices, Controversies*, New Delhi: Permanent Black, 2002.
2. Marc Gallanter, *Competing Equalities, Law and Backward classes in India*, New Delhi: OUP, 1984
3. Atul Kohli, and Prema Singh, ed., *Routledge Handbook of Indian Politics*, London: Routledge, 2013
4. Paul Brass R., *Routledge Handbook of South Asian Politics, India, Pakistan, Bangladesh, Sri Lanka and Nepal*, New York: Routledge, 2010.
5. Dipankar Gupta, *Political Sociology in India Contemporary trends*, New Delhi: Orient Longman, 1996
6. T.K Oommen, *Nation, Civil Society and Social Movements, Essays in Political Sociology*, New Delhi: Sage, 2004
7. S. Khilnani, *The Idea of India*, London: Hamish Hamilton, 1997.
8. Shashi Tharoor, *The Battle of Belonging: On Nationalism, Patriotism, And What it Means to be Indian*, New Delhi; Aleph Book Company, 2020

9. Shefali Roy, *Society and Politics in India Understanding Political Sociology*, Delhi: PHI Learning, 2014
10. Marilynn B Brewer, "The Psychology of Prejudice: Ingroup Love or Outgroup Hate?" *Journal of Social Issues* 55 (3): 429-44, 1999.
11. Ashutosh Varshney, *Ethnic Conflict and Civic Life: Hindus and Muslims in India*, Delhi: Oxford University Press, 2002
12. Ashutosh Varshney, *Battles Half Won India's improbable democracy*, New Delhi; Penguin, 2013
13. Bikhu Parekh, *A New Politics of Identity Political principles for an Interdependent World*, New York: Palgrave Macmillan, 2008
14. C. Jaffrelot, 'The Politics of the OBCs', in *Seminar*, Issue 2005.
15. P. Karat, *Language and Nationality Politics in India*, Bombay: Orient Longman, 1973.
16. Atul Kohli, *Democracy and Development in India: From Socialism to Pro-Business*, New Delhi: Oxford University Press, 2009
17. Madan, T.N., *Modern Myths, Locked Minds: Secularism and Fundamentalism in India*, New Delhi: OUP, 1997.
18. Rajani Kothari, *Politics in India*, New Delhi: Orient Longman, 1970.
19. Sudipta Kaviraj, ed., *Politics in India*, New Delhi, OUP, 1997.
20. M.P. Singh, & R. Saxena, *Indian Politics: Contemporary Issues and Concerns*, New Delhi: PHI Learning, 2008.
21. M.P. Singh, and Himanshu Roy,, *Indian Political System: Structure, Policies, Development*, New Delhi: GanandaPrakashan, 1998
22. A. Vanaik, & R. Bhargava, (eds.) *Understanding Contemporary India: Critical Perspectives*. New Delhi: Orient Blackswan, 2010.
23. Dunkin Jalaki, ed., "Bharatadalli Jativyavste ideye?", *Anandakanda Granthamale*, Malladahalli Publication, 2012.
24. P. Datta, *Major issues in the Development Debate: Lessons in Empowerment from India*, New Delhi: Kaniska, 1998

25.

MANGALORE UNIVERSITY

~~(Question paper pattern)~~

First/ Second Semester BA Degree Examination, (Month, Year)

POLITICAL SCIENCE

(TITLE OF THE PAPER)

Time: 3 Hours

Max. Marks: 60

SECTION – A

(5 x 3 =15)

Instructions: Answer **any three** of the following, each **not exceeding two** pages

- 1.
- 2.
- 3.
- 4.
- 5.

SECTION – B

(15 x 3 =45)

Instructions: Answer **any three** of the following questions, each not exceeding **four** pages

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

MANGALORE UNIVERSITY

QUESTION PAPER PATTERN FOR UNDER GRADUATE PROGRAM (UG) SANSKRIT LANGUAGE

**FRAMED ACCORDING TO THE NATIONAL EDUCATION POLICY
(NEP 2020)**

(I & II SEMESTERS)

**Ability Enhancement Compulsory Course (L+T)
TO IMPLEMENT FROM THE ACADEMIC YEAR -2021-22**

FOR ALL COURSES

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY
MANGALAGANGOTRI - 574199**

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
QUESTION PAPER PATTERN FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BA, BSW, HRD, BVA

Scheme of Examination			
Time : 2 hours			Maximum Marks :60
1	Translation and Explanation of Shlokas	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Filling in the blanks with the correct forms of the given word	15 of 20	15 x 1= 15

II Semester: BA, BSW, HRD, BVA

Scheme of Examination			
Time : 2 hours			Maximum Marks :60
1	Translation and Explanation of Gadya	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BCom

Scheme of Examination			
Time : 2 hours			Maximum Marks :60
1	Translation and Explanation of Shlokas	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Filling in the blanks with the correct forms of the given word	15 of 20	15 x 1= 15

II Semester: BCom

Scheme of Examination			
Time : 2 hours		Maximum Marks :60	
1	Translation and Explanation of Gadya	1 of 2	1X5=0 5
2	Reference to context	4 of 6	4X3=1 2
3	Essay Type Questions	3 of 5	3X8=2 4
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=0 4
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

I Semester : BSc, BSc/FND, BHS, BFD, BID, BHM, BSA, BFT, BCS

Scheme of Examination			
Time : 2 hours		Maximum Marks :60	
1	Translation and Explanation of Shlokas	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Filling in the blanks with the correct forms of the given word	15 of 20	15 x 1= 15

II Semester: BSc, BSc/FND, BHS, BFD, BID, BHM, BSA, BFT, BCS

Scheme of Examination			
Time : 2 hours		Maximum Marks :60	
1	Translation and Explanation of Gadya	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

I Semester : BBA

Scheme of Examination			
Time : 2 hours		Maximum Marks :60	
1	Translation and Explanation of Shlokas	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Filling in the blanks with the correct forms of the given word	15 of 20	15 x 1= 15

II Semester: BBA

Scheme of Examination			
Time : 2 hours			Maximum Marks :60
1	Translation and Explanation of Gadya	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

I Semester : BCA

Scheme of Examination			
Time : 2 hours		Maximum Marks :60	
1	Translation and Explanation of Shlokas	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Filling in the blanks with the correct forms of the given word	15 of 20	15 x 1= 15

II Semester: BCA

Scheme of Examination

Time : 2 hours			Maximum Marks :60
1	Translation and Explanation of Gadya	1 of 2	1X5=05
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	3 of 5	3X8=24
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X4=04
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

MANGALORE UNIVERSITY

**COURSE PATTERN AND SCHEME OF EXAMINATION FOR ALL UG
COURSES AS PER NEP -2020**

SUB: LANGUAGE SANSKRIT

ABILITY ENHANCEMENT COMPULSORY COURSE

**COURSE PATTERN AND SCHEME FRAMED UNDER NATIONAL
EDUCATION POLICY-2020**

I and II Semesters

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199**

Course Pattern and Scheme of Examination for all UG Courses as per NEP 2020

(2021-22 and onwards)

Subject : Language Sanskrit

Sl. No.	Se me ster	Title of the Paper	Teachi ng hours L+T	Hours Per week	Examination Pattern Max/Min Marks			Duration of Exam	Total marks	Credits
					Theory		I.A			
					Max	Min				
1	I	Sanskrit Poetry and Grammar	56	4	60	21	40	2 Hours	100	3
2	II	Sanskrit Prose Literature and Grammar	56	4	60	21	40	2 Hours	100	3

Ability enhancement Compulsory course (AECC) and Open Elective (OE)

Scheme of Internal Assessment Marks : Theory

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
TOTAL Theory IA Marks		40

MANGALORE UNIVERSITY

DISCIPLINE ELECTIVE/OPEN ELECTIVE

Three credits each

UNDER GRADUATE

BA/B.Sc/B.Com/BSW/BCA/BBA

Question Paper Pattern framed under National Education policy-2020

QUESTION PAPER PATTERN

For the year 2021-2022 and onwards

Discipline Electives/

Open electives for all UG Courses

I & II SEMESTERS

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI – 574199.**

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
Discipline Elective / Open Elective Courses in Sanskrit
I Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses
Title: Samskruta Bhasha Parichaya tatha Kathasahitya

Scheme of Examination

1. Multiple choice question	15 of 20	15x1=15
2. Essay type Question	3 of 5	3x8=24
3. Question Formation	5 of 8	5x1=05
4. Match the Following		5x1=05
5. Fill in the blanks	5 of 7	5x1=05
6. Translation –From Sanskrit to Kannada / English	6 of 7	1x6=06

Discipline Elective / Open Elective Courses in Sanskrit
II Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG
CoursesTitle: Vyavaharika Samskrutam tatha Jeevanamoulyani
(Functional Sanskrit and Moral Values)

Scheme of Examination

1. Multiple choice question	15 of 20	15x1=15
2. Essay type Question	3 of 5	3x8=24
3. Question Formation	5 of 8	5x1=05
4. Match the Following		5x1=05
5. Fill in the blanks	5 of 7	5x1=05
6. Translation –From Sanskrit to Kannada / English	6 of 7	1x6=06

MANGALORE UNIVERSITY

DISCIPLINE CORE COURSE

Three credits each

UNDER GRADUATE

BA (Basic/Hons.)

(for subjects without practicals with two major)

Framed under National Education policy-2020

QUESTION PAPER PATTERN

For the year 2021-2022 and onwards

I & II SEMESTERS

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199**

Discipline Core Course in Sanskrit/ Discipline Elective/ Open Elective

I Semester Bachelor of Arts (Basic/ Hons.)

(for subjects without practicals with two major)

B.A. (With Sanskrit major)

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	2 of 4	2X8=16
4	Short notes (To be answered in Sanskrit only)	2 of 3	2X4=08
5	Short notes in Kannada	1 of 2	1X8=08
6	One Mark Questions	6 of 8	6X1=06
	Total Marks		60

Scheme of Internal Assessment Marks

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
Total IA Marks		40

Discipline Core Course in Sanskrit/ Discipline Elective/ Open Elective

II Semester Bachelor of Arts (Basic/ Hons.)

(for subjects without practicals with two major)

B.A. (With Sanskrit major)

Scheme of Examination			
1	Translation and Explanation of Gadya/Shloka	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	2 of 4	2X8=16
4	Short notes (To be answered in Sanskrit only)	2 of 3	2X4=08
5	Short notes in Kannada	1 of 2	1X8=08
6	One Mark Questions	6 of 8	6X1=06
	Total Marks		60

Scheme of Internal Assessment Marks

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
	Total IA Marks	40



Dr. Nagaraj B,
Chairperson BOS,
Mangalore University, Konaje

MANGALORE UNIVERSITY

SYLLABUS FOR UNDER GRADUATE PROGRAM (UG) SANSKRIT LANGUAGE CURRICULUM FRAMEWORK

**FRAMED ACCORDING TO THE NATIONAL EDUCATION POLICY
(NEP 2020)**

(I & II SEMESTERS)

**Ability Enhancement Compulsory Course (L+T)
TO IMPLEMENT FROM THE ACADEMIC YEAR -2021-22**

FOR ALL COURSES

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY
MANGALAGANGOTRI - 574199**

MANGALORE UNIVERSITY

Syllabus

For the year 2021-22 and onwards

**Syllabus framed under National Education
Policy -2020**

SANSKRIT LANGUAGE

Ability Enhancement Compulsory Course

BA/B.Sc/B.Com/BSW/BCA/BBA

I & II semesters

Course pattern and scheme of examination for all UG Courses

DR. NAGARAJ B

CHAIRPERSON

BOARD OF STUDIES IN SANSKRIT

MANGALORE UNIVERSITY,

MANGALAGANGOTRI - 574199

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BA, BSW, HRD, BVA		
Sanskrit Language Paper-1 Title – Sanskrit Poetry and Grammar Maximum Marks: 100		
1	Introduction to Sanskrit Poetry - Selected portions from Sanskrit Poetic Compositions 1. Subhashitasudhanidhi 2. Matsyavataraha 3. Meghapratisandeshaha 4. Sriramagunavarnanam 5. Kailase Vasantaprabhavaha 6. Kautilyaneetihi 7. Shlokachamatkaraha 8. Shraddhatrayavibhagayogaha	45
2	Grammar 1. Identifying Namapadas/ Sarvanamapadas 2. Identifying Kriyapadas and Avyayas 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Shlokas	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Sentence Formation	15 of 20	15 x 1= 15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about Subhashitas, Itihasakavya, Mahakavya, Khandakavya, Bhagavadgeete etc. and the various Chandas used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sentence Formation, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas and Change of Voice.

Prescribed Textbook:

1. Padyachandrika, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) Subhashitha Rathna Bhandagaram - Enlarged and Re-edited with sources etc by Narayana Rama Acharya 'Kavyatirtha'
- (b) Subhasithagalu - Kannada Sahitya Parishath
2. Shreemad Bhagavathamahapurana - Bharatha darsana Prakasana
3. Megha Prathisandeshaha - Mandikal Ramashastry
4. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
- b) Shreemad Valmikiramayana - Bharatha darsana Prakasana
- c) Shreemad Valmikiramayana - Vidwan N Ranganatha Sharma
5. a) Kumarasambhavam - Mahakavyam of Mahakavi Kalidasa - Acharya Sesaraja Sarma Regmi
- b) Kumarasambhavam - Chaukhambha Sanskrit Granthamala
6. a) Chankya Neethi - Mahabala Seethalabhavi
- b) Complete Chanakya Neethi - Vishwanatha sharma and Igen B
7. Shreemad Bhagavadgeetha - Swamy Ramasukadas
8. Samskritha Vyakarana Sangraha - Vidwan Bailoor Narayana Thantri
9. Roopachandrika - Chaukhambha Sanskrit Pustakalaya

II Semester: BA, BSW, HRD, BVA		
Sanskrit Language Paper-2		
Title - Sanskrit Prose and Grammar		Maximum Marks: 100
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions 1. Taittiriyaopanishadi Jeevanamoulyam 2. Samudrollanghanam 3. Yaduvamsharajyaprapthi 4. Lobha Dukhasya Karanam 5. Shukacharitam 6. Mahashwetasantvanam 7. Anushasanaparva 8. Vyaktiparichayaha : Sri Shankaracharya, Sri Madhvacharya, Sri Ramanujacharya	45
2	Grammar 1. Karakaprakaranam 2. Correction of Sentence Errors 3. Identifying Sandhi 4. Identifying Samasas	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from Ramayana, Mahabharata, Upanishad, Panchatantra, Kadambari etc along with the life

histories of Sri Shankaracharya, Sri Madhwacharya, Sri Ramanujacharya are also introduced to enrich the imaginative and creative abilities of the students.

- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sandhis, Samasas, Karakas and Correction of Errors.

Prescribed Textbook:

1. Gadyachandrika, Published by Mangalore University Sanskrit Teachers Association

Reference books:

- | | | |
|----------------------------|---|---|
| 1. Upanishad Bhavadhare | - | Somanathananda |
| 2. Divyaramayanam | - | Swami Apoorvananda |
| 3. Yaduvamsharajyapraapthi | - | Jagguvakualabhushana |
| 4. Panchathantram | - | Vishnusharma |
| 5. a) Kadambari | - | Bannanje Govindacharya |
| b) Kadambari | - | Banabhatta |
| 6. Bharathasangraha | - | Lakshmanasoori |
| 7. Bharathiyadarsana | - | Dr K Krishnamurthy and N. Ranganatha Sharma |

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BCom		
Sanskrit Language Paper-1 Title – Sanskrit Poetry and Grammar Maximum Marks: 100		
1	Introduction to Sanskrit Poetry - Selected portions from Sanskrit Poetic Compositions 1. Sooktimuktavalihi 2. Satyaannasti Param Padam 3. Vidhuraneetihi 4. Kiraatarjuniyam 5. Indramanmathayohu Samvadaha 6. Srikrishnaleelaha 7. Chitrakavyam 8. Meghadhootam	45
2	Grammar 1. Identifying Namapadas/ Sarvanamapadas 2. Identifying Kriyapadas and Avyayas 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Shlokas	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Sentence Formation	15 of 20	15 x 1= 15

Learning Outcomes:

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Prescribed Textbook:

1. Padyaprasoonam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) Subhashitha Rathna Bhandagaram - Enlarged and Re-edited with sources etc by Narayana Rama Acharya 'Kavyatirtha'
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2. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
- b) Shreemad Valmikiramayana - Bharatha darsana Prakasana
- c) Shreemad Valmikiramayana - Vidwan N Ranganatha Sharma
3. Shreemanmahabharatha - Bharatha darsana Prakasana
4. a) Kiratarjuniyam of Mahakavi Bharavi - Acharya Sesaraja Sarma Regmi
- b) Kiratarjuniyam : Mallinatha Vyakhyasametham – G. Vishnumurthi Bhat
5. a) Kumarasambhavam- Mahakavyam of Mahakavi Kalidasa - Acharya Sesaraja Sarma Regmi
- b) Kumarasambhavam - Chaukhambha Sanskrit Granthamala
6. Shrikrishnakarnamrutham – Leelashukaha
7. a) Meghadootham Vyakhyasametham – Mangalore University Sanskrit Teacher's Association
- b) Meghadootham - Chaukhambha Sanskrit Granthamala
8. Samskritha Vyakarana Sangraha - Vidwan Bailoor Narayana Thantri
9. Roopachandrika - Chaukhambha Sanskrit Pustakalaya

II Semester: BCom		
Sanskrit Language Paper-2		
Title - Sanskrit Prose and Grammar		Maximum Marks: 100
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions 1. Dharmanushasanam 2. Jatayuprasangaha 3. Apareekshya Na Kartavyam 4. Gograhanam 5. Birabalatanasenayohu Pariksha 6. Kapinjalasyopadeshaha 7. Chikago Upanyasaha 8. Vyaktiparichayaha : Sri Shankaracharya, Sri Madhvacharya, Sri Ramanujacharya	45
2	Grammar 1. Karakaprakaranam 2. Correction of Sentence Errors 3. Identifying Sandhi 4. Identifying Samasas	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

Learning Outcomes:

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- This semester focuses on Sandhis, Samasas, Karakas and Correction of Errors.

Prescribed Textbook:

1. Gadyaprasoonam, Published by Mangalore University Sanskrit Teachers Association

Reference Books:

- | | | |
|-------------------------|---|--|
| 1. Upanishad Bhavadhare | - | Somanathananda |
| 2. Gadya Ramayanam | - | Shivadatha Thripatee |
| 3. Panchathantram | - | Vishnusharma |
| 4. Bharathasangraha | - | Lakshmanasoori |
| 5. a) Kadambari | - | Bannanje Govindacharya |
| b) Kadambari | - | Banabhatta |
| 6. Swami Vivekananda | - | Ramakrishnashrama |
| 7. Bharathiya Darshana | - | Dr. K Krishnamurthy and N. Ranganatha Sharma |

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC) LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BSc, BSc/FND, BHS, BFD, BID, BHM, BSA, BFT, BCS		
Sanskrit Language Paper-1 Title – Sanskrit Poetry and Grammar Maximum Marks: 100		
1	Introduction to Sanskrit Poetry - Selected portions from Sanskrit Poetic Compositions 1. Saduktikarnamrutam 2. Devaha Manusharoopena Charanti 3. Sandarshanam Lokaguroho Amogham 4. Meghasandeshaha 5. Parvatyaha Ugram Tapaha 6. Vidhuraneetihi 7. Chitrasamskrutam 8. Pajakavarnanam	45
2	Grammar 1. Identifying Namapadas/ Sarvanamapadas 2. Identifying Kriyapadas and Avyayas 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Shlokas	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Sentence Formation	15 of 20	15 x 1= 15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
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- This semester focuses on Sentence Formation, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas and Change of Voice.

Prescribed Textbook:

1. Padyavaibhavam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) Subhashitha Rathna Bhandagaram - Enlarged and Re-edited with sources etc by Narayana Rama Acharya 'Kavyatirtha'
- (b) Subhasithagalu - Kannada Sahitya Parishath
2. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
- b) Shreemad Valmikiramayana - Bharatha darsana Prakasana
- c) Shreemad Valmikiramayana - Vidwan N Ranganatha Sharma
3. a) Kiratarjuniyam of Mahakavi Bharavi - Acharya Sesaraja Sarma Regmi
- b) Kiratarjuniyam Mallinatha Vyakhyasametham – G. Vishnumurthi Bhat
4. Meghadoota- Ondu Haleya Kathe - M S Krishnamurthy
5. a) Kumarasambhava :Mahakavyam of Mahakavi Kalidasa - Acharya Sesaraja Sarma Regmi
- b) Kumarasambhavam - Chaukhambha Sanskrit Granthamala
6. a) Viduraneethi - Jagannath Shastri Hosinga and Anantharam Shastri Vethala
- b) Shreemanmahabharatha - Bharatha darsana Prakasana
- c) Viduraneethi - Dr. B.S. Ramakrishna Rao
7. Theerthaprabandha - Vyasanakere Prabhanjanacharya
8. Samskritha Vyakarana Sangraha - Vidwan Bailoor Narayana Thantri
9. Roopachandrika - Chaukhambha Sanskrit Pustakalaya

II Semester: BSc, BSc/FND, BHS, BFD, BID, BHM, BSA, BFT, BCS

Sanskrit Language Paper-2		
Title - Sanskrit Prose and Grammar		Maximum Marks: 100
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions 1. Snatakopadeshaha 2. Seetasvayamvaraha 3. Gadayuddham 4. Chandrabhoopatihi 5. Rajyashreepraptihi 6. Vineetaha Upamanyuhu 7. Shantiparva 8. Vyaktiparichayaha : Sri Shankaracharyaha, Sri Madhvacharyaha, Sri Ramanujacharyaha	45
2	Grammar 1. Karakaprakaranam 2. Correction of Sentence Errors 3. Identifying Sandhi 4. Identifying Samasas	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination

1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from Ramayana, Mahabharata, Upanishad, Panchatantra, Harshacharite etc along with the life histories of Sri Shankaracharya, Sri Madhwacharya, Sri Ramanujacharya are also introduced to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sandhis, Samasas, Karakas and Correction of Errors.

Prescribed Textbook:

1. Gadyavaibhavam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

- | | | |
|--|---|--|
| 1. Upanishad Bhavadhare | - | Somanathananda |
| 2. Gadya Ramayanam | - | Shivadatha Thripatee |
| 3. Gadya Bharatam | - | Shivadatha Thripatee |
| 4. Panchathantram | - | Vishnusharma |
| 5. Mahakavi Banabatta virachitam Harshacharitham | - | Shree Jaganatha Patakaha |
| 6. Bharathasangraha | - | Lakshmanasoori |
| 7. Shreemanmahabharatha | - | Bharatha darsana Prakasana |
| 8. Bharathiya Darshana | - | Dr. K Krishnamurthy and N. Ranganatha Sharma |
| 9. Samskritha Vyakarana Sangraha | - | Vidwan Bailoor Narayana Thantri |

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BBA		
Sanskrit Language Paper-1 Title – Sanskrit Poetry and Grammar		
		Maximum Marks: 100
1	Introduction to Sanskrit Poetry - Selected portions from Sanskrit Poetic Compositions 1. Subhashitani 2. Guhasamagamaha 3. Meghapratisandeshaha 4. Bhajagovindam 5. Kalidasasya Namrata 6. Chanakyaaneetihi 7. Anyoktayaha 8. Yakshaprashnaha	45
2	Grammar 1. Identifying Namapadas/ Sarvanamapadas 2. Identifying Kriyapadas and Avyayas 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Shlokas	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Sentence Formation	15 of 20	15 x 1= 15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about Subhashitas, Itihasakavya, Mahakavya, Khandakavya, Chanakyaneeeti, Bhajagovindam etc. and the various Chandas used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sentence Formation, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas and Change of Voice.

