UNIVERSITY OF MYSORE
YUVARAJA'S COLLEGE, MYSORE
(A Constituent Autonomous College with Potential for Excellence)
(Accredited "A" Grade with CGPA 3.34 by NAAC)

Under graduate (Bachelor) and Integrated M.Sc. Integrated Programs offered in Yuvaraja's College (Autonomous):

1. Bachelor of Science (B.Sc.) :
2. Bachelor of Computer Applications (BCA):
3. Bachelor of Business Administration (B.B.A.):
4. M.Sc. Integrated (5 Years)

The objectives and outcomes of the above programs and program specific subjectsand courses are given further. Following tables shows the programs and program specific subjects and the courses introduced as per NEP 2020 and CBCS (2019-20) during the academicyear 2022-23 for undergraduate and 5 Year Integrated M.Sc.

Sl. No	Program	Program Code	No of Program specific disciplines with code	Program Specific code	Page No. PSO & CO
1	B.Sc.	BSCNEPYCM	**Core Disciplines:** Any two have to be opted as per intake fixation orderfrom University. **(Fourteen)**:		
	B.Sc.	BSCNEPYCM	1. Biochemistry	BSCNEPBICYCM	9-14
	B.Sc.	BSCNEPYCM	2. Biotechnology	BSCNEPBITYCM	20-23
	B.Sc.	BSCNEPYCM	3. Botany	BSCNEPBOTYCM	29-34
	B.Sc.	BSCNEPYCM	4.Chemistry	BSCNEPCHEYCM	37-46
	B.Sc.	BSCNEPYCM	5. Computer Science	BSCNEPCOMYCM	51-57
	B.Sc.	BSCNEPYCM	6. Electronics	BSCNEPELEYCM	63-68
	B.Sc.	BSCNEPYCM	7. Environmental Science	BSCNEPENSYCM	74-78

	B.Sc.	BSCNEPYCM	8. Food and Nutrition	BSCNEPFSNYCM	84-88
	B.Sc.	BSCNEPYCM	9. Geology	BSCNEPGEOYCM	91-100
	B.Sc.	BSCNEPYCM	10. Mathematics	BSCNEPMATYCM	106-114
	B.Sc.	BSCNEPYCM	11. Microbiology	BSCNEPMICYCM	118-121
	B.Sc.	BSCNEPYCM	12. Physics	BSCNEPPHYYCM	125-126
	B.Sc.	BSCNEPYCM	13. Sericulture	BSCNEPSERYCM	130-132
	B.Sc.	BSCNEPYCM	14. Statistics	BSCNEPSTAYCM	137-144
	B.Sc.	BSCNEPYCM	15. Zoology	BSCNEPZOOYCM	150-155
2	BCA	BCANEPYCM	16. Computer Applications	BCANEPCAYCM	163-170
3	BBA	BBANEPYCM	17. Business Administration	BBANEPBAYCM	176-186
4	M.Sc. Integrated	MSCINTNEPYCM	18. Molecular Biology	MSCINTNEPMBYCM	195-199
Ability Enhancement Disciplines (AECC) Four have to be completed : Language disciplines: Compulsory (Two); One is Englishand the other can be chosen					
	B.Sc.	BSCNEPYCM	English This is included as one of the four ability Enhancement compulsory courses	BSCNEPENGYCM	
AECC: MIL: Optional any one (out of eight)					
	B.Sc.	BSCNEPYCM	19. Kannada	BSCNEPKANYCM	200-213
	B.Sc.	BSCNEPYCM	20. Sanskrit	BSCNEPSANYCM	214-218
	B.Sc.	BSCNEPYCM	21. Hindi	BSCNEPHINYCM	219-224
	B.Sc.	BSCNEPYCM	Malayalam	BSCNEPMALYCM	225-226
	B.Sc.	BSCNEPYCM	Persian	BSCNEPPERYCM	---

	B.Sc.	BSCNEPYCM	Tamil	BSCNEPTAMYCM	227-228

	B.Sc.	BSCNEPYCM	French,	BSCNEPFREYCM	---
	B.Sc.	BSCNEPYCM	Arabic	BSCNEPARAYCM	---
Compulsory two AECC					
	B.Sc.	BSCNEPYCM	22. Environmental Studies	BSCNEPESTYCM	231
	B.Sc.	BSCNEPYCM	23. Digital Fluency	BSCNEPDIGYCM	232
	B.Sc.	BSCNEPYCM	24. Indian Constitution	BSCNEPICNYCM	229
Skill Enhancement Courses (SEC): any one has to be opted					
	B.Sc BBA BCA M.Sc	BSCNEPYCM BBANEPYCM BCANEPYCM MSCINTNEPYCM	25. Physical Education	BSCNEPPHEYCM BBANEPPHEYCM BBANEPPHEYCM MSCINTNEPMBYCM	243
	B.Sc.	BSCNEPYCM	Financial Literacy	---	---
	B.Sc.	BSCNEPYCM	Banking & Finance	---	---
	BBA	BBANEPYCM	Creativity and Innovation	---	---
	BCA	BCANEPYCM	Bachelor of Computer Application	---	---

Program specific subjects and the courses introduced as per CBCS (2019-20) V & VI semester

Sl. No	Program	Program Code	No of Program specific disciplines	Program Specific code	Page No. PSO & CO
			Core Disciplines: Any		
1	B.Sc	BSCCBCSYCM	1.Biochemistry	BSCCBCSBICYCM	15-19

2	B.Sc	BSCCBCSYCM	2.Biotechnology	BSCCBCSBITYCM	24-28
3	B.Sc	BSCCBCSYCM	3.Botany	BSCCBCSBOTYCM	35-36
4	B.Sc	BSCCBCSYCM	4.Chemistry	BSCCBCSCHEYCM	47- 50
5	B.Sc	BSCCBCSYCM	5.Computer Science	BSCCBCSCOMYCM	58-62
6	B.Sc	BSCCBCSYCM	6.Electronics	BSCCBCSELEYCM	69-73
7	B.Sc	BSCCBCSYCM	7.Environmental Science	BSCCBCSENSYCM	79-84
8	B.Sc	BSCCBCSYCM	8.Food and Nutrition	BSCCBCSFSNYCM	89-90
9	B.