Prescribed Textbook:

1. Padyasopanam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. a) Subhashitha Rathna Bhandagaram - Enlarged and Re-edited with sources etc by Narayana Rama Acharya 'Kavyatirtha'
- b) Subhasithagalu - Kannada Sahitya Parishath
2. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
- b) Shreemad Valmikiramayana - Bharatha darsana Prakasana
- c) Shreemad Valmikiramayana - Vidwan N Ranganatha Sharma
3. Megha Prathisandesaha - Mandikal Ramashastry
4. Bhajagovindam - Chakravarthi Rajagopalacharya
5. a) Kumarasambhavam- Mahakavyam of Mahakavi Kalidasa - Acharya Sesaraja Sarma Regmi
- b) Kumarasambhavam - Chaukhambha Sanskrit Granthamala
6. a) Chankya Neethi - Dr. S. Hemalatha
- b) Chankya Neethi - Mahabala Seethalabhavi
- c) Complete Chanakya Neethi - Vishwanatha Sharma and Igen B
7. Shreemanmahabharatha - Bharatha darsana Prakasana
8. Samskritha Vyakarana Sangraha - Vidwan Bailoor Narayana Thantri
9. Roopachandrika - Chaukhambha Sanskrit Pustakalaya

II Semester: BBA		
Sanskrit Language Paper-2		
Title - Sanskrit Prose and Grammar		Maximum Marks: 100
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions 1. Dharmanushasanam 2. Sagarakatha 3. Saindhavarajagarvahanam 4. Upayam Chintayet Prajnaha Tatha Apayam Cha 5. Shalyaparva 6. Chanchalalakshmeehi 7. Vidyaya Vindate Amrutam 8. Vyaktiparichayaha : Sri Shankaracharyaha, Sri Madhvacharyaha, Sri Ramanujacharyaha	45
2	Grammar 1. Karakaprakaranam 2. Correction of Sentence Errors 3. Identifying Sandhi 4. Identifying Samasas	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari etc along with the life histories of Sri Shankaracharya, Sri Madhwacharya, Sri Ramanujacharya are also introduced to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sandhis, Samasas, Karakas and Correction of Errors.

Prescribed Textbook:

1. Gadyasopanam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

- | | | |
|----------------------------------|---|--|
| 1. Upanishad Bhavadhare | - | Somanathananda |
| 2. Gadya Ramayanam | - | Shivadatha Thripatee |
| 3. Gadya Bharatam | - | Shivadatha Thripatee |
| 4. Panchathantram | - | Vishnusharma |
| 5. Bharathasangraha | - | Lakshmanasoori |
| 6. a) Kadambari | - | Banabhatta |
| b) Banabhattana Kadambari | - | Bannanje Govindacharya |
| 7. Bharathiya Darshana | - | Dr. K Krishnamurthy and N. Ranganatha Sharma |
| 8. Samskritha Vyakarana Sangraha | - | Vidwan Bailoor Narayana Thantri |

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
LANGUAGES L+T
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER SCHEME 2021-22 ONWARDS

I Semester : BCA		
Sanskrit Language Paper-1 Title – Sanskrit Poetry and Grammar		
		Maximum Marks: 100
1	Introduction to Sanskrit Poetry - Selected portions from Sanskrit Poetic Compositions 1. Subhashitaswarasyam 2. Srisadashivanugraha 3. Sriramagunavarnanam 4. Upadeshashatakam 5. Dileepasimhasamvadaha 6. Viduropadishtani Moulyani 7. Chamatkarashlokaha 8. Bhaktiyogaha	45
2	Grammar 1. Identifying Namapadas/ Sarvanamapadas 2. Identifying Kriyapadas and Avyayas 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Shlokas	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Choosing the right Namapada/Sarvanamapada b) Choosing the right Kriyapada c) Change of Voice d) Sentence Formation	15 of 20	15 x 1= 15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about Subhashitas, Itihasakavya, Mahakavya, Khandakavya, Bhagavadgeete, Upadeshashataka, Bhagavatha Purana etc. and the various Chandas used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sentence Formation, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas and Change of Voice.

Prescribed Textbook:

1. Padyamouktikam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) Subhashitha Rathna Bhandagaram - Enlarged and Re-edited with sources etc by Narayana Rama Acharya 'Kavyatirtha'
- (b) Subhasithagalu - Kannada Sahitya Parishath
2. Shreemad Bhagavathamahapurana - Bharatha darsana Prakasana
3. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
- b) Shreemad Valmikiramayana - Bharatha darsana Prakasana
- c) Shreemad Valmikiramayana - N Ranganatha Sharma
4. Gumanikavivirachitam Upadeshashathakam - Translation and Explanation by T S Venkanayya
5. a) Raghuvamsa Mahakavyam - C Ramanathan
- b) Mahakavi Shree Kalidasa Virachitam Raghuvamsa Mahakavyam- Sahityacharyaha Shreehara Govinda Mishra
6. Shreemanmahabharatha - Bharatha darsana Prakasana
7. Shreemad Bhagavadgeetha - Swamy Ramasukadas

II Semester: BCA		
Sanskrit Language Paper-2		
Title - Sanskrit Prose and Grammar		Maximum Marks: 100
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions 1. Shishyopadeshaha 2. Lankapuridahanam 3. Pashupatastrasampadanam 4. Mandookaha Sarpamadhirohanti 5. Swargarohanaparva 6. Harisharmakatha 7. Shukanasopadeshaha 8. Vyaktiparichayaha : Sri Shankaracharyaha, Sri Madhvacharyaha, Sri Ramanujacharyaha	45
2	Grammar 1. Karakaprakaranam 2. Correction of Sentence Errors 3. Identifying Sandhi 4. Identifying Samasas	15
3	Internal Assessment Tests, Seminars, Assignments	40
4	Teaching hours/week – 4 Total Teaching Hours - 56 CREDITS – 3	

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	4 of 6	4X3=12
3	Essay Type Questions	4 of 6	4X5=20
4	Short notes (To be answered in Sanskrit only)	1 of 3	1X3=03
5	Grammar (To be answered in Sanskrit only) a) Identification of Karakas b) Correction of Sentence Errors c) Identification of Sandhi d) Identifying of Samasa	15 of 20	15 x 1=15

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari, Hitopadesha etc along with the life histories of Sri Shankaracharya, Sri Madhwacharya, Sri Ramanujacharya are also introduced to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, wherein students are trained to speak and write in Sanskrit without errors.
- This semester focuses on Sandhis, Samasas, Karakas and Correction of Errors.

Prescribed Textbook:

1. Gadyamouktikam, Published by Mangalore University Sanskrit Teachers Association

Reference books:

- | | | |
|----------------------------------|---|--|
| 1. Upanishad Bhavadhare | - | Somanathananda |
| 2. Gadya Ramayanam | - | Shivadatha Thripatee |
| 3. Gadya Bharatam | - | Shivadatha Thripatee |
| 4. Panchathantram | - | Vishnusharma |
| 5. Bharathasangraha | - | Lakshmanasoori |
| 6. Harisharmakatha | - | Somadevana Kathasarithsagara |
| 7. a) Kadambari | - | Banabhatta |
| b) Banabhattana Kadambari | - | Bannanje Govindacharya |
| 8. Bharathiya Darshana | - | Dr. K Krishnamurthy and N. Ranganatha Sharma |
| 9. Samskritha Vyakarana Sangraha | - | Vidwan Bailoor Narayana Thantri |

Dr. Nagaraj B,
Chairperson BOS,
Mangalore University, Konaje

MANGALORE UNIVERSITY

**COURSE PATTERN AND SCHEME OF EXAMINATION FOR ALL UG
COURSES AS PER NEP -2020**

SUB: LANGUAGE SANSKRIT

ABILITY ENHANCEMENT COMPULSORY COURSE

**COURSE PATTERN AND SCHEME FRAMED UNDER NATIONAL
EDUCATION POLICY-2020**

I and II Semesters

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199**

Course Pattern and Scheme of Examination for all UG Courses as per NEP 2020

(2021-22 and onwards)

Subject : Language Sanskrit

Sl. No.	Se me ster	Title of the Paper	Teachi ng hours L+T	Hours Per week	Examination Pattern Max/Min Marks			Duration of Exam	Total marks	Credits
					Theory		I.A			
					Max	Min				
1	I	Sanskrit Poetry and Grammar	56	4	60	21	40	3 Hours	100	3
2	II	Sanskrit Prose Literature and Grammar	56	4	60	21	40	3 Hours	100	3

Ability enhancement Compulsory course (AECC) and Open Elective (OE)

Scheme of Internal Assessment Marks : Theory

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
TOTAL Theory IA Marks		40

Dr. Nagaraj B
Chairperson BOS

MANGALORE UNIVERSITY

DISCIPLINE ELECTIVE/OPEN ELECTIVE

Three credits each

UNDER GRADUATE

BA/B.Sc/B.Com/BSW/BCA/BBA

Syllabus framed under National Education policy-2020

SYLLABUS

For the year 2021-2022 and onwards

Discipline Electives/

Open electives for all UG Courses

I & II SEMESTERS

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI – 574199.**

MANGALORE UNIVERSITY
NATIONAL EDUCATION POLICY 2020
Discipline Elective / Open Elective Courses in Sanskrit
I Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses
Title: Samskruta Bhasha Parichaya tatha Kathasahitya

Semester	Discipline Elective (DSE) / Open Elective (OE) –OE-1 (3) Credits	Marks	Credits
I	Samskruta Bhasha Parichaya tatha Kathasahitya 1. Samskruta Bhasha Parichyaha 2. Samhathihi Karyasadhika – Panchathantram 3. Ouchityaprajna tatha Sanmitrata 4. Puranalokasya Balakou 5. Pratyutpannamatitvam	60	3
	Continuous Evaluation: Assignment, Internal Test, Creative Writing	40	
	Total Teaching hours/week – 3 Total Teaching Hours - 42	100	3

Scheme of Examination

1. Multiple choice question	15 of 20	15x1=15
2. Essay type Question	3 of 5	3x8=24
3. Question Formation	5 of 8	5x1=05
4. Match the Following		5x1=05
5. Fill in the blanks	5 of 7	5x1=05
6. Translation –From Sanskrit to Kannada / English	6 of 7	1x6=06

Learning Outcomes:

- This course aims to get the students acquainted with Sanskrit Language.
- Students who do not have any knowledge about Sanskrit would also be able to learn the language from scratch and understand.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language.

Books for study & Reference:

- | | | |
|----------------------------|---|---|
| 1. Sanskruthabhashadeepika | - | Shrisurasaraswati Sabha Sringeri |
| 2. Panchathantram | - | Vishnusharma |
| 3. Upanishad Bhavadhare | - | Sri Somanathananda |
| 4. Vijnanaprasoonam | - | Mangalore University Sanskrit Teachers' Association |
| 5. Nirvahanasopanam | - | Mangalore University Sanskrit Teachers' Association |

Discipline Elective / Open Elective Courses in Sanskrit
II Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG
Courses Title: Vyavaharika Samskrutam tatha Jeevanamoulyani
(Functional Sanskrit and Moral Values)

Semester	Discipline Elective (DSE) / Open Elective (OE) –OE-1 (3) Credits	Marks	Credits
I	Vyavaharika Samskrutam 1. Introduction to reading, writing and speaking skills in Sanskrit 2. Upadeshashatakam (15 Shlokas) 3. Sugreevasakhyam (25 Shlokas) 4. Dinacharya	60	3
	Continuous Evaluation: Assignment, Internal Test, Creative Writing, Conversation in Sanskrit	40	
	Total Teaching hours/week -3 Total Teaching Hours - 42	100	3

Scheme of Examination

1. Multiple choice question	15 of 20	15x1=15
2. Essay type Question	3 of 5	3x8=24
3. Question Formation	5 of 8	5x1=05
4. Match the Following		5x1=05
5. Fill in the blanks	5 of 7	5x1=05
6. Translation –From Sanskrit to Kannada / English	6 of 7	1x6=06

Learning Outcomes:

- This course aims to get the students acquainted with Sanskrit Language.
- The course also seeks to help the students communicate fluently in Sanskrit.
- Students who do not have any knowledge about Sanskrit would also be able to learn the language from scratch and understand.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.

Books for study & Reference:

1. a) Samskrutaswadhyayaha Prathama Deeksha Sambhashanam – Edited by Vempati Kutumbashastri, published by Rashtriya Samskruta Samsthanam, New Delhi
b) Vyavaharasaahasri – Samskruta Bharathi
2. a) The Ramayana of Valmiki - Wasdev Laxman Sastri Pansikar
b) Shreemad Valmikiramayanaam - Bharatha darsana Prakasana
c) Shreemad Valmikiramayanaam - Vidwan N Ranganatha Sharma
3. Vijnanaprasoonam - Mangalore University Sanskrit Teachers' Association
4. Astangahrudayam - Vagbhatacharyaha

MANGALORE UNIVERSITY

DISCIPLINE CORE COURSE

Three credits each

UNDER GRADUATE

BA (Basic/Hons.)

(for subjects without practicals with two major)

Syllabus framed under National Education policy-2020

SYLLABUS

For the year 2021-2022 and onwards

I & II SEMESTERS

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199**

Discipline Core Course in Sanskrit/ Discipline Elective/ Open Elective

I Semester Bachelor of Arts (Basic/ Hons.)

(for subjects without practicals with two major)

B.A. (With Sanskrit major)

Discipline Core (DSC) (L+T+P)	Max Marks		Discipline Elective (DSE) / Open Elective (OE)	Max Marks	
	Theory	IA		Theory	IA
Gadyakavyam C1(3)- Classical Sanskrit Literature Candraapeeda Digvijaya Total Hours/Week – 3 Total Teaching Hours - 42	60	40	OE-1 (3) Sanskrita Bhasha Parichaya tatha Kathasahitya	60	40
Padyakavyam C2(3)- Raghuvamsha 6th Canto of Kalidasa Total Hours/Week – 3 Total Teaching Hours - 42	60	40			

Scheme of Examination			
1	Translation and Explanation of Gadya	2 of 3	2X5=10
2	Reference to context	5 of 7	5X3=15
3	Essay Type Questions	2 of 4	2X8=16
4	Short notes (To be answered in Sanskrit only)	2 of 3	2X3=06
5	Short notes in Kannada	2 of 3	2X4=08
6	One Mark Questions	5 of 8	5X1=05
	Total Marks		60

Scheme of Internal Assessment Marks

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
Total IA Marks		40

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry and Classical Sanskrit Prose Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from Bana's Kadambari is introduced which enables the students study in depth about Sanskrit Literature.
- This course also helps students get to know about Mahakavyas, Kalidasa and Raghuvamsha, and the various Alankaras, Chandas used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language.

Books for study & Reference:

1. History of Sanskrit Litreture - Krishnamacharya
2. Chandrapeedadigvijayaha - Dr. T.S.Krishnamoorthy
3. Kadambari of Bana - M.R.Kale
4. Samskritha Kavi Charithre - Sampath Ayyangar
5. Samskritha Sahitya Ithihasa - Baladevananda Upadhyaya; translated by Ramachandra Shastri
6. Bhashashastra mattu Samskritha Sahitya Charithre - Dr. K Krishnamurthy, Vidwan Ranganath Sharma and Siddalingayya
7. a) Raghuvamsa Mahakavyam - C Ramanathan
b) Mahakavi Shree Kalidasa Virachitam Raghuvamsa Mahakavyam- Sahityacharyaha Shreehara Govinda Mishraha

Discipline Core Course in Sanskrit/ Discipline Elective/ Open Elective

II Semester Bachelor of Arts (Basic/ Hons.)

(for subjects without practicals with two major)

B.A. (With Sanskrit major)

Discipline Core (DSC) (L+T+P)	Max Marks		Discipline Elective(DSE) / Open Elective (OE)	Max Marks	
	Theory	IA		Theory	IA
C3 (3)- Champookavyam Introduction of Champoo Literature Champooramayanam - Balakandam Total Hours/Week – 3 Total Teaching Hours - 42	60	40	OE-1 (3) Vyavaharika Samskrutam tatha Jeevanamoulyani	60	40
C4 (3)-Natakam History of Sanskrit Drama Bhasavirachitam Swapnavasavadattam Total Hours/Week – 3 Total Teaching Hours - 42	60	40			

Scheme of Examination			
1	Translation and Explanation of Gadya/Shloka	2 of 3	2X5=10
2	Reference to context	5 of 7	5X3=15
3	Essay Type Questions	2 of 4	2X8=16
4	Short notes (To be answered in Sanskrit only)	2 of 3	2X3=06
5	Short notes in Kannada	2 of 3	2X4=08
6	One Mark Questions	5 of 8	5X1=05
	Total Marks		60

Scheme of Internal Assessment Marks

Sl. No.	Particulars	IA Marks
1	Internal Tests , Assignments, Seminars	40
Total IA Marks		40

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from Champuramayana is introduced which enables the students study in depth about Champu Kavyas in Sanskrit Literature. Champu Kavyas are a beautiful blend of Prose and Poetry in Sanskrit Literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values.
- This course also helps students get to know about Classical Sanskrit Dramas, Bhasa and Swapnavasavadatta. Popular Classic Dramas in Sanskrit Literature not only reflect Prose and Poetic excellence, but the students also learn the theoretical aspects related to the production of the play. The concepts like Rasa, Bhava, Abhinaya are blended into the teaching- learning of the play.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language.

Books for study & Reference:

- | | | |
|---|---|--|
| 1. Bhashashastra mattu Samskritha Sahitya Charithre | - | Dr. K Krishnamurthy,
Vidwan Ranganath Sharma
and Siddalingayya |
| 2. Champoo Ramayanam | - | Chaukhambha Sanskrit
Granthamala |
| 3. Champoo Ramayanam | - | Dr. Mahesh Adakoli |
| 4. Bhasanatakachakram | - | Baladevananada Upadhyaya |
| 5. Swapnavasavadatam | - | Dr K Krishnamoorthy
Dr B R Modaka
Dr D N Shanbaga |
| 6. Samskruta Nataka | - | A.R.Krishnashastry |
| 7. History of Sanskrit Drama | - | A.B.Keith |
| 8. Sanskrit Drama | - | S.R.Leela |

Dr. Nagaraj B,
Chairperson BOS,
Mangalore University, Konaje

MANGALORE UNIVERSITY

SKILL ENHANCEMENT COURSE (SEC)

Two credits each

UNDER GRADUATE

BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses

Syllabus framed under National Education policy-2020

SYLLABUS

For the year 2021-2022 and onwards

I & II SEMESTERS

**BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTRI - 574199**

I Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG
Courses Title: Digital fluency – Sanskrit's Computer literacy

Semester	Topics	Marks	Credits
I	1. Digital fluency –Sanskrit's Computer literacy 2. Basic Computer Skills in Sanskrit/Conversation in Sanskrit 3. Devanagari (Sanskrit) typing	30	2
	Continuous Evaluation: Assignment, Internal Test, Creative Writing, Conversation in Sanskrit	20	
	Total Teaching hours/week -2 Total Teaching Hours - 28	50	2

Learning Outcomes:

- This course aims to get the students acquainted with Digital Fluency in Sanskrit.
- It intends to give an understanding of Sanskrit Devanagari typing, enabling the students type easily in Sanskrit which would also help students learn typing in other Indian Languages.
- The course also seeks to help the students communicate fluently in Sanskrit.

Reference:

Digital resources: www.archieve.org or <https://www.wikipedia.org>

II Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses

Title: Health & wellness/social & emotional learning/yoga and Ayurveda

Semester	Topics	Marks	Credits
II	1. Astangayogaha 2. Dinacharya 3. Ayurvedasubhashithani	30	2
	Continuous Evaluation: Assignment, Internal Test, Creative Writing, Conversation in Sanskrit	20	
	Total Teaching hours/week -2 Total Teaching Hours - 28	50	2

Learning Outcomes:

- This course aims to get the students acquainted with Health and Wellness concepts depicted in Sanskrit Language.
- Excerpts from Patanjali's Yogashastra, Vagbata's Ashtangahrudaya and Ayurveda Subhashitas from Charaka and Sushruta are introduced which enables students to understand concepts like Yoga and Ayurveda depicted in the mentioned texts.
- The study of this course helps students incorporate the learnings from these texts and in turn maintain good health and increase concentration. This ensures the overall well-being of an individual.

Reference:

- | | | |
|-----------------------------------|---|------------------------------|
| 1. Vaidyakiya Subhashitha Sahitya | – | Dr. Bhaskar Govinda Ghanekar |
| 2. Pathanjalayogadarshanam | – | Swamy Adidevananda |
| 3. Astangahradayam | - | Vagbhatacharyaya |



**Department of
Post Graduate Studies and Research in Sociology**

**Curriculum Content
For
Sociology**

**Under
New Education Policy-2020**

October 2021

**Board of Studies in Sociology (UG) Members
and Syllabus Committee**

Chairman:

Prof. Vinay Rajath, D. Department of Sociology, Mangalore University

Members:

Dr Giridhar Rao M. Principal, Govt. First Grade College, Mudipu.

Dr Shreemani, Principal, Vijaya College, Mulki.

Invited Honourary Members:

Dr Sridhara P., Principal, Govt. First Grade College, Puttur.

Dr Rajendra K., Dr G Shankar Govt. First Grade Women's College,
Udupi.

Adapted from the Model Curriculum Content for Sociology
Prepared by
Sociology Subject Expert Committee

Content

Sl No	Course Code	Course	Page
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ii		Programme Objectives and Outcomes	6
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iv		Course Evaluation – question paper pattern	9
		Semester I	
1	BASOC-DSC 101	Understanding Sociology	11
2	BASOC-DSC 102	Changing Social Institutions in India	13
3	BASOC-DOE 103	Indian Society: Continuity and Change	15
4	BASOC-DOE 104	Sociology of Everyday Life	17
		Semester II	
5	BASOC-DSC 151	Foundations of Sociological Theory	19
6	BASOC-DSC 152	Sociology of Rural Life in India	21
7	BASOC-DOE 153	Society through Gender Lens	23
8	BASOC-DOE 154	Social Development in India	25
		Semester III	
7	BASOC-DSC 201	Social Stratification and Mobility	
8	BASOC-DSC 202	Sociology of Urban Life in India	
9	BASOC-DOE 203	Sociology of Youth	
10	BASOC-DOE 204	Sociology of Tourism Management	
		Semester IV	
11	BASOC-DSC 251	Sociology of Marginalized Groups	
12	BASOC-DSC 252	Population and Society	
13	BASOC-DOE 253	Sociology of Leisure	
14	BASOC-DOE 254	Sociology of Food Culture	
		Semester V	
15	BASOC-DSC 301	Modern Sociological Theories	
16	BASOC-DSC 302	Gender and Society	
17	BASOC-DVC 303	Corporate Social Responsibility	
		Semester VI	
18	BASOC-DSC 351	Perspectives on Indian Society	
19	BASOC-DSC 352	Sociology of Ageing	
20	BASOC-DVC 353	Social Service Counseling	
21	BASOC-DIS 354	Internship	
		Semester VII	
22	BASOC-DSC 401	Contemporary Sociological Theories	
23	BASOC-DSC 402	Methods in Social Research	

24	BASOC-DSC 403	Sociology of Health	
25	BASOC-DSE 404	Sociology of Entrepreneurship	
26	BASOC-DSE 405	Human Resource Development	
27	BASOC-DVC 406	Digital Skills for Social Sciences	
28	BASOC-DRM 407	Research Methods	
		Semester VIII	
29	BASOC-DSC 451	Post Modern Social Theories	
30	BASOC-DSC 452	Social Statistics and Computer Application	
31	BASOC-DSC 453	Society in Karnataka	
32	BASOC-DSE 454	Society, Science and Technology	
33	BASOC-DSE 455	Industrial Sociology	
34	BASOC-DVC 456	Social Interventions in Health Care and Hospital Management	
35	Project		
36	BASOC-DSE 457	Sociology of Religion	
37	BASOC-DSE 458	Social Policy and Planning	
38	BASOC-DSE 459	Society and Media	
39	BASOC-DSE 460	Environment Sociology	

(A2) Model Programme Structure for Bachelor of Arts (Basic/Hons.) Programme (2Majors subjects without practical)

Sem.	Discipline Core (DSC)(Credits) (L+T+P)	DisciplineElective(DS E) /Open Elective (OE) (Credits) (L+T+P)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits)(L+T+P)		Skill Enhancement Courses (SEC)			Total Credits
					Skill based (Credits) (L+T+P)	Value based (Credits) (L+T+P)		
I	DSC A1(3), A 2(3) DSC B1(3), B 2(3)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs each)		SEC-1 (2)(1+0+2)	Yoga (1) (0+0+2)	Health & Wellness (1) (0+0+2)	25
II	DSC A 3(3), A 4(3) DSC B 3(3), B 4(3)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs each)	Environmental Studies (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
Exit option with Certificate (48 credits)								
III	DSC A 5(3), A 6(3) DSC B 5(3 B 6(3)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs. each)		SEC-2 (2)(1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G/ Cultural (1) (0+0+2)	25
IV	DSC A 7(3), A 8(3) DSC B 7(3), B 8(3)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs. each)	Constitution of India (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
Exit option with Diploma in Arts (96 credits)								
V	DSC A 9(4), A 10(4) DSC B 9(4), B 10(4)	Vocational-1 (3)			SEC-3 (1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	23
VI	DSC A 11(4), A 12(4) DSC B 11(4), B 12(4)	Vocational-2 (3) Internship (2)			SEC-4 (2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
Exit with Bachelor of Degree (140 credits)								
VII	DSC A/B 13(4) DSC A/B 14(4) DSC A/B 15(4)	DSC E-1(3) Vocational-3 (3) Res. Methodology (3)						21
VIII	DSC A/B 16(3) DSC A/B 17(3) DSC A/B 18(3)	DSC E-2(3) Vocational-4 (3) Research Project (6)* [DSC E-3(3)*, E-4(3)]*						21
Award of Bachelor of Degree with Honours, B.A. (Hons.) 180 credits)								

*In lieu of the research Project, two additional elective papers/ Internship may be offered.

General Objectives of the Programme:

1. To introduce the students to the basic concepts and processes in sociology to understand the social life.
2. To equip the students with updated sociological knowledge pertaining to various sub-fields within the discipline of sociology.
3. To orient the students for comprehending sociological perspectives.
4. Analyzing and critically assessing the social reality.
5. Prepare students for various competitive examinations.
6. To inculcate the research aptitude and relevant skills in the students useful for their professional life.
7. To prepare the students for undertaking research, jobs in Colleges/Universities/ Research Institutions, various Government Departments and Non-governmental organizations.
8. To prepare the students for undertaking income earning jobs in organizations and agencies.
9. Continuous education in various special fields of Sociology.
10. Need based curricula and teaching to develop aptitude and skills.

Programme Outcome: Progressive Certificate, Diploma, Bachelor Degree, Bachelor Degree with Honours or Master's Degree in Sociology

The programme in Sociology is to prepare the candidate to equip the employability skills and to acquire comprehensive knowledge on human life and social analysis leading expertise in Sociology. The curricula are prepared with programme specific outcomes:

- | | |
|--------|---|
| PSO 1 | Relevance of sociology in the present society. |
| PSO 2 | Strengthens in the core areas of Sociological thinking. |
| PSO 3 | Exposure to students on special and new streams in Sociology. |
| PSO 4 | Employability skills for efficient service in Govt departments, |
| PSO 5 | Skills to work with research groups, and Market research firms. |
| PSO 6 | Serve in Development agencies, |
| PSO 7 | Teaching - Universities and colleges. |
| PSO 8 | Work with Legal firms and correction centres |
| PSO 9 | Take up independent choice as entrepreneurs. |
| PSO 10 | Equipped with skills to face the social reality confidently. |
| PSO 11 | Field work research through Project Work |
| PSO 12 | Job orientation in Community work: as social and community worker. |
| PSO 13 | Skill for Survey Designer, Research, Data Analyst and Social Statistician. |
| PSO 14 | Prepared to work as Development and Health researcher and Social entrepreneur |

Sociology CBCS Scheme: 2021-22 Onwards

Course Scheme							
Course Code	Course	Instruction Hrs./ Wk/Sem	Exam Hrs	Marks Final Exam	IA	Total Marks	Credit
Semester I							
BASOC-DSC 101	Understanding Sociology	3/42	3	60	40	100	3
BASOC-DSC 102	Changing Social Institutions in India	3/42	3	60	40	100	3
BASOC-DOE 103	Indian Society: Continuity and Change	3/42	3	60	40	100	3
BASOC-DOE 104	Sociology of EverydayLife	3/42	3	60	40	100	3
Semester II							
BASOC-DSC 151	Foundations of Sociological Theory	3/42	3	60	40	100	3
BASOC-DSC 152	Sociology of Rural Life in India	3/42	3	60	40	100	3
BASOC-DOE 153	Society through Gender Lens	3/42	3	60	40	100	3
BASOC-DOE 154	Social Development in India	3/42	3	60	40	100	3
Semester III							
BASOC-DSC 201	Social Stratification and Mobility	3/42	3	60	40	100	3
BASOC-DSC 202	Sociology of Urban Life in India	3/42	3	60	40	100	3
BASOC-DOE 203	Sociology of Youth	3/42	3	60	40	100	3
BASOC-DOE 204	Sociology of Tourism Management	3/42	3	60	40	100	3
Semester IV							
BASOC-DSC 251	Sociology of Marginalized Groups	3/42	3	60	40	100	3
BASOC-DSC 252	Population and Society	3/42	3	60	40	100	3
BASOC-DOE 253	Sociology of Leisure	3/42	3	60	40	100	3
BASOC-DOE 254	Sociology of Food Culture	3/42	3	60	40	100	3
V Semester							
BASOC-DSC 301	Modern Sociological Theories	4/56	3	60	40	100	4
BASOC-DSC 302	Gender and Society	4/56	3	60	40	100	4
BASOC-DVC 303	Corporate Social Responsibility	3/42	3	60	40	100	3

VI Semester							
BASOC-DSC 351	Perspectives on Indian Society	4/56	3	60	40	100	4
BASOC-DSC 352	Sociology of Ageing	4/56	3	60	40	100	4
BASOC-DVC 353	Social Service Counseling	3/42	3	60	40	100	3
BASOC-DIS 354	Internship	2/28	3	60	40	100	2
VII Semester							
BASOC-DSC 401	Contemporary Sociological Theories	4/56	3	60	40	100	4
BASOC-DSC 402	Methods in Social Research	4/56	3	60	40	100	4
BASOC-DSC 403	Sociology of Health	4/56	3	60	40	100	4
BASOC-DSE 404	Sociology of Entrepreneurship	3/42	3	60	40	100	3
BASOC-DSE 405	Human Resource Development	3/42	3	60	40	100	3
BASOC-DVC 406	Digital Skills for Social Sciences	3/42	3	60	40	100	3
BASOC-DRM 407	Research Methods	3/42	3	60	40	100	3
VIII Semester							
BASOC-DSC 451	Post Modern Social Theories	3/42	3	60	40	100	3
BASOC-DSC 452	Social Statistics and Computer Application	3/42	3	60	40	100	3
BASOC-DSC 453	Society in Karnataka	3/42	3	60	40	100	3
BASOC-DSE 454	Society, Science and Technology	3/42	3	60	40	100	3
BASOC-DSE 455	Industrial Sociology	3/42	3	60	40	100	3
BASOC-DVC 456	Social Interventions in Health Care and Hospital Management	3/42	3	60	40	100	3
Project	In lieu of project* any two						6
BASOC-DSE 457*	Sociology of Religion	3/42	3	60	40	100	3
BASOC-DSE 458*	Social Policy and Planning	3/42	3	60	40	100	3
BASOC-DSE 459*	Society and Media	3/42	3	60	40	100	3
BASOC-DSE 460*	Environment Sociology	3/42	3	60	40	100	3

Evaluation of the course consists of

1. Theory exam for 3 hours duration for 60 marks
2. Internal Formative Continuous Assessment for 40 marks
 - a. 20 marks for 2 written Internal Assessment Exams
 - b. 20 marks for 2 Activities

Pedagogy: Class Lecture, Group discussions, Role play, Micro Project, Field Visits

Internal Assessment:

The internal assessment marks for a course shall be based on two tests and two activities of 10 marks each. The test shall be of at least one hour duration. The total marks of the tests and activities shall be taken as the internal assessment marks. Any two activities may be selected from the list of the activities given below or the concerned department may choose an activity that is appropriate to the course and the local relevance.

Item	Test 1	Test 2	Activity 1	Activity 2	Total
Score	10	10	10	10	40

List of Activities:

1. Assignment and presentation.
2. Seminar presentation on the assigned topic
3. Field study and report.
4. Interview and submit the report
5. Role play
6. Collage preparation
7. Visit to the local village
8. Visit to the welfare or correction institutions
9. Group discussion

For more details and activities refer 'Model Curriculum Content for Sociology'
(not attached to this document)

Question Paper Pattern

Time: 3 Hrs

Max. Marks - 60

(Title of the Course)

Note : Answer all Sections

I. Answer any FIVE questions in 2-3 sentences each (2x5=10)

1. Q.
2. Q.
3. Q.
4. Q.
5. Q.
6. Q.
7. Q.

II. Answer any Four questions in 10-12 sentences each (5x4=20)

1. Q.
2. Q.
3. Q.
4. Q.
5. Q.
6. Q.
7. Q.

III. Answer any THREE in 20-25 sentences each (10x3=30)

1. Q.
2. Q.
3. Q.
4. Q.
5. Q.

Sd/-
Dr. Rajendra K.

Sd/-
Dr Sridhara P.

Sd/-
Dr. Giridhar Rao M.

Sd/-
Dr. Shreemani.

Sd/-
Dr. Vinay Rajath D.
(Chairman)

Semester 1

BASOC-DSC101 Understanding Sociology

Course Objectives: this course will help the students

- 1 To understand the basic concepts in Sociology
- 2 To study the relationship between sociology and other social sciences
- 3 To study the deferent branches of sociology
- 4 To understand the process of socialization and its importance
- 5 Understand the linkage between the social changes in the economic and social systems and the emergence of discipline of Sociology.
- 6 Know the theoretical foundations of Sociology on which edifice of modern Sociological theories are built.
- 7 Learn the historical, socio-economic and intellectual forces in the rise of sociological theory.
- 8 Understand the sociological thinking of the founders of Sociology.

Course Outcome:

- CO1. Understand the emergence and foundations of Sociology
- CO2. Understand the contributions of early sociologists.
- CO3. Impart critical thinking to interpret the social scenario.
- CO4. Understand the perspectives and forces in the rise of sociological theory.
- CO5. Understand the concepts of early sociologists
- CO6. Understand the nature and role of Sociology in a changing world
- CO7. Comprehend the uniqueness of sociological imagination in the study of society

Course Content:

Unit –I Foundation of Sociology

14 Hrs

- a. Definitions, and Scope of Sociology
- b. Emergence of sociology as a discipline – enlightenment, industrial revolution, French revolution, growth of other social sciences.
- c. Importance of the Study of Sociology

Unit–II Sociology as Science

14Hrs

- a. Foci of Sociology: Social Institutions, Social Inequality and Social Change
- b. Sociological Perspectives: Functionalist, Conflict, Symbolic Interactionist, Feminist
- c. Social Construction of Reality; Sociological Eye (Randall Collins), Sociological Imagination (C Wright Mills)

Unit – III Culture and Socialization

14 Hrs

- a. Characteristics, Elements and Types of Culture
- b. Meaning, Agencies and Importance of Socialization
- c. Theories of Socialization : C.H. Cooley and G.H. Mead

References

- Berger, P L 1963, *Invitation to Sociology: A Humanistic Perspective*, Doubleday, Garden City, N.Y
- Bottomore T.B., 1971. *Sociology - A guide to problems and literature*. Delhi: Blackie and Sons.
- Bruce, Steve, 2018, *Sociology: A Very Short Introduction*, 2nd edition, OUP, New York
- Corrigall-Brown, Catherine 2020, *Imagining Sociology: An Introduction with Readings*, 2nd Edition, Oxford University Press, Canada
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- Ferris, Kerry and Jill Stein, 2018, *The Real World: An Introduction to Sociology*, 6th Edition, W W Norton, New York
- Giddens, A and Philip W Sutton, 2013, *Sociology*, 7th edition, Wiley India. New Delhi.
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- Lemert, Charles. 2012, *Social Things: An Introduction to the Sociological Life*, Rowman and Littlefield Publishers, Maryland
- Macionis, John 2018, *Sociology*. Global Edition, Pearson, England
- Pais, Richard (Ed.) 2008, *Principles of Sociology*, Mangalore, Mangala Publications.
- Tumin Melvin M. 1994. *Social Stratification - The forms and functions of inequality*, New Delhi: Prentice-Hall of India, Private Ltd.

BASOC-DSC102 Changing Social Institutions in India

Course Objectives: This course will help the students

- 1 To understand the basic social institutions
- 2 To study the relevance of social institutions
- 3 To study the concept of social change and its dynamics
- 4 To understand the process of social change and its factors
- 5 To study the nature of inequalities in the society
- 6 The forms of social stratification in India and their dynamics
- 7 To understand the dynamics of social groupings and discrimination
- 8 To learn the ideologies behind social stratification and mobility

Course Outcome:

- CO1. Understand the nature of inequalities in the society
- CO2. Learn the dynamics of social groupings and discrimination
- CO3. Understand the ideologies behind social stratification and mobility.
- CO4. The modes of social improvement people use
- CO5. Assess the reservation policy and its implications.
- CO6. Learn the nature of social mobility
- CO7. Identify the new forms taken by institutions of family and marriage
- CO8. Undertake micro research work and communicate effectively

Course Content:

Unit – 1 Family and Marriage

14 Hrs

- a. Family - Changing structure of family; changes in size and composition; care giving of children and elderly
- b. Democratization of relationships: between spouses, parent-children; step-parenting
- c. Marriage - changing patterns of marital relations - separation, divorce and remarriage
- d. Changes in age of marriage, regional variations and choice of mate selection

Unit – 2 Religion and Education

14 Hrs

- a. Religion: Religion in modern society and secularization
- b. Challenges to religious freedom and state control
- c. Education: types of education - formal and informal;
- d. Education and Employability; social categories and equal opportunity in education

Unit – 3 Economic and Political Institutions

14 Hrs

- a. Work; Gender division of work and feminization of labour.
- b. Job opportunities and Unemployment; Technology and job insecurity.
- c. Political Institution, Government and State; Democracy in India
- d. Challenges: Militancy, Fundamentalism, Regionalism

Reference

- Berger, P L 1963, Invitation to Sociology: A Humanistic Perspective, Doubleday, Garden City, N.Y
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- Worsley, Peter (ed), 1992. The New Introduction to Sociology. London: Penguin Books.
- Young, Kimbal & Mack R.W. 1969. Systematic Sociology. New Delhi: Eurasia Publication House.

BASOC-DOE103 Indian Society: Continuity and Change

Objectives:

The course seeks to

1. Go beyond the commonsense understanding of the prevailing social issues and problems
2. Focus on the structural linkages and interrelationships.
3. Sensitize to the emerging social issues of contemporary India.
4. Acquire sociological understanding of social issues and problems
5. Empower to serve as change agents both in governmental and non-governmental organizations
6. Gain a better understanding of their own situation and region.
7. Analyse the nature and direction of change in Indian society
8. Examine the changing conditions of socially excluded groups through movement for social justice

Course Outcome:

- CO1. Understand social issues and problems of contemporary India.
- CO2. Change agents - governmental and non-governmental organizations.
- CO3. Structural linkages and interrelationships of social issues.
- CO4. Emerging social issues and problems of contemporary India,
- CO5. Sociological understanding of issues and problems
- CO6. Empower to deal with issues and problems
- CO7. Better understanding of their own situation and region.

Course Content:

Unit – 1 Social Change in India	14 Hrs
<ul style="list-style-type: none">a. Nature of Change in Indian Societyb. Changing Social Institutions: Family, Caste, Polity and Economyc. Rural-Urban links: Infrastructure, Education, Health	
Unit – 2 Social Movements for Social Justice	14 Hrs
<ul style="list-style-type: none">a. Backward Classes and Dalit Movementsb. New Social Movements: LGBTQ and Anticorruption Movementsc. Women empowerment movements	
Unit – 3 India in the Globalisation Era	14 Hrs
<ul style="list-style-type: none">a. Impact on Food Habits, Language, Ideas and Life Stylesb. Changing Social Values: Impact on Youth and their World View,c. Impact on Family Relationships and norms	

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BASOC-DOE104 Sociology of Everyday Life

Course Objectives:

This course will help the students

- 1 To understand the basic concepts in Sociology
- 2 To study the relationship between social institutions
- 3 To understand the process of social life and its importance
- 4 To Understand the sociological thinking of the founders of Sociology.
- 5 To Understand social practices and their significance
- 6 To learn the process of socialization
- 7 To analyze the social construction of the reality
- 8 Look at the familiar world from a new perspective

Course Outcome:

- CO1. Impart critical thinking to interpret the social scenario.
- CO2. Understand the forces in the rise of sociological theory.
- CO3. Understand the concepts of early sociologists
- CO4. Learn the social construction of reality
- CO5. Understand the process of socialization
- CO6. Appreciate culture and its elements

Course Content:

Unit – 1 Introduction 14 Hrs

- a. Everyday Life - Meaning; Sociology as a study of Social Interaction
- b. Social practices, customs and institutions; role of socialization
- c. Challenges and Problems of Everyday Life

Unit – 2 Self and Society 14 Hrs

- a. Definition of Situation (W I Thomas)
- b. The development of Self: CH Cooley and GH Mead
- c. Role of Social Media in Constructing Self and Identity

Unit – 3 Culture in Everyday Life 14 Hrs

- a. Culture: elements and Types of Culture
- b. Social values and norms; conformity and deviance
- c. Acculturation and Cultural Diffusion

Reference

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Semester II

BASOC-DSC151 Foundations of Sociological Theory

Objectives:

After studying this course, the learners will be able to -

1. Understand the linkage between the social changes and the emergence of discipline of Sociology.
2. Know the theoretical foundations of Sociology on which edifice of modern Sociological theories are built.
3. Develop critical thinking, analytical ability to interpret the social scenario around.
4. Learn the historical, socio-economic and intellectual forces in the rise of sociological theory.
5. Understand the sociological theories of early sociologists as Auguste Comte, Herbert Spencer, Karl Marx, Max Weber and Emile Durkheim.

Course Outcome:

- CO1. Understand the emergence of Sociology.
- CO2. Know the foundations of Sociology.
- CO3. Understand the contributions of early sociologists.
- CO4. Impart critical thinking
- CO5. Inculcate analytical ability to interpret the social scenario.
- CO6. Understand the forces in the rise of sociological theory.
- CO7. Understand the concepts of early sociologists

Course Content:

Unit – 1 Auguste Comte and Herbert Spencer 14 Hrs

- a. Intellectual Context; Positivism,
- b. Law of Three Stages, Classification of Sciences
- c. Theory of Social Evolution, Organic Analogy,
- d. Types of Society

Unit – 2 Karl Marx and Georg Simmel 14 Hrs

- a. Dialectical Materialism, Economic Determinism,
- b. Class Struggle, Alienation
- c. Formal Sociology, Theory of Sociation,
- d. Theory of Conflict

Unit - 3 Emile Durkheim and Max Weber 14 Hrs

- a. Social Facts, Division of Labour in Society,
- b. Suicide, Sociology of Religion
- c. Social Action and types; Ideal Types, Protestant Ethics and Spirit of Capitalism
- d. Bureaucracy, Types of Authority,

References

- Berger, P L 1963, *Invitation to Sociology: A Humanistic Perspective*, Doubleday, Garden City, N.Y
- Abraham, J.H., 1974. *Origin and Growth of Sociology*, London: Pelican books.
- Aron, Raymond. 1965 – 1967: *Main Currents in Sociological Thought*, Vol.1 and II, Penguin, Chapters on Marx, Durkheim and Weber.
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BASOC-DSC152 Sociology of Rural Life in India

Objectives:

This course is designed

1. To provide sociological understanding of rural society in India
2. To acquaint students with basic concepts in rural studies
3. To analyze rural problems in India
4. To provide knowledge of rural governance.
5. To impart sociological skills to reconstruct rural institutions and rural development programmes.
6. To develop the understanding regarding the linkages between urban and rural reality
7. Understand the myths and realities of village India
8. Understand the changes in land tenure systems and consequences
9. To analyze various development programmes

Course Outcome:

- CO1. Analyze rural problems in India
- CO2. Knowledge of rural governance.
- CO3. Skills to reconstruct rural institutions and rural development.
- CO4. Sociological understanding of society in India
- CO5. Basic concepts in rural studies
- CO6. Development programmes to plan, monitor and evaluate.
- CO7. Understanding of the linkages between urban and rural reality

Course Content:

Unit – 1 Rural and Agrarian Social Structure 14 Hrs

- a. Social Construction of Rural Societies: Myth and Reality (M N Srinivas)
- b. Agrarian Social Structure: Land Tenure Systems (Colonial Period); Indian Land Reform Laws (Post-Independence)
- c. Commercialization of Agriculture and Commodification of Land

Unit - 2. Rural Society in India 14 Hrs

- a. Rural Caste and Class Structure
- b. Panchayat Raj System and Rural Politics
- c. Actors in Market - Trading Castes, Role of Intermediaries and Weekly Fairs

Unit – 3 Rural Development 14 Hrs

- a. Induced Intervention: PURA, MGNREGA, Water and Land Development Efforts
- b. Challenges to Sustainable Rural Development: Casteism, Factional Politics,
- c. Natural Calamities (Droughts and Floods).

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- Doshi S.L. and P.C. Jain. 1999. *Rural Sociology*, Jaipur, Rawat.
- Gouda, M Sateesh, Khan, A G and Hiremath, S L 2019, *Spouse Abusal in India: A Regional Scenario*, GRIN Publishing, Munich
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BASOC-DOE153 Society through Gender Lens

Objectives:

After completion of this course, the learners will be able:

1. To introduce the debate on the determination of gender roles.
2. To orient regarding theories of gender relation in Indian society.
3. To trace the evolution of gender as a category of social analysis.
4. To introduce the basic concepts of gender and gender inequality
5. To analyze the gendered nature of major social institutions
6. To understand the challenges to gender inequality

Course Outcome:

- CO1. Understand gender determination and gender roles.
- CO2. Analyse gendered nature of major social institutions
- CO3. Understand the challenges to gender inequality
- CO4. Theories of gender relation in Indian society.
- CO5. Gender as a category of social analysis.
- CO6. Basic concepts of gender and gender inequality
- CO7. Gendered nature of major social institutions
- CO8. Social construction of gender and gender roles
- CO9. Identify gender bias and discrimination in everyday social interaction

Course Content:

Unit – 1 Social Construction of Gender 14 Hrs

- a. Gender and Sex, Gender Relations, Gender Discrimination, Gender Division of Labour
- b. Gender Equality, Androgyny and Gender Sensitivity
- c. Representation of Women and inclusion of Third Gender.

Unit – 2 Gender and Violence 14 Hrs

- a. Media presentation and Political representation
- b. Education, Employment and Health, Sexual Harassment at Work Place
- c. Domestic Violence, Dowry, Rape, Honor-Killing, Cyber Crimes

Unit-3 Addressing Gender Justice 14 Hrs

- a. The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)
- b. 73rd and 74th Constitutional Amendment and Women Empowerment
- c. Legal measures.

Reference:

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BASOC-DSC154 Social Development in India

Objectives:

The course is designed to achieve the following objectives:

1. To provide conceptual and theoretical understanding of social development
2. To offer an insight into the ways in which social structure influences development
3. To address the Indian experience of social change and development
4. To prepare for professional careers in the field of development planning.
5. To provide an understanding of the alternate trends and paths of development
6. To understand the contemporary socio-economic framework of development in India

Course Outcome:

- CO1. Understand social change and development
- CO2. Indian experience of social change and development
- CO3. Professional careers in development planning.
- CO4. Theoretical understanding of social change and development
- CO5. Social structure and development relationship
- CO6. Alternative trends and paths of development
- CO7. Contemporary socio-economic framework of development in India

Course Content:

Unit – 1 Social Change and Development 14 Hrs

- a. Economic development to social development and Human Development.
- b. Importance of Social Development
- c. Indian thought on Social Development - M K Gandhi and Dr BR Ambedkar

Unit - 2. Components of Social Development 14 Hrs

- a. Political Freedom, Economic Facilities
- b. Social Opportunities, Transparency,
- c. Individual and group Security

Unit – 3 Challenges to Social Development 14 Hrs

- a. Sustainable and Inclusive Development, Environmental Sustainability.
- b. Responsible Private Corporations
- c. Redressing Regional Imbalance

References

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MANGALORE

UNIVERSITY

**Regulations Governing the Choice Based Credit System Semester
Scheme(CBCS) with Multiple Entry and Exit Options in the Undergraduate
and Post-graduate Degree Programmes under the Faculty of Science as per
NEP-2020**

(Framed under Section 44(1)(c) of the KSU Act 2000)

**B.Sc.STATISTICS (Basic/Hons.)/
M.Sc. Statistics Syllabus
September-2021**

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1. Preamble of the Programme

The BOS in Statistics of the Mangalore University has framed and proposed the syllabi for I and II semester B.Sc.(Basic/Hons) and M.Sc(Statistics) with Statistics subject as one of the major(s) as per the Regulations Governing the Choice Based Credit System (CBCS) Semester Scheme with Multiple Entry and Exit Options in the Undergraduate, and Postgraduate Degree Programmes under the Faculty of Science from the academic year 2021-2022. The titles of the Core papers and elective papers from semester III to semester X have been listed as per the Karnataka State Higher Education Council (KHSC) Statistics model syllabus prepared by Statistics subject expert committee.

Statistics as the technology of data analysis and decision making under uncertainty has expanded vastly in the past few decades. It's descriptive and inferential roles not only formulate the basis of growth of almost all the disciplines of the contemporary world but also provide an array of employment avenues in industry, academia, computer software companies, government and R&D organizations. Candidates

successfully completing the B.Sc.(Honors) or B.Sc. and M.Sc. in Statistics program will have good knowledge and expertise to work as statistical consultant for the analysis of all kinds of data, pursue Ph.D. in Statistics, work in software industry as domain experts and use the Statistical Knowledge effectively in academic institutions, Industry, Government and Research Institutions.

2. Eligibility for Admission to B.Sc. Statistics (Basic/Hons) and M.Sc. (Statistics):

- Only those Candidates who have passed 10+2 level or equivalent with Mathematics as one of the subjects are eligible for admission to B.Sc. Statistics.
- Candidates must opt Mathematics as one of the majors along with Statistics during first two years (I to IV semesters of the undergraduate (UG) programme) are eligible for admission to M.Sc. Statistics

Programme Outcomes (POs)

By the end of the program the students will be able to:

1. Acquire fundamental/systematic or coherent understanding of the academic field of Statistics and its different learning areas and applications.
2. Develop and demonstrate an ability to understand major concepts in various disciplines of Statistics.
3. Demonstrate the ability to use skills in Statistics and different practicing areas for formulating and tackling Statistics related problems and identifying and applying appropriate principles and methodologies to solve a wide range of problems associated with Statistics.
4. Understand procedural knowledge that creates different types of professionals related to subject area

of Statistics, including professionals engaged in government/public service and private sectors.

5. Plan and execute Statistical experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate statistical software including programming languages, and report accurately the findings of the experiment/investigations.

6. Have a knowledge regarding use of data analytics tools like Excel and R-programming.

7. Developed ability to critically assess a standard report having graphics, probability statements.

8. Analyze, interpret the data and hence help policy makers to take a proper decision.

9. Recognize the importance of statistical modeling and computing to analyze the real problems using various statistical tools.

10. Demonstrate relevant generic skills and global competencies such as

(i) Problem-solving skills that are required to solve different types of Statistics related problems with well-defined solutions, and tackle open-ended problems, that belong to the disciplinary-area boundaries;

(ii) Investigative skills, including skills of independent thinking of Statistics-related issues and problems;

(iii) Communication skills involving the ability to listen carefully, to read texts and reference material analytically and to present information in a concise manner to different groups/audiences of technical or popular nature;

(iv) Analytical skills involving paying attention to details and ability to construct logical Arguments using correct technical language related to Statistics and ability to translate them with popular language when needed;

(v) ICT skills;

(vi) Personal skills such as the ability to work both independently and in a group.

11. Undertake research projects by using research skills- preparation of questionnaire, conducting sample survey, research projects using sample survey, sampling techniques.

12. Understand and apply principles of least squares to fit a regression model to the given data, study the association between the variables, applications of Probability Theory and Probability Distributions.

3. Assessment

Weightage for assessments (in percentage)

Type of Course	Formative Assessment/IA	Summative Assessment
Theory	40	60
Practicals	20	30(25+05(For Recordbook))
Projects	40	60
Experimental Learning (Internships, etc.)	40	60

4. Programme Structures with options

The programmes are flexible enough to allow liberty to students in designing them according to their requirements.

- Students choose Two Major subject/disciplines along with Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses, including Extracurricular Activities.
- **Exit with Certificate** upon the Successful Completion of the First Year with 50 credits (Two Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme.
- **Exit with Diploma** upon the Successful Completion of the Second Year with 100 credits (Four Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme.
- **Exit with Basic Bachelor Degree** at the Successful Completion of the Third Year with 142-146 credits (Six Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme.
- **Exit with Bachelor Degree with Honours** in a Discipline at the Successful Completion of the Fourth Year with 184-188 credits (Eight Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme.

Model Program Structures for the Under-Graduate Programs Departments and Colleges affiliated to Mangalore University

Bachelor of Science (Basic/Hons.) with Statistics as one of the major with practicals and with other subject as another major subject.

Semester	Discipline Core(DSC) (Credits)(L+T+P)	Discipline Elective (DSE)/Open Elective(OE) (Credits)(L+T+P)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits)(L+T+P)		Skill Enhancement Courses (SEC)			Total Credits
					Skill based(Credits)(L+T+P)	Value based(Credits)(L+T+P)		
I	Descriptive Statistics (4+2) Discipline B1(4+2)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs. each)		SEC-1: (2)(1+0+2)	Yoga (1)(0+0+2)	Health & Wellness(1) (0+0+2)	25
II	Probability and Probability Distributions-I(4+2) Discipline B2(4+2)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrseach)	Environmental Studies(2)		Physical Education(1)(0+0+2)	NCC/NSS /R&R(S&G)/Cultural(1) (0+0+2)	25
Exit option with Certificate (48 credits)								
III	Probability and Probability Distributions-II(4+2) Discipline B3(4+2)	OE-3 (3)	L1-3(3), L2-3(3)(4 hrseach)		SEC-2: Artificial Intelligence(2) (1+0+2)	Physical Education-Sports(1)(0+0+2)	NCC/NSS /R&R(S&G)/Cultural (1) (0+0+2)	25

IV	Statistical Inference I (4+2)DisciplineB4 (4+2)	OE-4 (3)	L1-4(3), L2-4(3)(4 hrseach)	Constitution of India(2)		Physical Education - Games(1) (0+0+2)	NCC/NSS /R&R(S&G)/Cultural (1) (0+0+2)	25
Exitoptio with Diploma(96 credits) or continuethethirdyear with both the subjects as majors								
V	1.Matrix Algebra and Regression Analysis(3+2). 2.Analysis of Variance and Design of Experiments (3+2) Discipline B5(3+2),Discipline B6(3+2)				SEC-3:SEC such asCyberSec urity(2) (1+0+2)	Physical Education - Games(1) (0+0+2)	NCC/NSS /R&R(S&G)/Cultural (1) (0+0+2)	24
VI	1.Sampling Techniques(3+2), 2. Statistical Inference II (3+2) B7(3+2)DisciplineB 8(3+2) Internship(2)				SEC-4: Professional Communicati on (2)	Physical Education - Games(1) (0+0+2)	NCC/NSS /R&R(S&G)/Cultural (1) (0+0+2)	24
Exitoptio n with Bachelor of Science,B.Sc. Basic Degree(140 credits) or Choose one of the Disciplines as Major								
VII	Real Analysis(3)Probability Theory (3+2) Statistical Inference (3 +2)	DS- Elective-1(3) DS- Elective-2(3) Res.Methodology(3)						22
VIII	Linear Algebra(3)Multivariate Analysis (3) Linear Models and Regression Analysis (3) Practical based on all theory papers (2)	DS- Elective 3(3)Research Project(6)*						20
Award Bachelor of Science Honours, B.Sc. (Hons) degree in Statistics discipline(188 credits)								
Master Degree with two Semesters								

*In lieu of the research Project, two additional elective papers/Internship may be offered.

5. Curriculum Structure-

Statistics(Corecourses)

Semesters-I to X

Semester	DSC	Core Courses	Credits
I	A1/B1	Descriptive Statistics	4
		Practicals based on A1/B1	2
II	A2/B2	Probability and Probability Distributions-I	4
		Practicals based on A2/B2	2
III	A3/B3	Probability and Distributions-II	4
		Practicals based on DSCA3/B3	2
IV	A4/B4	Statistical Inference-I	4
		Practicals based on DSCA4/B4	2
V	A5/B5	Matrix Algebra and Regression Analysis	3
		Practicals based on DSCA5/B5	2
	A6/B6	Analysis of Variance and Design of Experiments	3
		Practicals based on DSCA6/B6	2
VI	A7/B7	Sampling Techniques	3
		Practicals based on DSCA7/B7	2
	A8/B8	Statistical Inference-II	3
		Practicals based on DSCA8/B8	2
	Internship	Data Analysis with R	2
VII	A9	Real Analysis	3
	A10	Probability Theory	3
	A11	Statistical Inference	3
		Practicals based on A10, A11	4
	E-1 and E-2	Select Two DSE courses from group-II listed below	3+3
	Research Methodology	Latex and use of Latex in report writing	3
VIII	A12	Linear Algebra	3
	A13	Multivariate Analysis	3
	A14	Linear Models and Regression Analysis	3
		Practicals based on A13 and A14	2
	E-3	Select one DSE courses from list below	3
	Research	Research Project	6

	Project		
IX	A15	Stochastic Processes	3
	A16	Time Series Analysis	3
	A17	Decision Theory and Bayesian Inference	3
		Practicals based on A16 and A17	2
	E-4, E-5	Select any two DSE courses from the list below	3+3
X	A18	Design and Analysis of Experiments	3
	A19	Limit Theorems in Probability	3
		Practicals based on A18	2
	Dissertation Work	Project Work	6

Discipline Specific Electives (DSE) for VII to X Semesters

- Actuarial Statistics
- Advanced Statistical Inference
- Categorical Data Analysis
- Analysis of Clinical Trials
- Reliability Analysis
- Operations Research
- Econometrics
- Nonparametric Regression
- Nonparametric and Semiparametric Methods
- Bio-Statistics
- Computational Statistics
- Financial Time Series
- Machine Learning with R/Python
- Reliability and Statistical Quality Control
- Statistical Learning and Data Mining
- Survival Analysis

Open Electives for I to IV Semesters

Sl.NO.	Titles of Open Electives
OE-1	Statistical Methods and Applications
OE-2	Business Statistics

OE-3	Applied statistics
OE-4	Biostatistics
OE-5	Introduction to Statistics with R
OE-7	Introduction to Time Series Analysis
OE-8	Multivariate Techniques with R

6. Curriculum Structure for the Undergraduate Degree Program B.Sc.

Total Credits for the Program: 184/188
22 Name of the Degree Program : B.Sc.

Starting year of implementation: 2021-
Discipline/Subject: Statistics (Major)

Program Articulation Matrix for I and II Semester B.Sc.

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internship etc.

Semester	Title of the DSC	Program outcome that the course addresses (not more than 3 per course)	Pre-requisite course(s)	Pedagogy	Assessments
I	Descriptive Statistics	PO-1, PO-2, PO-3, PO-5, PO-08	10+2 level or Equivalent Mathematics	1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises. 2. Students are encouraged to use resources available on open sources.	The assessment is done using continuous assessment through written test, viva-voce, seminars, Data Analysis and peer discussions.
I	Practical	PO-2, PO-3, PO-4, PO-5, PO-06, PO-08	10+2 level or Equivalent Mathematics	The course is taught using Excel software and/or manually to carry out descriptive statistical analysis.	Assessment Through practical experiments

II	Probability and Distributions-I	PO-1, PO-2, PO-3, PO-12	10+2 level or Equivalent Mathematics	1. The course is taught using traditional chalk and talk method using problem solving	The assessment is done using
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				through examples and exercises. 2. Students are encouraged to use resources available on open sources	continuous assessment through written test, viva-voce, seminars, and peer discussions.
II	Practicals	PO-1, PO-2, PO-4, PO-5, PO-06, PO-07 and PO-08, PO-12	10+2 level or Equivalent Mathematics	The course is taught using R programming software and/or manually to carry out descriptive statistical analysis	Assessment through experiments

Course Pre-requisite(s): 10+2 Level Mathematics

Course Outcomes (COs) for I and II semesters

At the end of the I and II semesters course the students should be able to:

CO-1. Acquire knowledge of introductory statistics, its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.

CO -2. Learn various types of data, their organization and descriptive statistics such as presentations in tabular form, graphs and summary measures such as measures of central tendency and dispersion etc.

CO-3. Learn correlation, curve fitting, regression analysis, regression diagnostics, partial and multiple correlations.

CO-4. Learn different types of data reflecting independence and association between two or more attributes.

CO-5. Conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem and able to solve problems on these topics.

CO -6. Learn concept of discrete and continuous random variables and their probability distributions including expectation and moments.

CO-

7. Learn Standard univariate discrete and continuous distributions and their applications disciplines of science.

CO -8. Learn basics of R-programming and able to write and execute R codes in descriptive statistics, probability models and fitting of suitable distribution to the given dataset, applications of normal and other standard distributions

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-11)

Course Outcomes (COs)/ Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
CO-1. Acquire knowledge of introductory statistics, its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.	x			x	x							
CO-2. Will learn various types of data, their organization and descriptive statistics such as presentations in tabular form graphs and summary measures such as measures of central tendency and dispersion etc.		x	x	x	x							
CO-3: Learn correlation, curve fitting, regression analysis, regression diagnostics, partial and multiple correlations.	x	x	x	x		x						x
CO-4. Learn different types of data reflecting independence and association between two or more attributes.	x	x	x	x	x							
CO -5. Conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem and able to solve problems on these topics.	x	x	x	x								
CO -6. Will learn concept of discrete and continuous random variables and their probability distributions including expectation and moments	x	x	x	x								x

CO -7. Learn Standard univariate discrete and continuous distributions and their applications in other disciplines of science	X	X	X	X	X					X		X
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CO -8. Will learn basics of R-programming and able to write and execute R codes and descriptive statistics, probability models, Fitting of suitable distribution to the given data set, applications normal and other distributions.			X	X	X	X				X	X
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Detailed Syllabus for Semesters I & II B.Sc., Statistics

Course Content of Semester – I

Descriptive Statistics

Course Title: Descriptive Statistics	Course Credits: 4
Total Contact Hours: 56	Duration of ESA: 3 hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60

Title of DSC A1/B1: Descriptive Statistics

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
04	56	02	52

Theory Content of DSC A1/B1	56hrs
Unit-1: Introduction to Statistics	13hrs
Statistics: Definition and scope. Data: quantitative and qualitative, cross-sectional and time-series, discrete and continuous. Scales of measurement: nominal, ordinal, interval and ratio. Presentation of data: tabular and graphical. Frequency distributions, cumulative frequency distributions and their graphical representations. Stem and leaf displays. Concepts of population and sample. Methods of sampling- SRS, Stratified, Systematic and Cluster sampling methods: definitions only.	
Unit-2: Univariate Data Analysis	18hrs
Concept of measures of central tendency and measures of dispersion. Mean, weighted mean, trimmed mean, Median, Mode, Geometric and harmonic means, properties, merits and limitations, relation between these measures. Range, Quartile deviation, Mean deviation, Standard deviation and their relative measures. Gini's Coefficient, Lorenz Curve. Moments, Skewness and Kurtosis. Portion Values and measures based on them. Box Plot. Outliers, normal datasets.	

Unit –3:BivariateDataAnalysis	15 hrs
BivariateData,Scatterplot,Correlation,KarlPearson’scorrelationcoefficient,Rankcorrelation: Spearman’sandKendall’smeasures. Functional relation between the variables, conceptoferrors,principleofleastssquares,Simple linear regressionand itsproperties.Fitting oflinear regression lineand coefficientof determination their interpretation. Fitting of polynomial and exponential curves.	
Unit –4:MultivariateDataAnalysis	10hrs
AnalysisofCategoricalData:Contingencytable,independenceandassociationofattributes,measuresofasociation-oddsratio,Pearson’sand Yule’smeasure,MultivariateFrequencies,MultivariateDataVisualization,meanvectoranddispersionmatrix,Multiplelinearregression,multipleandpartialcorrelationcoefficients.Residualvariance.	

References

1. Agresti, A. (2010). Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.
2. Anderson T. W. and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer
3. Freedman, D., Pisani, R. and Purves, R. (2014). Statistics, 4th Edition, W. W. Norton & Company.
4. Gupta, S. C. (2018). Fundamental of Statistics, Himalaya Publishing House, 7th Edition.
5. Gupta S. C. and V. K. Kapoor (2020). Fundamental of Mathematical Statistics, Sultan Chand and Co. 12th Edition.
6. Hogg, R. V. McKean J. W. and Craig, A. T. (2012). Introduction to Mathematical Statistics, Pearson 7th Edition.
7. Joao Mendes Moreira, Andre CPL Fde Carvalho, Tomas Horvath (2018). General Introduction to Data Analytics, Wiley.
8. Johnson, R. A. and Bhattacharyya, G. K. (2006). Statistics: Principles and methods. 5th Edition, John Wiley & Sons, New York.
9. Medhi, J. (2005). Statistical Methods, New Age International.
10. Ross, S. M. (2014). Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Academic Press.
11. Tukey, J. W. (1977). Exploratory Data Analysis, Addison-Wesley Publishing Co.

Pedagogy

- The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
- Students are encouraged to use resources available on open sources.

Formative Assessment: Total 30 marks	
Assessment Occasion/type	Marks
Internal Test 1	15
Internal Test 2	15
Assignment/Seminar/ Data Analysis (07 marks) + Attendance (3 marks)	10
Total	40

Practical Content based on DSCA1/B1

(Carrying-out all the practicals manually as well as using Excel spread sheet)

1. Presentation of data by frequency tables, diagrams and graphs, stem and leaf, partition values.
2. Arithmetic Mean (AM), geometric mean, harmonic mean, weighted AM, trimmed mean, corrected mean.
3. Mode, median, partition values.
4. Absolute and relative measures of dispersion, Box plots.
5. Problems on moments, skewness and kurtosis.
6. Fitting of curves by least squares method.
7. Product moment correlation coefficient and rank correlation.
8. Fitting Simple Linear Regression
9. Partial and Multiple correlation.
10. Problems on Association of attributes.

Course Content of Semester-II

Probability and Distributions-I

Course Title: Probability and Distributions-I	Course Credits: 4
Total Contact Hours: 56	Duration of ESA: 3 hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60

Course Pre-requisite(s): 10+2 level or equivalent

Mathematics Title of the Course A2/B2: **Probability and Distributions-I**

Title of DSCA2/B2: Probability and Distributions-I

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
04	56	02	52

Theory of Content DSCA2/B2		56hrs
Unit-1 : Probability		14hrs
Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.		
Unit-2: Random variables, Mathematical Expectation and Generating Functions		14hrs
Random variables: discrete and continuous random variables, p.m.f., p.d.f. and c.d.f.,		

<p>illustrations and properties of random variables, univariate transformations with illustrations. Mathematical Expectation and Generating Functions: Expectation of single random variables and its properties. Moments and cumulants, moment generating function, cumulant generating function, probability generating functions (p.g.f.). Probability inequalities (Markov's and Chebychev's).</p>	
Unit-3: Standard Discrete and Continuous distributions	14hrs
<p>Standard discrete probability distributions: Bernolli, Poisson, geometric, discrete uniform negative binomial, hypergeometric. Standard continuous probability distributions: uniform, Beta Type-I and Type-II, Gamma, normal, exponential and applications of discrete and continuous distributions.</p>	
Unit -4: Data Analysis Using R	14hrs
<p>Introduction to R: R as a calculator, statistical software and a programming language, R preliminaries, getting help, data inputting methods (direct and importing from other spreadsheet applications like Excel), data accessing, and indexing, packages, Graphics in R, built in functions, saving, storing and retrieving work. Descriptive statistics: measures of central tendency (mean, median and mode), partition values, measures of dispersion (range, standard deviation, mean deviation and inter quartile range), summaries of a numerical data, skewness and kurtosis.</p> <p>Creating a vector using c (), reg() and Colon operator- Functions to summarize a vector sum mean, sd, median etc. Extracting a subset from the vector (by index, by property) Introduction to plotting, plot(), lines(), Abin(), Barplot, Pie chart and Histogram-Box plot, Scatter Plot and fitting simple linear regression.</p> <p>Probability Distributions: R as a set of statistical tables- cumulative distribution, probability density function, quantile function, and simulate from the distribution, plotting probability curves for standard distributions.</p>	

References

1. Dudewitz, E.J. and Mishra, S.N. (1998). Modern Mathematical Statistics. John Wiley.
2. Goon A.M., Gupta M.K., Das Gupta, B. (1991), Fundamentals of Statistics, Vol. I, World Press, Calcutta.
3. Hogg R.V., McKean J.W., and Craig, A.T. (2019). Introduction to mathematical Statistics, 8th Edition, Pearson Education, New Delhi.
4. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009). Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.
5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics, 3rd Edition. (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
6. Ross, S. (2002), A First Course in Probability, Prentice Hall.
7. Sudha G. Purohit, Sharad D. Gore, Shailaja R Deshmukh, (2009). Statistics Using R, Narosa Publishing House.
8. Emmanuel Paradis (2005). R for Beginners (available at https://cran.rproject.org/doc/contrib/Paradisrdebuts_en.pdf)

Pedagogy

- The course is taught using traditional chalk and talk method using problem solving through examples and exercises.

- Students are encouraged to use resources available on open sources.

Formative Assessment: Total 30 marks	
Assessment Occasion/type	Marks
Internal Test 1	15
Internal Test 2	15
Assignment/Seminar/ Data Analysis (7 marks)+Attendance(3 marks)	10
Total	40

Content of Practical Course 2: List of Experiments to be conducted (Computing all the practicals manually and using Excel/R)

1. Descriptive statistics-
1 using R (Presentations, Summarizations, Graphs using R)
2. Descriptive statistics-2 using R (Measures of central tendency and dispersions)
3. Bivariate and Multivariate Analysis using R
4. Regression: Simple and Multiple regression analysis using R.
5. Computing probability: using addition and multiplication theorems. Conditional probability and Bayes' theorem
6. Problems on pmf, CDF, expectation, variance, quantiles, skewness, kurtosis. Plots of pmf, pdf, cdf, quantiles using R
7. Fitting of binomial, Poisson, distributions, Fitting of suitable discrete distributions
8. Application problems based on negative binomial distribution.
9. Fitting of normal distribution when parameters are given. Fitting of suitable continuous distributions.
10. Application based problems using normal distribution.
11. Generation of Random samples (Binomial, Poisson, Normal)

Detailed Syllabus of Open Elective Courses for I and II Semesters

OE-1: Statistical Methods and Applications

Course Title: Statistical Methods and Applications	Course Credits: 3
Total Contact Hours: 42	Duration of ESA: 3 hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
03	42	-	-

Course Objectives

- ☐ This is an open elective course for other than statistics students.
- ☐ The students will learn the elements of descriptive statistics, probability, statistical methods such as tests of hypotheses, correlation and regression.

Course Outcomes

Students will be able to

CO-1. Acquire knowledge of statistical methods.

CO-2. Identify types of data and visualization, analysis and

interpretation. CO-3. Learn elementary probability and probability models.

CO-4. Learn to apply test procedures for given data set.

Pedagogy

- ☐ The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
- ☐ Students are encouraged to use resources available on open sources.

Course Contents

Unit 1: Introduction

10 Hours

Definition and scope of Statistics. Data: quantitative and qualitative, attributes, variables, scales of measurement: nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives. Concepts of population and sample. Sampling from finite population. Simple random sampling, Stratified and systematic random sampling procedures (definitions and methods only). Concepts of sampling and non-sampling errors.

Unit 2: Univariate and Bivariate Data Analysis

10

Hours Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis. Bivariate data, scatter diagram, Correlation, Karl-Pearson's correlation coefficient, Rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

Unit 3: Probability and Distributions

12 Hours

Probability: Random experiment, trial, sample space, events - mutually exclusive and exhaustive events. Classical, statistical and axiomatic definitions of probability, addition and multiplication theorems, Bayes theorem (only statements). Discrete and continuous random variables, probability mass and density functions, distribution functions, expectation of a random variable. Standard univariate distributions: Binomial, Poisson and Normal distributions (Elementary properties and applications only).

Unit 4: Sampling Distributions and Testing of Hypothesis

10 Hours

Distribution of sample mean from a normal population, Chi-square, t and F distributions (No derivations) and their applications. Statistical Hypothesis: null and alternative hypothesis, simple

dcompositehypothesis.TypeIandTypeIIerrors,levelofsignificance,criticalregion,P-valueanditsinterpretation.Testforsinglemean,equalityoftwomeans,singlevariance,andequalityof two variancesfornormal populations.

References

1. Daniel, W. W. (2007) Biostatistics - A Foundation for Analysis in the Health Sciences, Wiley
2. T. W. Anderson and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer.
3. Mukhyopadhyaya P (1999). Applied Statistics, New Central book Agency, Calcutta.
4. Ross, S. M. (2014) Introduction to Probability and Statistics For Engineers and Scientists.
5. Cochran, W. G. (1984): Sampling Techniques, Wiley Eastern, New Delhi.

OE-2: Business Statistics

Course Title: Business Statistics	Course Credits: 3
Total Contact Hours: 42	Duration of ESA: 3 hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
03	42		

Course Objectives

- ☐ Provide an introduction to basics of statistics within a financial context.
- ☐ To enable students to use statistical techniques for analysis and interpretation of business data.

Course Outcomes (COs)

Upon the completion of this course students should be able to:

CO1. Frame and formulate management decision problems.

CO2. Understand the basic concepts underlying quantitative analysis.

CO3. Use sound judgment in the applications of quantitative methods to management decisions.

Pedagogy

- ☐ The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
- ☐ Students are encouraged to use resources available on open sources.

Course Contents

Unit 1: Statistical Data and Descriptive Statistics

12 Hours

Nature and Classification of data: univariate, bivariate and multivariate data; time-series

and cross-sectional data. Measures of Central Tendency: mathematical averages including arithmetic mean, geometric mean and harmonic mean, properties and applications. Positional Averages Mode and Median (and other partition values including quartiles, deciles, and percentiles). Measures of Variation: absolute and relative. Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis.

Unit 2: Simple Correlation and Regression Analysis 10 Hours

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (Proof not required). Correlation and Probable error; rank correlation.

Regression Analysis: Principle of least squares and simple linear regression (SLR). Fitting of Simple Linear Regression and interpretation. Properties of regression coefficients; Standard Error of Estimate and its use in interpreting the results.

Unit 3: Index Numbers 10 Hours

Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyres's, Paasche's, Bowley's, Marshall-Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests of consistency of index numbers, time reversal test and factor reversal test for index numbers, Uses and limitations of index numbers. Consumer price index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate—CPI and GNP Deflator.

Unit 4: Time Series Analysis 10 Hours

Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time series: Secular trend, method of moving averages, least squares method—linear, quadratic, exponential trend fitting to the data. Seasonal variation—definition, illustrations, measurements, simple average method, ratio to moving average method, Cyclical variation—definition, distinction from seasonal variation, Irregular variation—definition, illustrations.

References

1. Levin, Richard, David S. Rubin, Sanjay Rastogi, and H M Siddiqui. Statistics for Management. 7th ed., Pearson Education.
2. David M. Levine, Mark L. Berenson, Timothy C. Krehbiel, P. K. Viswanathan, Business Statistics: A First Course, Pearson Education.
3. Siegel Andrew F. Practical Business Statistics. McGraw Hill Education.
4. Gupta, S. P., and Archana Agarwal. Business Statistics, Sultan Chand and Sons, New Delhi.
5. Vohra N. D., Business Statistics, McGraw Hill Education.
6. Murray R Spiegel, Larry J. Stephens, Narinder Kumar. Statistics (Schaum's Outline Series), McGraw Hill Education.
7. Gupta, S. C. Fundamentals of Statistics. Himalaya Publishing House.
8. Anderson, Sweeney, and Williams, Statistics for Students of Economics and Business, Cengage Learning.

OE-3.AppliedStatistics

Course Title: Applied Statistics	CourseCredits:3
Total ContactHours: 42	DurationofESA:3hours
FormativeAssessmentMarks:40	SummativeAssessmentMarks:60

Number of TheoryCredits	Number of lecturehours/semester	Number of practicalCredits	Number of practicalhours/semester
03	42		

CourseObjectives

- ☐ Toenablethestudentstousestatisticaltoolsinfinance,industries,populationstudiesandhealthsciences.
- ☐ Toacquireknowledge about sampling methodsforsurveys.

CourseOutcomes(COs)

Uponsuccessful completionofthiscourse,thestudentwillbeableto:

CO1.UnderstandthePriceandQuantityIndexnumbersandtheirifferentmeasures,understandtheapplicability of cost of living Index number.

CO2.KnowthecomponentsandNeed forTimeseries,understand thedifferentmethodsofstudyingtrend and Seasonal Index.

CO3.Studytheconceptofvitalstatistics,sourcesofdata,differentmeasuresofFertilityandMortality,Understand theGrowthrates-GRR andNRR and theirinterpretations.

CO4.KnowtheconceptofPopulation,Sample,Samplingunit,samplingdesign,samplingframe,sampling scheme, need for sampling, apply the different sampling methods for designing andselectingasamplefrom apopulation, explain sampling and non-samplingerrors.

CO5.Describethephilosophyofstatisticalqualitycontrol toolsaswellastheirusefulnessinindustryand hencedevelop quality control tools in agiven situation.

Pedagogy

- ☐ The course is taught using traditional chalk and talk method using problem solvingthroughexamples andexercises.
- ☐ Studentsareencouragedtouseresourcesavailableonopensources.

CourseContents

Unit1:EconomicStatistics

12Hours

Index numbers: Definition, Criteria for a good index number, different types of index numbers. Construction of index numbers of prices and quantities, consumer price index number. Uses

and limitations of index numbers. Consumer price index number: construction of consumer price index numbers. Applications of consumer price index numbers

Time Series Analysis: Components of time series, Decomposition of time series- Additive and multiplicative model with their merits and demerits, Illustrations of time series. Measurement of trend by method of free-hand curve, method of semi-averages and method of least squares (linear). Measurement of seasonal variations by method of ratio to trend.

Unit 2: Vital Statistics

10 Hours

Sources of demographic data, errors in data. Measurement of mortality: crude death rate, specific death rates, and standardized death rates, infant mortality rate, maternal mortality rate, neonatal mortality rates, merits and demerits and comparisons of various mortality rates. Measurement of Fertility and Reproduction: Fecundity, fertility, measurement of fertility, crude birth rate, general fertility rate, age specific fertility rate and total fertility rates, merits and demerits of each measure of fertility, comparative study of these measures of fertility, Growth rates: Gross reproduction rate and Net reproduction rates.

Unit 3: Sampling Methods

10 Hours

Population and Sample. Need for sampling, Complete Enumeration versus Sample Surveys, Merits and Demerits, Non-Probability and Probability Sampling, Need and illustrations. Use of random numbers, principal steps in sample survey. Requisites of a good questionnaire. Pilot surveys, Sampling and non – sampling errors, Description of simple random sampling with and without replacement procedures, Merits and demerits of Simple random sampling. Need for stratification, stratifying factors, Merits and demerits of stratified random sampling. Systematic random sampling procedure of obtaining sample, Merits and demerits of systematic random sampling.

Unit 4: Statistical Quality Control

10 Hours

Concept of quality and its management Causes of variations in quality: chance and assignable. General theory of control charts, Control charts for variables: X-bar and R-charts. Control charts for attributes: p and c-charts. Acceptance Sampling Plans (Product control): Basic terminologies: AQL, LTPD, AOQ, AOQL, ASN, OC curve, producer's risk, and consumer's risk. Single sampling plan, double sampling plan.

References

1. J. Medhi (1992) Statistical Methods. New Age International (P) Ltd. New Delhi.
2. M.N. Das (1993) Statistical Methods and Concepts. Wiley Eastern Ltd.
3. Irwin Miller, John E Freund and Richard A Johnson (1992) Probability and Statistics for Engineers. Prentice Hall of India New Delhi.
4. D.C. Montgomery (1996) Introduction to Statistical Quality Control.
5. Cochran, W.G. (1984) Sampling Techniques, Wiley Eastern, New Delhi.
6. Mukhopadhyaya P (1998) Theory and Methods of Survey Sampling. Prentice Hall of India.

7. Mukhopadhyay P. (2011): Applied Statistics, 2nd ed. Revised reprint, Books and Allied
8. Kendall M. G. (1976): Time Series, Charles Griffin.
9. Chatfield C. (1980): The Analysis of Time Series – An Introduction, Chapman & Hall.

OE-4. Biostatistics

Course Title: Biostatistics		Course Credits: 3	
Total Contact Hours: 42		Duration of ESA: 3 hours	
Formative Assessment Marks: 40		Summative Assessment Marks: 60	
Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
03	42		

Course Objectives

- To enable the students to identify the variables of biological studies and explore the tools of classification and presentation.
- To study the probability notion, models and their applications in the study of biological phenomenon.
- To acquire knowledge on sampling distribution and testing of hypotheses.

Course Learning Outcomes

After studying the course, the student will be able to apply statistical tools and techniques in data analysis of biological sciences.

Pedagogy

- The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
- Students are encouraged to use resources available on open sources.

Course Contents

Unit 1: Introduction to Bio-Statistics

10 hours

Definition and scope of Statistics. Scales of Measurement: nominal, ordinal, interval and ratio. Collection, classification and tabulation of data, construction of frequency table for grouped and ungrouped data, graphical representation of data by histogram, polygon, ogive curves and Pie diagram.

Unit 2: Descriptive Statistics

12 hours

Measures of Central Tendency: Arithmetic mean, Median and Mode- definition, properties, merits and limitations. Measures of Dispersion: Range, Standard deviation and Coefficient of Variation. Correlation and Regression Analysis: Bivariate Data, Scatter Diagram, definition of correlation, types of correlation, Karl-Pearson's coefficient of correlation and its

properties, Spearman's Rank Correlation coefficient. Regression- Simple linear regression, fitting of regression equations by method of Least Squares, regression coefficients and their properties and interpretation.

Unit 3: Probability and Distributions

10 Hours

Probability: Random experiment, sample space, events- mutually exclusive and exhaustive events. Classical, statistical and axiomatic definitions of probability, addition and multiplication theorems, Bayes' theorem (only statements), application. Sensitivity, Specificity, positive predictive value, negative predictive value, odds ratio. Discrete and continuous random variables, probability mass and density functions, distribution functions, expectation of a random variable. Standard univariate distributions: Bernoulli, Binomial, Poisson and Normal distributions (Elementary properties and applications only).

Unit 4: Sampling Distributions and Statistical Inference 10 hours

Concepts of random sample and statistic, distribution of sample mean from a normal population, Chi-square, t and F distributions (no derivations) and their applications. Estimation of population mean, population standard deviation and population proportion from the sample counterparts. Statistical hypothesis: null and alternative hypothesis, simple and composite hypothesis. Type I and Type II errors, size, level of significance, power test, critical region, P-value and its interpretation. Test for single mean, equality of two means, single variance, equality of two variances for normal Populations, Test for proportions. Anova and Non parametric Tests.

References

1. Dutta, N. K. (2004), *Fundamentals of Biostatistics*, Kanishka Publishers.
2. Gurumani N. (2005), *An Introduction to Biostatistics*, MJ Publishers.
3. Daniel, W. W. (2007), *Biostatistics - A Foundation for Analysis in the Health Sciences*, Wiley
4. Rao, K. V. (2007), *Biostatistics - A Manual of Statistical Methods for use in Health Nutrition and Anthropology*
5. Pagano, M. and Gauvreau, K. (2007), *Principles of Biostatistics*.
6. Rosner Bernard (2010), *Fundamentals of Biostatistics*, 6th Edition, Duxbury.

UNIT V - Statistical computing (R software) (10L)

Introduction to R, R as a calculator, statistical software and a programming language, R preliminaries, getting help, data inputting methods (direct and importing from other spread sheet applications like Excel), data accessing, and indexing, packages, Graphics in R, built in functions, saving, storing and retrieving work. Descriptive statistics: diagrammatic representation of univariate and bivariate data (box plots, stem and leaf diagrams, bar plots, pie diagram), measures of central tendency (mean, median and mode), partition values, measures of dispersion (range, standard deviation, mean deviation and inter quartile range), summaries of a numerical data, skewness and kurtosis, Probability Distributions: R as a set of statistical tables- cumulative distribution, probability density function, quantile function, and simulate from the distribution, plotting probability curves for standard distributions.



Department of Higher education
Karnataka State Higher Education Council
National Education Policy - 2020

**Proposed Model Curriculum for Undergraduate Programme in
Zoology**

In

All state Universities and Colleges in Karnataka

For the year 2021-2022

Submitted by

Zoology/Genetics Subject Committee

NEP 2020

Preamble

National Education Policy 2020 (NEP 2020) aims at equipping students with knowledge, skills, values, leadership qualities and initiate them for lifelong learning. It is in tune with the global education development agenda reflected in the Goal 4 (SDG4) of the 2030 Agenda for Sustainable Development, adopted by India in 2015, which seeks to –ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by 2030. The stated principle of NEP 2020 is to develop –good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, scientific temper and creative imagination, with sound ethical moorings and values. Higher education institutions (HEIs) must empower students in their contexts and at the same time keep them in phase with the pace of technological developments. Their purpose is to enable students to acquire expertise in specialized areas of interest, mould their character by imparting ethical and Constitutional values, kindle their intellectual curiosity and scientific temper, and create imaginative individuals who are service oriented. Students in HEIs should be able to expose themselves to a range of disciplines and obtain practical knowledge in professional, technical, and vocational subjects. Hence, HEIs must strive to create a space of multidisciplinary exposure. They must offer exposure to a wide range of subjects and skills and the possibility of obtaining deep knowledge or expertise in any of these subjects or skills. A successful HEI is the one that enables its pupils to combine personal fulfilment with societal concerns: a skilled scholar with a proactive interest in engaging with the society constructively. Their students and in this endeavour; it offers a new vision to all its Under-Graduate courses. Imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Under Graduate programs.

The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the program of their choice. The Under-Graduate Programs will prepare the students for both, academia and employability. Each program vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The program also states the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each program prepares students for sustainability and life-long learning.

The Universities in Karnataka hopes the LOCF approach of the program B.Sc. (Hons.) Zoology will help students in making an informed decision regarding the goals that they wish to pursue in further education and life, at large.

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1. INTRODUCTION

The learning outcomes-based curriculum framework for B.Sc. degree in Zoology is structured to offer a broad outline within which a Zoology program could be developed. The course is upgraded keeping in mind the aspirations of students, changing nature of the subject as well as the learning environment. Courses within Zoology have been revisited to incorporate recent advancements, techniques to upgrade the skills of learners. The new structure is expected to enhance the level of understanding among students and maintain the standard of Zoology degrees/program across the country. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students.

This framework permits the review of graduate attributes, qualification descriptors, program learning outcomes and course-level learning outcomes periodically. The framework offers flexibility and innovation in syllabi designing and in methods adopted for teaching- learning process and learning assessment. The major objective is to elevate the subject knowledge of the students, making them critical thinkers and able to solve problems and issues related to Zoology logically and efficiently. Overall, this course has been modified to upgrade skills related to biological science and provide our students a competitive edge in securing a career in academia, industry, pharmaceutical research and development in private as well as public sectors. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

2. LEARNING OUTCOME BASED CURRICULUM FRAMEWORK IN PROGRAM

Zoology to be studied in an integrated and cross-disciplinary manner with a comprehensive understanding of all living systems, their relationship with the eco-system and unravelling of their application value; the scale, character and rigor of which may vary from one institution to the other, it would, however, be mandatory to bring in uniformity in the learning outcomes with respect to the ‘broad-range skill sets’ related-to-the-discipline of the study and the ‘Social skills’ in 21st century. The framework imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Under Graduate program in Zoology.

A comprehensive understanding and appreciation of the organismal differences through ICT tools, MOOCs and well-designed hands on practical exposures along with the field work and if the same principle is followed to understand different phyla through the ladder

of evolution and compare cardinal features for classification involving both morphological and molecular tools, along with associated field and lab work, the final product would be better trained without rote learning. Syllabi required is to impart and assess the quality of critical thinking, analytical and scientific reasoning, reflective thinking, information and digital literacy, and problem-solving capacity. Along with social skills to imbibe values for cooperative team work, moral and ethical awareness and reasoning, multicultural competence, leadership readiness and qualities and self-directed and lifelong learning attitude.

3. AIM OF PROGRAM

Zoology deals with the study of animal kingdom specially the structural diversity, biology, embryology, evolution, habits and distribution of animals, both living and extinct. As it covers a fascinating range of topics, the modern zoologists need to have insight into many disciplines. The learning outcomes-based curriculum framework for a B.Sc. (Hons.) degree in Zoology is designed to cater to the needs of students in view of the evolving nature of animal sciences as a subject.

The Zoology courses designed in terms of concepts, mechanisms, biological designs & functions and evolutionary significance cutting across organisms at B.Sc. (Hons.) level can be delivered by chalk and board, and PowerPoint presentations while teaching-learning process. The students should do the dissertation/ project work under practical of different courses, wherever possible.

4. NATURE AND EXTENT OF THE PROGRAM

The CBCS framework with credit bank system is to assist in the maintenance of the standard of Zoology degrees/programmes across the Karnataka state by reviewing and revising a broad framework of agreed, expected, graduate attributes of qualification with quality, programme learning outcomes and course-level learning outcomes. The framework, however, does not seek to bring about uniformity in syllabi for a programme of study in Zoology, or in teaching-learning process and learning assessment procedures. Instead, the framework is intended to allow for flexibility and innovation in programme design and syllabi development, teaching-learning process, assessment of student learning levels.

5. GRADUATE ATTRIBUTES IN B.Sc. (Hons.) ZOOLOGY

Some of the characteristic attributes of a graduate in Zoology may include the following:

a. Disciplinary knowledge: Capable of demonstrating-

- (i) Comprehensive knowledge of major concepts, theoretical principles and experimental findings in Zoology and its different subfields including biodiversity, anatomy, physiology, biochemistry, biotechnology, ecology, evolutionary biology, cell biology, molecular biology, immunology and genetics, and some of the other applied areas of study such as wildlife conservation and management, apiculture, sericulture, neurosciences, aquatic biology, fish and fisheries sciences, bioinformatics and research methods;
- (ii) Interdisciplinary knowledge of allied biological sciences, environmental science and chemical science;
- (iii) Learning of the various techniques, instruments, computational software used for analysis of animal's forms and functions.

b. Effective communicator: Capability to convey the intricate Zoological information effectively and efficiently.

c. Critical thinker and problem solver: Ability to rationally analyze and solve the problems related to animal sciences without relying on assumptions and guess work.

d. Logical thinking and reasoning: Capability of seeking solutions and logically solving them by experimentation and data processing either manually or through software.

e. Team spirit: Ability to work effectively in a heterogeneous team.

f. Leadership quality: Ability to recognize and mobilize relevant resources essential for a project, and manage the project in a responsible way by following ethical scientific conduct and bio-safety protocols.

g. Digitally literate: Capable of using computers for biological simulation, computation and appropriate software for biostatistics, and employing search tools to locate, retrieve, and evaluate zoology-related data.

h. Ethical Awareness: Avoiding unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, as well as appreciate environmental and sustainability issues.

i. Lifelong learners: Capable of self-paced and self-directed learning aimed at personal and social development.

6. UALIFICATION DESCRIPTORS:

The qualification descriptors for a Bachelors' Degree program in Zoology may include the following:

Demonstrate a logical and consistent understanding of the broad concepts in Zoology, its applications, and related interdisciplinary subjects.

Technical knowledge that produces varied types of professionals in the fields like research and development, teaching and public sector service.

Utilise wide-range knowledge, logical thinking and skills for evaluating problems and issues related to Zoology.

Collection of pertinent quantitative and/or qualitative data obtained from various sources/experiments, and analysis of the data using appropriate research methodologies to formulate evidence-based solutions.

Effective and precise communication of the investigations undertaken in a variety of contexts using the major concepts, principles and techniques of the subject(s).

Meet one's own learning desires, employing broad range of research and development work and professional materials.

Apply one's subject knowledge and skills to novel circumstances enabling to solve complicated problems with evidence-based well-defined elucidations

Demonstrates subject-related skills relevant to Zoology-related jobs and employment opportunities

5 Curriculum in subjects has to follow these Model Program Structures. The Terminology used in these Program Structures is.

Discipline Core (DSC) refers to Core Courses/Papers in a Core Discipline/ Subject

Discipline Elective (DSE) refers to Elective Courses/Papers in the Core Subject or Discipline.

Open Elective (OE) refers to Elective Courses/Papers in a non-core Subject across all disciplines.

Program Structures also contain Ability Enhancement Compulsory Courses (AECC), Languages, Skill Enhancement Courses

(SEC) (Both skills and value based). Pedagogy involves L+T+P model. Generally subjects with practical involve L+P, while the

subjects without practical involve L+T model. The numbers in parentheses indicate credits allotted to various courses/papers as per

definitions of Choice Based Credit System (CBCS). Generally 1 hour of Lecture or 2 hours of practical per week in a semester is

assigned one credit. Generally core subject theory courses/papers will have 3 or 4 credits, while practical are assigned 2 or 3 credits

Subject prerequisite: To Study Zoology in undergraduate, student must have studied Biology or any other equivalent subject in Class 12.

Model Curriculum Structure for Degree Program

B. Sc., Hons in Zoology

Name of the Degree Program: **B. Sc., Hons**

Discipline Core: **Zoology** Total Credits for the Program: **50/100/142/184/268**

Starting year of implementation: **2021-22**

PROGRAM OBJECTIVES (POs)

POs1-The Programme offers both classical as well as modern concepts of Zoology in higher education.

POs2-It enables the students to study animal diversity in both local and global environments.

POs3-To make the study of animals more interesting and relevant to human studies more emphasis is given to branches like behavioural biology, evolutionary biology and economic zoology.

POs4-More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, genetic engineering and bioinformatics have been also included.

POs5-Equal importance is given to practical learning and presentation skills of students.

POs6-The lab courses provide the students necessary skills required for their employability.

POs7-Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skills of students.

POs8-The global practices in terms of academic standards and evaluation strategies.

POs9-Provides opportunity for the mobility of the student both within and across the world.

POs 10-The uniform grading system will benefit the students to move across institutions within India to begin with and across countries.

POs11-It will also enable potential employers in assessing the performance of the candidates across the world.

Credit distribution for the course

*In lieu of the research Project, two additional elective papers/ Internship may be offered

Assessment:

Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA Marks	Summative Assessment Marks
Theory	40	60
Practical	20	30
Projects	45	105
Experiential Learning (Internships etc.)		

IIA. Model Program Structures for the Under-Graduate Programs in Universities and Colleges in Karnataka

Sem.	Discipline Core (DSC) (Credits) (L+T+P)	Discipline Elective(DSE) / Open Elective (OE) (Credits) (L+T+P)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P)		Skill Enhancement Courses (SEC)			Total Credits
					Skill based (Credits) (L+T+P)	Value based (Credits) (L+T+P)		
I	Zoology A1(4+2) Botany B1(4+2)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs. each)		SEC-1: Digital Fluency (2) (1+0+2)	Physical Education for Health &Wellness fitness(1)(0+0+2) (1) (0+0+2)		25
II	Zoology A2(4+2) BotanyB2(4+2)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs. each)	Environmental Studies (2)		Physical Education - NCC/NSS/R&R(S&		25
Exit option with Certificate (50 credits)								
III	Zoology A3(4+2) Botany B3(4+2)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs. each)		SEC-2: Artificial Inte- lligence (2)(1+0+2)	Physical Education- NCC/NSS/R&R(S&		25
IV	Zoology A4(4+2) Botany B4(4+2)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs. each)	Constitution of India (2)		Physical Education - NCC/NSS/R&R(S&		25
Exit option with Diploma in Science (100 credits) OR Choose any one of the core subjects as Major and the other as Minor								
V	Zoology A5(3+2) Zoology A6(3+2) Botany B5(3+2)	Vocational-1 (3)			SEC-3: SEC such as Cyber Security (2) (1+0+2)			20
VI	Zoology A7(3+2) Zoology A8(3+2) Botany B6(3+2)	Vocational-2 (3) Internship (2)			SEC-4: Professional Communication (2)			22
Exit option with Bachelor of Science Degree, B. Sc. Degree in Zoology (142 credits) or continue studies with the Major in the third year								
VII	Zoology e A9(3+2) ZoologyA10(3+2) Zoology A11(3)	Zoology E-1 (3) Zoology E-2 (3) Res. Methodology (3)						22
VIII	Zoology A12(3+2) Zoology A13(3) Zoology A14(3)	Zoology E-3 (3) Research Project (6)*						20
Award of Bachelor of Science Honours Degree, B.Sc.(Hons.) Degree in Zoology (184 credits)								

SEMESTER WISE CURRICULUM STRUCTURE OF COURSES

Semester	Name of the course/credits	What all program outcomes the course addresses (not exceeding three per course)	Pre-requisite course(s)	Concurrent course	Pedagogy	Assessment
1 Semester A1 Major course	Cytology, Genetics and Infectious Diseases (4)	1. The structure and functions of animal cell, cell organelles, cell-cell interactions, process of reproduction leading to new organisms. 2. The principles of inheritance, Mendel's laws and the deviations. 3. Inheritance of chromosomal aberrations in humans by pedigree analysis in families.	Student must have studied Biology or equivalent subjects in Class 12.	Lab on Cell Biology and Genetics (2)	Lectures/Videos/ Seminars/Case study/Project/ Group discussion/ Problem Solving/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
1 Semester B1 Minor course	Biology of Non-Chordates (4)	1. Learn the systematics and biology of non-chordates through their adaptive features. 2. Study the functional biology of non-chordates through their body organization. 3. Comprehend identification of species and their evolutionary relationships.	Student must have studied Biology or equivalent subjects in Class 12.	Lab on Biology of Non-Chordates (2)	Lectures/Videos/ Seminars/Case study/Project/ Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
1 Semester OE1 Open Elective course	Economic Zoology (3)	1. Acquaint the knowledge about basic procedure and methodology of integrated animal rearing. 2. Students can start their own business i.e. self employments. 3. Get			Lectures/Videos/ Seminars/Case study/Project/ Group discussion/ Problem Solving/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,

		employment in different sectors of Applied Zoology				
SEC 1 Skill Enhancement course	SEC 1 Digital fluency Vermiculture (2)		Student must have studied Biology or equivalent subjects in Class 12.		Lectures/Videos/Seminars/Case study/Project/Group discussion/Problem Solving/Formative Assessment/Summative Assessment	Formative and Summative Assessment/Evaluation/Analysis of result/Application of Heutagogy,
2 Semester A2 Major course	Biochemistry and Physiology (4)	1. In depth understanding of structure of biomolecules like proteins, lipids and carbohydrates. 2. The thermodynamics of enzyme catalyzed reactions. 3. To know various physiological processes of animals.	Student must have studied Biology or equivalent subjects in Class 12.	A2 Lab on Biochemistry, Physiology and Hematology (2)	Lectures/Videos/Seminar/Case study/Project/Formative Assessment/Summative Assessment	Formative and Summative Assessment/Evaluation/Analysis of result/Application of Heutagogy,
2 Semester B2 Minor course	Biology of Chordates (4)	1. Learn the systematics and biology of Chordates through their adaptive features. 2. Study the functional biology of Chordates through their body organization. 3. Comprehend identification of Chordate species and their evolutionary relationships.	Student must have studied Biology or equivalent subjects in Class 12.	Lab on Biology of Chordates (2)	Lectures/Videos/Seminar/Case study/Project/Formative Assessment/Summative Assessment	Formative and Summative Assessment/Evaluation/Analysis of result/Application of Heutagogy,
2 Semester OE2 Open Elective course	Parasitology (3)				Lectures/Videos/Seminar/Case study/Project/Formative Assessment/Summative Assessment	Formative and Summative Assessment/Evaluation/Analysis of result/Application of Heutagogy,

2 Skill Enhancement course	Environmental Studies Sericulture (2)	1. Sericulture is an agro-based industry which gives economic empowerment to the students. 2. Sericulture may be taken up as a small scale industry by the small farmers and unemployed youth. 3. Get jobs in teaching profession, silk board and other Govt. institutions as technicians.	Student must have studied Biology or equivalent subjects in Class 12.		Lectures/Videos/ Seminar/Case study/Project/ Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
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EXIT OPTION WITH CERTIFICATE (50 CREDITS)

3 A3 Major Core Course	Molecular Biology & Techniques in Biology (4)		Certificate Course in Zoology	Lab on Molecular Biology, Bioinstrumentation & Techniques in Biology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
3 B3 Minor Core Course	Comparative Anatomy and Microanatomy (4)		Certificate Course in Zoology	Lab on Comparative Anatomy and Microanatomy (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
3 OE-3 Open Elective course	Endocrinology (3)				Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
3 Semester Skill Enhancement course	SEC 3 Artificial Intelligence Apiculture (2)		Certificate Course in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,

4 A4 Major Core course	GeneTechnology, Immunology and Computational Biology (4)		Certificate Course in Zoology	Lab on Genetic Engineering And Counselling (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
4 B4 Minor Core Course	Cell Biology and Genetics (4)		Certificate Course in Zoology	Lab on Cell Biology and Genetics (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
4 Sem OE 4 Open Elective Course	Animal Behaviour (3)				Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
4 Semester Skill Enhancement course	Constitute of India (2) Poultry		Certificate Course in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
EXIT OPTION WITH DIPLOMA (100 CREDITS)						
5 A5 Major Core Course	Non-Chordates and Economic Zoology (4)		Diploma in Zoology	Lab on Non- Chordates and Economic Zoology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
5 A6 Major Core Course	Chordates and Comparative Anatomy (3)		Diploma in Zoology	Lab on Chordates (Virtual Dissection) and Comparative Anatomy (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of

					Assessment/ Summative Assessment	Heutagogy,
5 B5 Minor Core Course	Animal Physiology and Animal Biotechnology (3)		Diploma in Zoology	Lab on Animal Physiology and Animal Biotechnology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
5 DSEC1	Vocational -1 Aquatic Biology (3)		Diploma in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
5 SEC 3 Skill Enhanceme nt course	Cyber Security Integrated Animal Rearing (2)		Diploma in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
6 A7 Major Core Course	Evolutionary and Developmental Biology (3)		Diploma in Zoology	Lab on Evolutionary and Developmental Biology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Institute/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
6 A8 Major Core Course	Environmental Biology, Wildlife management and Conservation (3)		Diploma in Zoology	Lab on Environmental Biology, Wildlife management and Conservation (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
6 B6 Minor Core Course	Animal Behaviour (3)		Diploma in Zoology	Lab on Animal Behaviour (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of

					Assessment/ Summative Assessment	Heutagogy,
6 DSEC	Vocational-2 Entomology 3 Internship (2)		Diploma in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
6 Skill Enhancement Course	SEC 4 Professional Communication Ornamental Fish Culture (2)		Diploma in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
EXIT OPTION WITH B. Sc. DEGREE (142 CREDITS)						
7 A9 Major Core Course	Ethology (3)		Degree in Bachelor Of Science in Zoology	Lab on Ethology @2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
7 A8 Major Core Course	Evolution and Zoogeography (3)		Degree in Bachelor Of Science in Zoology	Lab on Evolution and Zoogeography (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
7 A9 Major Core Course	Genetics and Computational Biology (3)		Degree in Bachelor Of Science in Zoology	Lab on Advanced Genetics and Computational Biology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
7	RESEARCH METHODOLOGY (3)		Degree in Bachelor Of		Lectures/Videos / Seminars/Case study/Project/ Group	Formative and Summative Assessment/Ev aluation/

			Science in Zoology		discussion/Visit to research lab/Formative Assessment/ Summative Assessment	Analysis of result/ Application of Heutagogy,
7 DSEC	Zoology E-1 (3) Radiation Biology		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
7DSEC	Zoo Management Zoology E-2 (3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8 A12 Major Core Course	Immunology and Stem Cell Biology (3)		Degree in Bachelor Of Science in Zoology	Lab on Immunology and Stem Cell Biology 2	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8 A13 Major Core Course	Advanced Molecular Biology and Biostatistics (3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8 A 14 Major Core Course	Genomics and Proteomics (3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8	RESEARCH PROJECT (6)		Degree in Bachelor Of		Lectures/Videos / Seminars/Case study/Project/ Group	Formative and Summative Assessment/Evaluation/

			Science in Zoology		discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Analysis of result/ Application of Heutagogy,
8DSEC1	<i>Any one of the below 4 choice</i> E-3 Neurosciences (3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8DSEC2	E-3 Parasitology(3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8DSEC3	E-3 Animal Experimentation and Ethics(3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
8DSEC4	E-3 Behavioural Biology(3)		Degree in Bachelor Of Science in Zoology		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
EXIT OPTION WITH B. Sc. HONOURS DEGREE (184 CREDITS)						
9 A15 Major Core Course	Animal Biotechnology and Genetic Engineering (3)		Degree in Bachelor of Science Honors	Lab on Animal Biotechnology and Genetic Engineering (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
9	Microanatomy		Degree in	Lab on	Lectures/Videos	Formative and

A 16 Major Core Course	Histochemistry and Histopathology (3)		Bachelor of Science Honors	Microanatomy ,Histochemistry and Histopathology (2)	/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
9 A 17 Major Core course	Molecular Endocrinology (3)		Degree in Bachelor of Science Honors	Lab on Molecular Endocrinology (2)	Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Lab/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
9 A18	Research methodology (3) of 7 th sem) Applied Zoology (In Place of		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
9DSEC1	E-1 Animal Biotechnology (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
9DSEC2	E-1 Toxicology (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
9 Skill Enhanceme nt Cpourse	Cattle Farming (3)		Degreein Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formati ve Assessment/ Summative Assessment	Formative and Summative Assessment/Ev aluation/ Analysis of result/ Application of Heutagogy,
10	Physiology of		Degree in	Lab on	Lectures/Videos	Formative and

A 19 Major	Reproduction (3)		Bachelor of Science Honors	Reproductive Physiology 2	/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 A 20 Major	Developmental Biology (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 A 21 Major	Chronobiology (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Lab/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 A 22	NanoBiotechnology (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 DSEC 1	RESEARCH PROJECT or Any two DSEC Or INTERNSHIP (6)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 DSEC 2	E-3 Insect Vector & Diseases (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 DSEC 3	E-3 Human		Degree in		Lectures/Videos	Formative and

	Physiology (3)		Bachelor of Science Honors		/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 DSEC 4	E-3 Food, Nutrition & Health (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
10 Skill Enhancement	E-3 Animal Breeding Techniques (3)		Degree in Bachelor of Science Honors		Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment	Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy,
EXIT OPTION WITH M. Sc. DEGREE (268 CREDITS)						

Proposed Course content under New Education Policy Year 2021-22 for I Semester B.Sc. Zoology

Core Course Content

Course Title/Code: Cytology, Genetics and Infectious Diseases	Course Credits: 4
Course Code: DSCC5Z00T1	L-T-P per week: 4-0-0
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Model Syllabus Authors:	

Core Course prerequisite: To study Zoology in undergraduate, student must have studied Biology or equivalent subject in Class 12.

Course Outcomes (COs):

At the end of the course the student should be able to understand:

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an
4. Organism and also reproduces to form a new organisms.
5. How a cell communicates with its neighboring cells.
6. The principles of inheritance, Mendel's laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC T1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency	X										
II Critical thinking	X										
III Analytical reasoning	X										
IV Research skills	X										
V Team work	X										

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Semester I- Zoology Core Course I Content:

Content	Hours
Unit I	14
Chapter 1. Structure and Function of Cell Organelles I in Animal cell <ul style="list-style-type: none"> • Plasma membrane: chemical structure—lipids and proteins • Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis 	
Chapter 2. Structure and Function of Cell Organelles II in Animal Cell <ul style="list-style-type: none"> • Cytoskeleton: microtubules, microfilaments, intermediate filaments • Mitochondria: Structure, oxidative phosphorylation; electron transport system • Peroxisome and Ribosome: structure and function 	
Unit II	14
Chapter 3. Nucleus and Chromatin Structure <ul style="list-style-type: none"> • Structure and function of nucleus in eukaryotes • Chemical structure and base composition of DNA and RNA • DNA supercoiling, chromatin organization, structure of chromosomes • Types of DNA and RNA 	
Chapter 4. Cell cycle, Cell Division and Cell Signaling <ul style="list-style-type: none"> • Cell division: mitosis and meiosis • Introduction to Cell cycle and its regulation, apoptosis • Signal transduction: intracellular 11 signaling and cell surface receptors, via G-protein linked receptors • Cell-cell interaction: cell adhesion molecules, cellular junctions 	

Unit III	14
Chapter 5. Mendelism and Sex Determination <ul style="list-style-type: none"> Basic principles of heredity: Mendel's laws- monohybrid cross and hybrid cross Complete (3:1- Body colour in <i>Drosophila</i>) and Incomplete Dominance (1:2:1- Plumage pigmentation in fowl) Penetrance and expressivity Genetic Sex-Determining Systems, Environmental Sex Determination, Sex Determination and mechanism in <i>Drosophila melanogaster</i>. Sex-linked characteristics in humans and dosage compensation 	
Chapter 6. Extensions of Mendelism, Genes and Environment <ul style="list-style-type: none"> Extensions of Mendelism: Multiple Alleles (ABO blood groups in humans), Gene Interaction. (Supplementary factors - 9:3:3:1 - Comb pattern in fowls Dominant Epistasis - 12:3:1 - Plumage colour in Leghorn and Wyandotte Recessive Epistasis - 9:3:4 - Coat colour in Guinea pigs Complementary factors - 9:7 - Flower colour in sweet peas) . The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics Cytoplasmic Inheritance (in <i>Paramecium</i>), Genetic Maternal Effects. Interaction between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristics (Polygenic inheritance in man – skin colour) 	
Unit IV	14
Chapter 7. Human Chromosomes and Patterns of Inheritance <ul style="list-style-type: none"> Patterns of inheritance: autosomal dominance (Achondroplasia), autosomal recessive (Sickle cell anaemia), X-linked recessive (Colour blindness), X-linked dominant (Vitamin D-resistant rickets). Chromosomal anomalies: Structural and numerical aberrations with examples (Structural – deletion, duplication, translocation, inversion; Numerical – Aneuploidy – Klinefelter's, Turner's and Down Syndrome). Human karyotyping and Pedigree analysis. 	
Chapter 8. Infectious Diseases <ul style="list-style-type: none"> Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa and worms. Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: <i>Plasmodium vivax</i>, <i>Giardia</i> and <i>Wuchereria</i>. 	

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell(2017).
9. Principles of Genetics by B. D. Singh
10. Cell-Biology by C. B. Pawar, Kalyani Publications
11. Economic Zoology by Shukla and Upadhyaya

Pedagogy: Written Assignment/Presentation/Project / TermPapers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks

House Examination/Test	20
Written Assignment/Presentation/Project / Term Papers/Seminar	15
Class performance/Participation	05
Total	40

Date: Co-ordinator

Subject Committee Chairperson

Scheme of Examination: Theory (Semester I)

Question No.	PART - A	Marks
I	Answer any SIX Questions out of EIGHT Questions (2 questions of 2 marks from each unit)	6 x 2 = 12
	PART - B	
	Unit - I	
II	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
III	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - II	
IV	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
V	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - III	
VI	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
VII	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - IV	
VIII	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
IX	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Total	60

Zoology Core Lab Course Content

Semester I

Course Title: Cell Biology &Cytogenetics Lab	Course Credits: 2
Course Code: DSCC5Z00P1	L-T-P per week: 0-0-4
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 20	Summative Assessment Marks: 30
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3. To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families.
The antigen-antibody reaction.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC P1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency	X										
II Critical thinking	X										
III Analytical reasoning	X										
IV Research skills	X										
V Team work	X										

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Lab Course Content

List of labs to be conducted	56 Hrs.
<ol style="list-style-type: none">1. Understanding of simple and compound microscopes.2. To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using Methylene blue/any suitable stain (virtual/ slaughtered tissue).3. To study the different stages of Mitosis in root tip of <i>Allium cepa</i> (Permanent slides and squash preparation).4. To study the different stages of Meiosis in grasshopper testis (virtual or permanent slides).5. To check the permeability of cells using salt solution of different concentrations.6. Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent microslides (<i>Plasmodium</i> signet ring and <i>Microfilaria</i>).7. To learn the procedures of preparation of temporary and permanent stained slides, with available mounting material.(Coelenterate colony or crustacean/insect larva)8. Study of mutant phenotypes of <i>Drosophila</i> sp. (from Cultures or Photographs) (any four).9. Preparation of polytene chromosomes (<i>Chironomus</i> larva or <i>Drosophila</i> larva).10. Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional).11. To prepare family pedigrees.12. https://www.vlab.co.in13. https://zoologysan.blogspot.com14. www.vlab.iitb.ac.in/vlab15. www.onlinelabs.in16. www.powershow.com17. https://vlab.amrita.eduhttps://sites.dartmouth.edu/	

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA(2004).
2. Alberts et al: Molecular Biology of the Cell: Garland(2002).
3. Cooper: Cell: A Molecular Approach: ASM Press(2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman(2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman(2007).
6. Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, New Delhi.

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	10
Written Assignment/Presentation/Project / Term Papers/Seminar	05
Class performance/Participation	05
Total	20

Date:

Course Co-ordinator

Subject committee Chairperson

Course Title/Code: Cell Biology & Cytogenetics Lab
(BSCC5ZOOP1)
Scheme of Practical Examination

Time: 3 hours

Max. marks: 30

- I. Identify and comment on the permanent slides A & B with labeled diagrams.** 2 x 3 = 06
(1- mitosis and 1- meiosis)
(Identification - ½ Mark; Labeled diagram – 1 Mark; Comments - 1½ Marks)
- II. Squash - Make a stained squash preparation of onion root tip and Report.**
or
Make a stained squash preparation of Polytene chromosomes and Report. = 06
(Stained slide preparation with at least one dividing stage - 3 Mark; Report - 3 Mark
or Stained slide preparation of Polytene chromosome - 3 Mark; Report - 3 Mark)
- III. Identify the *Drosophila* mutant C with reasons.** = 02
(Identification - ½ Mark; Chromosome number and site - ½ Mark; Characters -1 Mark)
- IV. Identify the parasite D with reasons.** = 02
(Identification - ½ Mark; Report - 1½ Mark)
- V. Study of permeability of animal cells using salt solutions of different concentrations and report (experiment - 3 Marks; report- 2 Mark)**
or
Prepare a stained slide of the buccal epithelial cells and report.
(Slide preparation - 3 Marks; report- 2 Mark) = 05
- VI. Preparation of human karyotype **or** construction of a family pedigree chart.** = 04
- VII. Class Records.** = 05

Minor Course Content

Semester: **I Semester, B. Sc., (Hons) Zoology**

Course Title: BIOLOGY OF NON-CHORDATES	Course Code: MDC5ZOOT1
Course Type: Minor Discipline Core Theory, L-T-P: 4-0-0	Course Credits: 4
Total Contact Hours: 56	Duration of ESA: 3 Hrs
Formative Assessment Marks: 30	Summative Assessment Marks: 70
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Learn the structural biology of non-chordates through their adaptive features.
2. Study the functional biology of non-chordates through their body organization and its function.
3. Comprehend identification of species and their evolutionary relationships.
4. Enhancement of research skills like critical thinking.
5. Develop abilities required for industrial employment as well as self-employment.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) /(POs)	MDC5ZOO T1	MDC5ZOO T2	MDC5ZOO T3	MDC5ZOO T4	MDC5ZOO T5	MDC5ZOOT6
I Core competency	X					
II Critical thinking	X					
III Analytical reasoning	X					
IV Research skills	X					
V Team work	X					

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content	Hrs
Unit I	14
Chapter 1. Animal Architecture- Body symmetry- asymmetry, radial, biradial and bilateral symmetry with suitable example and Significance. Body organization- Protoplasmic, cellular, tissue and organ level of organization with suitable examples and Significance. Diploblasty (apparent and absolute) and Triploblasty with suitable Examples and Significance. Coelom- Acoelom, Pseudocoelom, and Eucoelom with suitable examples and Significance. Metamerism- Psuedometamerism (Strobilization), Eumetamerism with suitable examples and Significance. Cephalization- origin and significance. Chapter 2. General characters and classification of major Invertebrate phyla- Protozoa,	

Porifera, Coelenterata, Helminthes, Annelida, Arthropoda, Mollusca and Echinodermata up to the level of classes with suitable examples.	
Unit II	14
<p>Chapter 3. Diversity of life sustaining systems in nonchordates: (with an example for each type of system)</p> <p>Locomotion: Protozoa- amoeboid (Sol-Gel theory), Flagellar, euglenoid and ciliary movements. Hydrostatic movements in Annelida-Earthworm and Echinodermata-starfish.</p> <p>Nutrition: In Protozoa.</p> <p>Feeding apparatus and mechanism: In Annelida-filter feeding, Arthropoda-Prawn, Mollusca-Pila and Echinodermata-Sea Star.</p> <p>Respiration: In Protozoa-diffusion, Helminthes-parasitic, Annelida-cutaneous, Arthropoda (any one type), Mollusca (Gill) and Echinodermata (Dermal papillae and Tube feet).</p> <p>Circulation: In Protozoa (cyclosis), Annelida- Earthworm, Arthropoda-Prawn, Mollusca-Pila and Echinodermata- Sea Star.</p> <p>Osmoregulation and excretion: In Protozoa-Contractile vacuoles, Platyhelminthes- Flame cells, Annelida-Nephredia and Arthropoda-Green glands.</p>	
Unit III	14
<p>Chapter 4. Diversity of coordinating systems and generative systems in nonchordates: (with an example for each type of system)</p> <p>Nervous system in Coelenterata, Platyhelminthes, Annelida, Arthropoda, Mollusca and Echinodermata.</p> <p>Neuroendocrine system and pheromones in Insecta.</p> <p>Sense organs: Mechanoreceptors, Photoreceptors, Chemoreceptors, thigmoreceptors, rheoreceptors and proprioceptors.</p> <p>Reproduction: Asexual and sexual reproduction in Protozoa, Porifera, Coelenterate, Annelida and Echinodermata.</p> <p>Metamorphosis in Insecta.</p> <p>Larval forms of Coelenterata, Annelida and Echinodermata.</p>	
Unit IV	14
<p>Chapter 5. Beneficial non-chordates:</p> <p>Non-chordates used as food; Arthropoda and Mollusca.</p> <p>Non-chordates in Industry and Industrial products; Silkworm-silk, Lac Insect-shellac, Honey bees-bee wax, Pearl Oysters- pearls, Corals, sponges, shells dyes and pigments.</p> <p>Non-chordates in medicinal use-Leeches, Maggot larva and honey.</p> <p>Non-chordates in agriculture-earthworms, pollinators and pest controllers.</p> <p>Non-chordates in food chain and as scavengers.</p> <p>Chapter 6. Harmful non-chordates</p> <p>Parasitic Platyhelminthes.</p> <p>Soil Nematodes.</p> <p>Agricultural, veterinary and human pests of Arachnida.</p> <p>Agricultural, veterinary and human pests of Arthropoda.</p>	<p>07</p> <p>07</p>

Topics Suggested for Assignment/ Formative Assessment:

Animal connecting links. 2. Polymorphism 3. Parasitic adaptations 4. Metamorphosis 5. Freshwater sponges 6. Molluscs of industrial value 7. Coral reefs and their role in ecosystem generation 8. Invertebrate minor phyla 9. Regeneration in sponges and *Planaria* 10. Soil and water protozoa

Recommended Books:

- Barnes, R. S. K.; Calow, P.; Olive, P. J. W.; Golding, D. W.; Spicer, J. I. (2002) The Invertebrates: a Synthesis, Blackwell Publishing.
- Hickman, C.; Roberts, L.S.; Keen, S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
- Holland, P. (2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
- Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
- Bushbaum, R. (1964) Animals without Backbones. University of Chicago Press.

Web Sources:

Animal Diversity (<https://swayam.gov.in/courses/5686-animal-diversity>)

Advances in Animal Diversity, Systematics and Evolution

(<https://swayam.gov.in/courses/5300-zoology>)

ePGPathshala (MHRD)Module 10, 18, 19 of the paper P-08 (Biology of Parasitism)

<https://epgp.inflibnet.ac.in/ahl.php?csrno=35>

Pedagogy: Lectures, Presentations, videos, Assignments and Weekly Formative Assessment Tests.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Assignment/ Field Report/ Project	15 Marks
Test	10 Marks
Participation in class	05 marks
Total	30 Marks

Date:

Co-Ordinator

Subject Committee Chairperson

Minor Course Lab Content

Semester: **I**

Course Title: Lab on BIOLOGY OF NON-CHORDATES	Course Credits: 02
Course Type: Minor Discipline Core Practical, L-T-P: 0-0-4	Course Code: MDC5ZOOP1
Total Contact Hours: 56	Duration of ESA: 03 Hours
Formative Assessment Marks: 15	Summative Assessment Marks: 35
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand basics of classification of non-chordates.
2. Learn the diversity of habit and habitat of these species.
3. Develop the skills to identify different classes and species of animals.
4. Know uniqueness of a particular animal and its importance
5. Enhancement of basic laboratory skill like keen observation and drawing.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	MDC5ZOO P1	MDC5ZOOP 2	MDC5ZOOP 3	MDC5ZOOP 4	MDC5ZOOP 5	MDC5ZOOP 6
I Core competency	X					
II Critical thinking	X					
III Analytical reasoning	X					
IV Research skills	X					
V Team work	X					

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

MDC Lab I Course Content

List of labs to be conducted	Hours
1. Preparation and observation of protozoan culture. 2. Protozoa: Systematics of <i>Amoeba</i> , <i>Euglena</i> , <i>Noctiluca</i> , <i>Paramecium</i> and <i>Vorticella</i> (Permanent slides). 3. Porifera: Systematics of <i>Sycon</i> , <i>Euplectella</i> , <i>Hyalonema</i> , <i>Spongilla</i> and <i>Euspongia</i> (Specimens). Study of permanent slides of T.S of <i>Sycon</i> , spicules and gemmules. 4. Cnidaria: Systematics of <i>Aurelia</i> and <i>Metridium</i> (Specimens). Slides of <i>Hydra</i> , <i>Obelia</i> -polyp and medusa, and <i>Ephyra</i> larva, T.S. of <i>Metridium</i> passing through mesenteries. 5. Study of Corals - <i>Astraea</i> , <i>Fungia</i> , <i>Meandrina</i> , <i>Corallium</i> , <i>Gorgonia</i> , <i>Millepora</i> and <i>Pennatulula</i> .	56

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| <ol style="list-style-type: none"> 6. Helminthes: Systematics of <i>Planaria</i>, <i>Fasciola hepatica</i> and <i>Taenia solium</i>, Ascaris-Male and female (Specimens). Slides of T.S. of <i>Planaria</i>, T.S of male and female <i>Ascaris</i>, 7. Annelida: Systematics of <i>Nereis</i>, <i>Heteronereis</i>, <i>Sabella</i>, <i>Aphrodite</i> (Specimens).Slide of T.S. of Earth worm through typhlosole. 8. Arthropoda: Systematics of <i>Panaeus</i>, <i>Palaemon</i>, <i>Astracus</i>, Scorpion, Spider, <i>Limulus</i>, <i>Peripatus</i>, Millipede, Centipede, Praying mantis, Termite Queen, Moth, Butterfly, Dung beetle/Rhinoceros beetle (Any six specimens).Slide of Larvae-Nauplius, Zoea, Mysis. 9. Mollusca: Systematics of <i>Chiton</i>, <i>Mytilus</i>, <i>Aplysia</i>, <i>Pila</i>, <i>Octopus</i>, <i>Sepia</i>,Glochidium larva (Specimens). 10. Shell Pattern-<i>Unio</i>, <i>Ostrea</i>, <i>Cypria</i>, <i>Murex</i>, <i>Nautilus</i>, <i>Patella</i>, <i>Dentalium</i>,Cuttle bone. 11. Echinodermata: Systematics of Sea star, Brittle star, Sea Urchin, Sea cucumber, Sea lilly (Specimens).Slide of Bipinnaria larva, Echinopluteus larva and Pedicellaria. 12. Harmful Nonchordates: Soil Nematodes. Agricultural, veterinary and human pests of Arachnida. Agricultural, veterinary and human pests of Arthropoda. 13. Beneficial Nonchordates: 14. Sericulture: Life cycle of <i>Bombyxmori</i>, Uzi fly, Cocoon, Raw silk. 15. Apiculture: Any 2 Species of honey bee, bee wax. 16. Pearl Culture: Pearl Oyster and Natural Pearls. 17. Virtual Dissection/Cultured specimens: Earthworm – Nervous system Leech-Digestive System 18. Virtual Dissection/ Cultured specimens: Prawn - Nervous system. Cockroach-Salivary Apparatus and Digestive system. | |
|---|--|

Recommended Books:

- Barnes, R. S. K.; Calow, P.; Olive, P. J. W.; Golding, D. W.; Spicer, J. I. (2002) The Invertebrates: a Synthesis, Blackwell Publishing.
- Hickman, C.; Roberts, L.S.; Keen, S.L.; Larson, A. and Eisenhour, D. (2018) AnimalDiversity, McGraw-Hill.
- Holland, P. (2011) The Animal Kingdom: A Very Short Introduction, OxfordUniversity Press.
- Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S.and Nelson.
- Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia PublishingHome.
- Bushbaum, R. (1964) Animals without Backbones. University of Chicago Press.

Web References:

Anatomy of earthworm: The dissection works (CD); www.scienceclass.com, www.neosci.com
Cockroach dissection- www.ento.vt.edu

Pedagogy: Lectures, Presentations, videos, Labs, Assignments, Tests, Individual or group Field oriented Project Report on, Visit to one research institute/ one wild life sanctuary / museum / zoo.

TOPICS RECOMMENDED FOR PROJECT/MONOGRAPH PREPARATION

General account of protozoan ooze.
Monograph on sea anemones.
Monograph on polychaetes.
Monograph on leeches.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Assignment/Monograph	05
Test	05
Participation in class	05
Total	15

Date:

Co-Ordinator

Subject Committee Chairperson

Open Elective Course Content

Semester: I

Course Title: Economic Zoology Course Code: OEC5ZOOT1	Course Credits: 3
Total Contact Hours: 42	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student will be able to:

1. Gain knowledge about silkworms rearing and their products.
2. Gain knowledge in Bee keeping equipment and apiary management.
3. Acquaint knowledge on dairy animal management, the breeds and diseases of cattle and learn the testing of egg and milk quality.
4. Acquaint knowledge about the culture techniques of fish and poultry.
5. Acquaint the knowledge about basic procedure and methodology of vermiculture.
6. Learn various concepts of lac cultivation.
7. Students can start their own business i.e. self-employments.
8. Get employment in different applied sectors

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12
I Core competency	X											
II Critical thinking	X											
III Analytical reasoning	X											
IV Research skills	X											
V Team work	X											

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

Content	Hrs
Unit I	14
Chapter 1. Sericulture: <ul style="list-style-type: none"> History and present status of sericulture in India Mulberry and non-mulberry species in Karnataka and India Mulberry cultivation Morphology and life cycle of <i>Bombyx mori</i> Silkworm rearing techniques: Processing of cocoon, reeling Silkworm diseases and pest control Chapter 2. Apiculture: <ul style="list-style-type: none"> Introduction and present status of apiculture Species of honey bees in India, life cycle of <i>Apis indica</i> Colony organization, division of labour and communication Bee keeping as an agro based industry; methods and equipments: indigenous methods, extraction appliances, extraction of honey from the comb and processing Bee pasturage, honey and bees wax and their uses Pests and diseases of bees and their management 	
Unit II	14
Chapter 3. Live Stock Management: <ul style="list-style-type: none"> Dairy: Introduction to common dairy animals and techniques of dairy management Types, loose housing system and conventional barn system; advantages and limitations of dairy farming Establishment of dairy farm and choosing suitable dairy animals-cattle Cattle feeds, milk and milk products Cattle diseases Poultry: Types of breeds and their rearing methods Feed formulations for chicks Nutritive value of egg and meat Disease of poultry and control measures Chapter 4. Aquaculture: <ul style="list-style-type: none"> Aquaculture in India: An overview and present status and scope of aquaculture Types of aquaculture: Pond culture: Construction, maintenance and management; carp culture, shrimp culture, shellfish culture, composite fish culture and pearl culture 	
Unit - 3	14
Chapter 5. Fish culture: <ul style="list-style-type: none"> Common fishes used for culture. Fishing crafts and gears. Ornamental fish culture: Fresh water ornamental fishes- biology, breeding techniques Construction and maintenance of aquarium: Construction of home aquarium, materials used, setting up of freshwater aquaria, aquarium plants, ornamental objects, cleaning the aquarium, maintenance of water quality. control of snail and algal growth. Modern techniques of fish seed production Chapter 6. Prawn culture: <ul style="list-style-type: none"> Culture of fresh and marine water prawns. Preparation of farm. Preservation and processing of prawn, export of prawn. Chapter 7. Vermiculture: <ul style="list-style-type: none"> Scope of vermiculture. Types of earthworms. Habit categories - epigeic, endogeic and anecic; indigenous and exotic species. Methodology of vermicomposting: containers for culturing, raw materials 	

<p>required, preparation of bed, environmental pre-requisites, feeding, harvesting and storage of vermicompost.</p> <ul style="list-style-type: none"> • Advantages of vermicomposting. • Diseases and pests of earthworms. <p>Chapter 8.Lac Culture:</p> <ul style="list-style-type: none"> • History of lac and its organization, lac production in India. • Life cycle, host plants and strains of lac insect. • Lac cultivation: Local practice, improved practice, propagation of lac insect, inoculation period, harvesting of lac. • Lac composition, processing, products, uses and their pests. 	
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Text Books

Suggested Readings:

1. Eikichi, H. (1999). Silkworm Breeding (Translated from Japanese). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Ganga, G. (2003). Comprehensive Sericulture Vol-II: Silkworm Rearing and Silk Reeling.
3. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Mahadevappa, D., Halliyal, V.G., Shankar, D.G. and Bhandiwad, R., (2000). Mulberry Silk
5. Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Roger, M (1990). The ABC and Xyz of Bee Culture: An Encyclopedia of Beekeeping, Kindle Edition.
7. Shukla and Upadhyaya (2002). Economic Zoology, Rastogi Publishers
8. YadavManju (2003). Economic Zoology, Discovery Publishing House.
9. JabdePradip V (2005). Textbook of applied Zoology, Discovery Publishing House, New Delhi.
10. Cherian & Ramachandran Bee keeping in-South Indian Govt. Press, Madras.
11. Sathe, T.V. Vermiculture and Organic farming.
12. Bard. J (1986). Handbook of Tropical Aquaculture.
13. Santhanam, R. A. Manual of Aquaculture.
14. Zuka. R.1 and Hamiyn (1971). Aquarium fishes and plants
15. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
16. Animal Disease- Bairagi K. N. Anmol Publications Pvt.Ltd 2014
17. Economics Of Aquaculture - Singh(R.K.P) - Danika Publishing Company 2003
18. Applied and Economic Zoology (SWAYAM) web https://swayam.gov.in/nd2_cec20_ge23/preview

Course Books published in English and Kannada may be prescribed by the Universities and College

References

Pedagogy: Chalk and Talk, PPT, Group discussion, Seminar, Field visit

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	20
Written Assignment/Presentation/Project / Term Papers/Seminar	15
Class performance/Participation	05
Total	40

Date: Course Co-Ordinator

Subject Committee Chairperson

Scheme of Examination: Open elective (Semester I)

Question No.	PART - A	Marks
I	Answer any SIX Questions out of NINE Questions (3 questions of 2 marks from each unit)	6 x 2 = 12
	PART - B	
	Unit - I	
II	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
III	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Unit - II	
IV	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
V	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Unit - III	
VI	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
VII	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Total	60

Skill Enhancement Course in Zoology

Course Content

Semester: I

Course Title: Vermiculture Course Code: VEC5ZOOP1	Course Credits: 2
Total Contact Hours: 56 Hours	Duration of ESA: 3 Hrs
Formative Assessment Marks: 15	Summative Assessment Marks: 35
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student:

1. Understands the importance of earthworms in maintaining soil quality.
2. Learns that the vermicomposting is an effective organic solid waste management method.
3. Gets acquainted with the importance of earthworms in agro-based economic activity.
4. Vermicomposting leads to organic farming and healthy food production.
5. Vermicomposting may be taken up as a small scale industry by the farmers and unemployed youth.
6. Get jobs in teaching institutions or vermiculture units as technicians.
7. Learn the concept of vermicomposting as bio fertilizers thus student can become an entrepreneur after completion of the course.
8. Best opportunity for self-employment and lifelong learning with farmers.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	VEC5ZOO P1	2	3	4	5	6	7	8	9	10	11	12
i Core competency.	X											
ii Critical thinking.	X											
iii Analytical reasoning.	X											
iv Research skill.	X											
v Team work.	X											

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

List of labs to be conducted		56Hrs
1	Collection of native earth worm species to study habit and habitat.	
2	Keys to identify different species of earth worm.	
3	Externals and Life cycle of <i>Eisenia fetida</i> and <i>Eudrilus eugeniae</i> .	
4	Dissection of digestive and reproductive system.	
5	Study of vermicomposting equipments and devices.	
6	Preparation of vermibeds and their maintenance.	
7	Study of different vermicomposting methods.	
8	Harvesting, separation of worms, packaging, transport and storage of vermicompost.	
9	Vermi-wash collection and processing.	
10	Small scale earth worm farming for home gardens and studying the effect of vermicompost on garden plants.	
11	Budget and cost scenario of vermiculture (Project).	
12	Diseases and natural enemies of earth worms and their control measures.	
13	Role of vermitechnology in environmental protection.	
14	Economics and Marketing of vermicompost and vermi wash.	
15	Visit to vermiculture farm to acquaint with latest techniques.	

Text Books and references

1. Bhatt J.V. & S.R. Khambata (1959) -Role of Earthworms in Agriculture|| Indian Council of Agricultural Research, New Delhi
2. Edwards, C.A. and J.R. Lofty (1977) -Biology of Earthworms|| Chapman and Hall Ltd., London.
3. Lee, K.E. (1985) -Earthworms: Their ecology and Relationship with Soils and Land Use|| Academic Press, Sydney.
4. Dash, M.C., B.K.Senapati, P.C. Mishra (1980) — Vermes and Vermicomposting|| Proceedings of the National Seminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part B), School of Life Sciences, Sambalpur University, JyotiVihar, Orissa.
5. Kevin, A and K.E.Lee (1989) — Earthworm for Gardeners and Fisherman|| (CSIRO,Australia, Division of Soils)
6. Satchel, J.E. (1983) -Earthworm Ecology|| Chapman Hall, London.
7. Wallwork, J.A. (1983) -Earthworm Biology|| Edward Arnold (Publishers) Ltd. London.

Pedagogy

1. Demonstration
2. Assignment
3. Group discussion
4. Field visit
5. Use of Audio-Visual aids.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Class Test	05
Attendance and Assignments	05
Visit to vermicompost unit and report	05
Total	15

Date:**Course Coordinator****Subject Committee Chairperson**

Proposed Course content under New Education Policy – Year 2021-22
For II Semester B.Sc.

Zoology Core Course Content

Course Title: Biochemistry and Physiology	Course Credits: 4
Course Code: DSCC5Z00T2	L-T-P per week: 4-0-0
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Model Syllabus Authors:	

Course outcomes:

The student at the completion of the course will learn:

1. To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.
2. How simple molecules together form complex macromolecules.
3. To understand the thermodynamics of enzyme catalyzed reactions.
4. Mechanisms of energy production at cellular and molecular levels.
5. To understand various functional components of an organism.
6. To explore the complex network of these functional components.
7. To comprehend the regulatory mechanisms for maintenance of function in the body.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC 1	CC T2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency		X									
II Critical thinking		X									
III Analytical reasoning		X									
IV Research skills		X									
V Team work		X									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Core Course content:

Content	Hours
Unit I	14
Chapter 1. Structure and Function of Biomolecules: <ul style="list-style-type: none"> Structure and Biological importance of carbohydrates (Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates) (Structure of Glucose, Lactose and Glycogen only) Lipids (saturated and unsaturated Fatty acids, Tri-acylglycerols, Phospho lipids, Glycolipids and Steroids) Structure, Classification and General Properties of amino acids; Essential and non-essential amino acids, Levels of organization in proteins; Simple and conjugate proteins. 	
Chapter 2. Enzyme Action and Regulation <ul style="list-style-type: none"> Nomenclature and classification of enzymes; Cofactors; Specificity of enzyme action. Isozymes; Mechanism of enzyme action Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions ; Equation of Michaelis-Menten, Concept of K_m and V_{max}, Enzyme inhibition Clinical importance of enzymes. 	
Unit 2	14
Chapter 3. Metabolism of Carbohydrates and Lipids <ul style="list-style-type: none"> Metabolism of Carbohydrates: glycolysis, citric acid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis Lipids- Biosynthesis of palmitic acid; Ketogenesis, β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms 	

Chapter 4. Metabolism of Proteins and Nucleotides <ul style="list-style-type: none"> • Catabolism of amino acids: Transamination, Deamination, Ureacycle, Nucleotides and vitamins • Peptide linkages 	
Unit 3	14
Chapter 5. Digestion and Respiration in humans <ul style="list-style-type: none"> • Structural organization and functions of gastrointestinal tract and associated glands. • Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; • Physiology of trachea and Lung. Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood, Respiratory pigments, Dissociation curves and the factors influencing it; • Control of respiration. 	
Chapter 6. Circulation and Excretion in humans <ul style="list-style-type: none"> • Components of blood and their functions; hemopoiesis • Blood clotting: Blood clotting system, Blood groups: Rh-factor, ABO and MN • Structure of mammalian heart • Cardiac cycle; Cardiac output and its regulation, Electrocardiogram, Blood pressure and its regulation • Structure of kidney and its functional unit; Mechanism of urine formation 	
Unit IV	14
Chapter 7. Nervous System and Endocrinology in humans <ul style="list-style-type: none"> • Structure of neuron, resting membrane potential(RMP) • Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapse • Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them and functions. • Classification of hormones; Mechanism of Hormone action. 	
Chapter 8. Muscular System in humans <ul style="list-style-type: none"> • Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus 	

Suggested Readings:

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet & Voet: Biochemistry Vols 1 & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hercourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. & Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume 1 & 2, 11th edition, CBS Publishers (2016).

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	20
Written Assignment/Presentation/Project / Term Papers/Seminar	15
Class performance/Participation	05
Total	40

Date: Coordinator

Subject Committee Chairperson

Scheme of Examination: Theory (Semester II)

Question No.	PART - A	Marks
I	Answer any SIX Questions out of EIGHT Questions (2 questions of 2 marks from each unit)	6 x 2 = 12
	PART - B	
	Unit - I	
II	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
III	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - II	

IV	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
V	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - III	
VI	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
VII	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Unit - IV	
VIII	3 Marks Questions (Answer any TWO out of THREE)	3 x 2 = 6
IX	6 Marks Questions (Answer any ONE out of TWO)	6 x 1 = 6
	Total	60

Zoology Semester II Core Course Lab Content

Course Title/Code: Biochemistry and Physiology Lab	Course Credits: 2
Course Code: DSCC5Z00P2	L-T-P per week: 0-0-4
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 20	Summative Assessment Marks: 30
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to understand:
 Basic structure of biomolecules through model making.
 Develop the skills to identify different types of blood cells.
 Enhance basic laboratory skill like keen observation, analysis and discussion.
 Learn the functional attributes of biomolecules in animal body.
 Know uniqueness of enzymes in animal body and their importance through enzyme kinetics.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC P1	CC P2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency		X									
II Critical thinking		X									
III Analytical reasoning		X									
IV Research skills		X									
V Team work		X									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

List of labs to be conducted	Hours
1. Preparation of models of nitrogenous bases- nucleosides and nucleotides. 2. Preparation of models of amino acids and dipeptides. 3. Preparation of models of DNA and RNA. 4. Qualitative analysis of Carbohydrates (Molisch's test, Iodine test, Benedict's test), Proteins (Xanthoproteic test/Biuret test/Ninhydrin test-any 2 tests) and Lipids (Greasy spot test). 5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid. 6. Separation of amino acids or proteins by paper chromatography.	20
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of Km and Vmax. 8. Determination of the activity of enzyme (amylase) - Effect of temperature and time. 9. Action of salivary amylase under optimum conditions. 10. Quantitative estimation of Oxygen consumption by fresh water Crab. 11. Quantitative estimation of salt gain and salt loss by fresh water.	15
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.	15

13. Counting of RBC in blood using Hemocytometer. 14. Counting of WBC in blood using Hemocytometer. 15. Differential staining of human blood corpuscles using Leishman stain. 16. Recording of blood glucose level by using glucometer.	
Virtual Labs (Suggestive sites) https://www.vlab.co.in https://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlab www.onlinelabs.in www.powershow.com https://vlab.amrita.edu https://sites.dartmouth.edu	06

Text Books

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols 1 & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hercourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. & Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume 1 & 2, 11th edition, CBS Publishers (2016).

Web References:

- Mammalian Physiology– www.biopac.com

Pedagogy: Lectures, Presentations, videos, Virtual Labs, Assignments, Tests, Individual or group Field oriented Project Report on or visit to a research institute.

TOPICS RECOMMENDED FOR SEMINAR/PROJECT REPORT/ASSIGNMENT/MONOGRAPH

1. Biochemical pathways, their evolutionary background and regulation.
2. Blood groups and their importance.
3. Vital enzymes for human body.
4. Essential and nonessential amino acids.
5. Important body lipids.
6. Significance of animal proteins.
7. Role of carbohydrates in animal body.
8. Nature of proteins and nurture of animal body.
9. Role of lipids in structural and functional organization of body.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Assignment/Monograph/Seminar/Project Report	10
Test	05
Participation in class	05
Total	20

Date: Coordinator

Subject Committee Chairperson

**Course Title/Code: Biochemistry and Physiology Lab
(BSCC5ZOOP2)**

Scheme of Practical Examination

Time: 3 hours

Max. marks: 30

I. Biochemistry experiment (by lots). = 10

Conduct suitable qualitative tests for the detection of Organic compounds/Nitrogenous Wastes in the sample provided and report.

(Name of the test - 1 Mark; Principle - 2 Marks; Conducting the test - 3 Marks; Procedure/observation/inference (in tabular form) -3 Marks; Result -1 Mark)

II. Conduct tests and report the salivary amylase activity of human saliva = 05
(Common for all) (Conducting the test - 3 Marks; report – 2 Marks)

III. Physiology experiment (by lots). =10

Conduct Physiology experiment as per lots and report

(Conducting the test - 4 Marks; Principle/Procedure/observation/calculation/ Inference - 4 Marks; Result - 2 Marks)

IV. Class Records = 05

Course Content

Semester: **II Semester B. Sc., (Hons) Zoology**

Minor Core course

Course Title: PAPER I-BIOLOGY OF CHORDATES	Course Code: MDC5ZOOT2
Course Type: Minor Discipline Core Theory, L-T-P: 4-0-0	Course Credits: 4
Total Contact Hours: 56	Duration of ESA: 3 Hrs
Formative Assessment Marks: 30	Summative Assessment Marks: 70
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Learn the structural biology of Chordates through their adaptive features.
2. Study the functional biology of Chordates through their body organization and functions.
3. Comprehend the identification of species and their evolutionary relationships.
4. Enhancement of research skills like critical thinking.
5. Develop abilities required for industrial employment as well as self-employment.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / (POs)	MDC5ZOOT1	MDC5ZOOT2	MDC5ZOOT3	MDC5ZOOT4	MDC5ZOOT5	MDC5ZOOT6
I Core competency		X				
II Critical thinking		X				
III Analytical reasoning		X				
IV Research skills		X				
V Team work		X				

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content	Hrs
Unit I	14
<p>Chapter 1: Hemichordata: Type Study of <i>Balanoglossus</i> – Habit and Habitat, Morphology, Coelom. Tornaria larva and its affinities. Affinities and systematic position of Hemichordata.</p> <p>Chapter 1: Chordates: Origin of Chordates. Basic characters of chordates and classification upto classes.</p> <p>Chapter 3: Urochordata : Type Study of <i>Herdmania</i>-Habit and Habitat, Morphology, Ascidian tadpole- structure and its retrogressive metamorphosis.</p> <p>Chapter 4: Cephalochordata : Type Study of <i>Branchiostoma (Amphioxus)</i>-Habit and Habitat, Morphology, Digestive system, Feeding mechanism and circulatory system.</p> <p>Chapter 5: Agnatha General characters of Agnatha and classification upto classes. Salient features of Cyclostomata and Ostracodermi with orders and examples. Ammocoete larva and its significance.</p>	
Unit II	14
<p>Chapter 6: Vertebrates: General characters and Classification of different classes of vertebrates (Pisces, Amphibia, Reptilia, Aves, Mammalia) up to the order with examples. General characters of Chondrichthyes and Osteichthyes. Interesting features and evolutionary significance of Dipnoi. Salient features of Placodermi with examples. Interesting features of Sphenodon. Interesting features of Archaeopteryx. Salient features of Ratitae and Carinatae with examples. Interesting features of mammalian orders (Insectivora, Carnivora, Chiroptera, Cetacea, Proboscidea, Ungulata – Perissodactyla and Artiodactyla, and Primates – Platyrrhini and Catarrhini) with examples.</p>	
Unit III	14
<p>Chapter 7: General account of Chordates: Types of caudal fins and tails in fishes. Osmoregulation and Swim bladder in Fishes. Origin of Amphibia. Neoteny and Paedogenesis. Adaptive radiation in extinct reptiles with suitable examples. Temporal fossae in reptiles. Poison apparatus and biting mechanism in snakes. Parental care in Pisces, Amphibians, Reptiles, Birds and Mammals. Dentition in mammals. Evolution of molar tooth. Migration in Pisces, and Birds and Mammals.</p> <p>Chapter 8: Type study of <i>Rattus</i>: Morphology, Endoskeleton (Axial and appendicular skeleton, except hands and feet) Digestive system, circulatory system, reproductive system.</p>	
Unit IV	14
Beneficial Chordates:	

Chapter 9: Pisciculture

Meaning of Aquaculture and Pisciculture, inland and marine fisheries.
 Inland Pisciculture – Procedure, composite fish forming and significance.
 A brief account of fishing gears and crafts.
 Fish processing and preservation.

Chapter 10: Poultry

Definition, breeds of Fowls.
 Indigenous and exotic breeds with suitable examples.
 Poultry products and by-products.
 Diseases of poultry – Ranikhet, Fowl pox, Fowl Cholera, Fowl Typhoid.

Chapter 11: Dairy

Breeds of cattle: indigenous and exotic breeds.
 Improvements in cattle breeding – artificial insemination, MOET.
 Pasteurization and gobar gas.
 Diseases in cattle- Foot and Mouth diseases, causes and effects.

Topics Suggested for Assignment/ Formative Assessment:

1. Animal connecting links.
2. Migration in Birds
3. Communication in Primates
4. Parental Care in Animals
5. Neoteny
6. Paedogenesis
7. Poultry management
8. Dairy Management
9. Fisheries management
10. Products and by-products of Dairy.

Suggested Readings:

1. Harvey et al: The Vertebrate Life (2006)
2. Colbert et al: Colbert's Evolution of the Vertebrates: A history of the backbone animal through time (5th ed 2002, Wiley-Liss)
3. Hildebrand: Analysis of Vertebrate Structure (4th ed 1995, John Wiley)
4. Kenneth V. Kardong (2015) Vertebrates: Comparative Anatomy, Function, Evolution McGraw Hill
5. McFarland et al: Vertebrate Life (1979, Macmillan Publishing)
6. Parker and Haswell: Text Book of Zoology, Vol. II (1978, ELBS)
7. Romer and Parsons: The Vertebrate Body (6th ed 1986, CBS Publishing Japan)
8. Young: The Life of vertebrates (3rd ed 2006, ELBS/Oxford)
9. Weichert C. K. and William Presch (1970). Elements of Chordate Anatomy, Tata McGraw Hills

Web Sources:

1. <https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crash-course-biology-science/v/crash-course-biology-123>
2. <https://opentextbc.ca/biology2/openstax/chapter/chordates/>

Pedagogy: Lectures, Presentations, videos, Assignments and Weekly Formative Assessment Tests.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Assignment/ Field Report/ Project	15 Marks
Test	10 Marks
Participation in class	05 marks
Total	30 Marks

Date: Co-Ordinator

Subject Committee Chairperson

Minor Core Course Lab Content

Semester: II Zoology

Course Title: Lab on Biology of Chordates, L-T-P: 0-0-4	Course Credits: 2
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 15	Summative Assessment Marks: 35
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand basics of classification of Chordates.
2. Learn the diversity of habit and habitat of animal species.
3. Develop the skills to identify different classes and orders of Chordates.
4. Know uniqueness of particular animal and its importance
5. Enhancement of basic laboratory skill like keen observation and drawing.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	MDC5ZOO P1	MDC5ZOOP 2	MDC5ZOOP 3	MDC5ZOOP 4	MDC5ZOOP 5	MDC5ZOOP 6
I Core competency		X				
II Critical thinking		X				
III Analytical reasoning		X				
IV Research skills		X				
V Team work		X				

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Minor Course Lab Content

List of labs to be conducted	56 Hours
<p>1. Protochordata: Balanoglossus and its T. S through proboscis Ascidian/ <i>Herdmania</i> and <i>Amphioxus</i>, T.S. of <i>Amphioxus</i> through pharynx and intestine.</p> <p>2. Cyclostomata: -<i>Petromyzon</i>, Ammocoete larva and <i>Myxine</i>.</p> <p>3. Pisces: - Cartilaginous Fishes – <i>Narcine</i>, <i>Trygon</i>, <i>Pristis</i>, <i>Myxobatias</i> - Bony Fishes – Zebra fish, Hippocampus, Muraena, Ostracion, Tetradon, Pleuronectus, Diodon, Echeneis.</p> <p>4. Ornamental fishes: -Siamese, Koi, Oscar, Betta Sp., Neon tetra, Guppies, Gold fish, Angle fish, Rainbow fish, Mollies.</p> <p>5. Accessory respiratory organs – Saccobranchus, Clarias and Anabas.</p> <p>6. Amphibia: -Frog, Bufo, Ambystoma, Axolotl larva, Necturus and Ichthyophis.</p> <p>7. Reptilia: -Turtle, Tortoise, Mabuya, Calotes, Chameleon, Varanus. snakes –Dryophis, Rat snake, Brahmini, Cobra, Krait, Russell's viper and Hydrophis; Poison apparatus.</p> <p>8. Aves:Beak and feet modifications in the following examples: Duck, Crow, Sparrow, Humming bird, Parrot, King fisher, Eagle or Hawk.</p> <p>9. Mammalia: -Mongoose, Squirrel, Pangolin, Hedge Hog, Rabbit, Rat, Monkey and Loris.</p> <p>10. Virtual Dissection/Cultured specimens: -Shark/Bony fish: Afferent and efferent branchial systems, glossopharyngeal and vagus nerves.</p> <p>11.Virtual Dissection/Cultured specimens: - Frog: Origin and distribution of trigeminal nerve.</p> <p>12. Virtual Dissection/Cultured specimens: -Rat: Dissection (only demonstration) – Circulatory system (arterial and venous), urinogenital system.</p> <p>Beneficial Chordates:</p> <p>13. Pisciculture: Cultured varieties of fishes- fresh water and marine water fishes (locally available) Diseases- (Bacterial, viral, fungal and parasitic) Products and by products- (Meat, gelatin, Insulin, Isinglass, protein and chitin)</p>	

14. Poultry: Cultured varieties- Indigenous and exotic species. Diseases- Bacterial and viral. Products and by-products –Meat, Eggs, albumin flakes and manure. 15. Dairy: Cultured varieties-Indigenous and exotic breeds. Diseases- Infectious, hereditary and deficiency. Products and by-products – Milk, Cheese, Yougurt.	
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Suggested Readings:

1. Harveyetal:TheVertebrateLife(2006)
2. Colbertetal:Colbert’sEvolutionoftheVertebrates:Ahistoryofthebackbonedanimalsthroughtime (5thed2002, Wiley-Liss)
3. Hildebrand: Analysis of Vertebrate Structure(4thed1995,JohnWiley)
4. KennethV.Kardong(2015)Vertebrates:ComparativeAnatomy,Function,EvolutionMcGrawHill
5. McFarlandetal:VertebrateLife(1979,MacmillanPublishing)
6. Parkerand Haswell: Text Book of Zoology, Vol. II(1978,ELBS)
7. Romerand Parsons: The Vertebrate Body(6thed 1986,CBSPublishingJapan)
8. Young: The Life of vertebrates(3rded2006,ELBS/Oxford)
9. WeichertC.KandWilliamPresch(1970).ElementsofChordateAnatomy,TataMcGrawHills

Web Sources:

1. <https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crashncourse-biology-science/v/crash-course-biology-123>
2. <https://opentextbc.ca/biology2eopenstax/chapter/chordates/>

Pedagogy: Lectures, Presentations, videos, Assignments and Weekly Formative Assessment Tests.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Assignment/Monograph	05
Test	05
Participation in class	05
Total	15

Date: Co-Ordinator

Subject Committee Chairperson

Open Elective Course Content

Semester: II Zoology

Course Title: Parasitology	Course Credits: 3
Course Code: OEC5ZOOT2	
Total Contact Hours: 42	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the students will be able to:

9. Know the stages of the life cycles of the parasites and infective stages.
10. Develop ecological model to know population dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system.
11. Develop skills and realize significance of diagnosis of parasitic infection and treatment.
12. Understand about diseases caused by Protozoa, Helminthes, Nematodes and Arthropods at molecular level.
13. Develop their future career in medical sciences and related administrative services.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12
I Core competency	X											
II Critical thinking	X											
III Analytical reasoning	X											
IV Research skills	X											
V Team work												

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

Content	42Hrs
Unit – 1	
Chapter 1. General Concepts <ul style="list-style-type: none">• Introduction, Parasites, parasitoids, host, zoonosis• Origin and evolution of parasites• Basic concept of Parasitism, symbiosis, phoresis, commensalisms and mutualism• Host-parasite interactions and adaptations• Life cycle of human parasites• Occurance, mode of infection and prophylaxis Chapter 2. Parasitic Platyhelminthes <ul style="list-style-type: none">• Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of• <i>Fasciolopsis buski</i>• <i>Schistosoma haematobium</i>• <i>Taenia solium</i>• <i>Hymenolepis nana</i> Chapter 3. Parasitic Protists <ul style="list-style-type: none">• Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of• <i>Entamoeba histolytica</i>• <i>Giardia intestinalis</i>	14

<ul style="list-style-type: none"> • <i>Trypanosoma gambiense</i> • <i>Plasmodium vivax</i> 	
Unit – 2	14
<p>Chapter 4. Parasitic Nematodes</p> <ul style="list-style-type: none"> • Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of <ul style="list-style-type: none"> • <i>Ascaris lumbricoides</i> • <i>Ancylostoma duodenale</i> • <i>Wuchereria bancrofti</i> • <i>Trichinella spiralis</i> • Nematode plant interaction; Gall formation <p>Chapter 5. Parasitic Arthropods</p> <ul style="list-style-type: none"> • Biology, importance and control of <ul style="list-style-type: none"> • Ticks (Soft tick <i>Ornithodoros</i>, Hard tick <i>Ixodes</i>) • Mites (<i>Sarcoptes</i>) • Lice (<i>Pediculus</i>) • Flea (<i>Xenopsylla</i>) • Bug (<i>Cimex</i>) • Parasitoid (Beetles) <p>Chapter 6. Parasitic Vertebrates</p> <ul style="list-style-type: none"> • Cookicutter Shark • Hood Mocking bird and Vampire bat and their parasitic behavior and effect on host 	
Unit – 3	14
<p>Chapter 7. Molecular diagnosis & clinical parasitology</p> <ul style="list-style-type: none"> • General concept of molecular diagnosis for parasitic infection • Advantages and disadvantages of molecular diagnosis • Fundamental techniques used in molecular diagnosis of endoparasites • Immunoassay or serological techniques for laboratory diagnosis of endoparasites on the basis of marker molecules like <i>G.intestinalis</i>, <i>B. coli</i>, <i>E. histolytica</i>, <i>L. donovani</i>, Malarial parasite using <ul style="list-style-type: none"> • ELISA, RIA • Counter Current Immunelectrophoresis (CCI) • Complement Fixation Test (CFT) PCR, DNA, RNA probe 	

Suggested Readings:

- Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors.
- E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition, Lea &Febiger.
- Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group.
- Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
- Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers.
- K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.
- Gunn, A. and Pitt, S.J. (2012). Parasitology: an Integrated Approach. Wiley Blackwell.
- Noble, E. R. and G.A.Noble (1982) Parasitology: The biology of animal parasites. V th Edition, Lea &Febiger.
- Paniker, C.K.J., Ghosh, S. [Ed} (2013). Paniker's Text Book of Medical Parasitology. Jaypee, New Delhi.
- Parija, S.C. Text book of medical parasitology, protozoology & helminthology (Text and color Atlas), IIEdition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
- Roberts, L.S and Janovy, J. (2009). Smith & Robert's Foundation of Parasitology. 8th. Edn. McGraw Hill.

30. Bogitsh, B. J. and Cheng, T. C. (2000). Human Parasitology. 2nd Ed. Academic Press, New York.
31. Chandler, A. C. and Read. C. P. (1961). Introduction to Parasitology, 10th ed. John Wiley and Sons Inc.
32. Cheng, T. C. (1986). General Parasitology. 2nd ed. Academic Press, Inc. Orlando. U.S.A.
33. Schmidt, G. D. and Roberts, L. S. (2001). Foundation of Parasitology. 3rd ed. McGraw Hill Publishers.
34. Schmidt, G. D. (1989). Essentials of Parasitology. Wm. C. Brown Publishers (Indian print 1990, Universal Book Stall).
35. John Hyde (1996) Molecular Parasitology Open University Press.
36. J Joseph Marr and Miklos Muller (1995) Biochemistry and Molecular Biology of Parasites 2nd Edn Academic Press.

Course Books published in English and Kannada may be prescribed by the Universities and College

Pedagogy: Chalk and Talk, PPT, Group discussion, Seminar, Interaction, virtual lab, Lab visit

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	20
Written Assignment/Presentation/Project / Term Papers/Seminar	15
Class performance/Participation	05
Total	40

Date: _____ **Course Co-Ordinator** _____ **Subject Committee Chairperson** _____

Scheme of Examination: Open elective (Semester II)

Question No.	PART - A	Marks
I	Answer any SIX Questions out of NINE Questions (3 questions of 2 marks from each unit)	6 x 2 = 12
	PART - B	
	Unit - I	
II	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
III	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Unit - II	
IV	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
V	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Unit - III	
VI	3 Marks Questions (Answer any THREE out of FOUR)	3 x 3 = 9
VII	7 Marks Questions (Answer any ONE out of TWO)	7 x 1 = 7
	Total	60

Skill Enhancement Course Content

Semester: II Zoology

Course Title: Sericulture Course Code: VEC5ZOOP2	Course Credits: 2
Total Contact Hours: 56 Hours	Duration of ESA: 3 Hrs.
Formative Assessment Marks: 15	Summative Assessment Marks: 35
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student acquires the following knowledge:

1. Sericulture is an agro-based industry which gives economic empowerment to the students.
2. Sericulture may be taken up as a small scale industry by the small farmers and unemployed youth.
3. Get jobs in teaching profession, silk board and other Govt. institutions as technicians.
4. Student can be self-employed after successful completion of the course.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	VEC5ZOO P1	VEC5ZOO P2	3	4	5	6	7	8	9	10	11	12
i Core competency.		X										
ii Critical thinking.		X										
iii Analytical reasoning.		X										
iv Research skill.		X										
v Team work.		X										

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

List of Lab to be conducted		42 Hrs
1	Morphology and taxonomy of mulberry.	
2	Raising of saplings – cutting preparation, planting and maintenance of nursery.	
3	Agronomical practices in mulberry cultivation-weeding, manuring, irrigation and harvesting.	
4	Diseases and pests of mulberry.	
5	Silk producing insects – non mulberry and mulberry silk worms.	
6	Life cycle and morphology of <i>Bombyx mori</i> .	
7	Dissection of digestive system and silk glands of <i>Bombyx mori</i> .	
8	Silk worm rearing equipments.	
9	Rearing process – incubation, chawki rearing, late age worm rearing, mounting and harvesting of cocoons.	
10	Silk worm diseases and pests – Grasserie, Flacherie, Muscardine, Pebrine, Uzi fly and Beetles.	
11	Grainages – production of silk worm eggs.	
12	Physical and commercial characteristics of cocoons.	
13	Reeling and weaving process – stiffling , cooking , brushing, reeling and re-reeling, different types of looms.	
14	Visit to mulberry farm and sericulture centre.	
15	Economics of silk production (Project)	

Text Books and References

1. Govindan , R.,Narayanswami,T.K and Devaiah, M.C.1998,Principles of silk worm pathology.Ser Publishers ,Banglore.
2. Tazima, Y.1964 –The genetics of the silk worml Logos Press Ltd.London .
3. Tazima Y 1978 The silk worm an important laboratory tool Kodnasha Ltd. Tokyo.
4. Ganga G ,SulochanaChetty J An introduction to sericulture Oxford and IBH Publishing Co.Pvt. Ltd. New Delhi.
5. Ullal and Narasimhanna Hand book of practice sericulture .
6. FAO Mannuall on sericulture vol . 1-4.
7. Tazima Y 1958 Silkworm egg CSB Publication ,Bombay .
8. Yashimoro Tanaka 1964 Sericology CSB Publication , Bombay.

Pedagogy

1. Demonstration
2. Assignment
3. Group discussion
4. Field Visit.
5. Use of Audio-Visual aids.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Class Test	05
Attendance and Assignments	05
Visit to Mulberry Farm and Sericulture centre.	05
Total	15

Date:**Course Co-Ordinator****Subject Committee Chairperson**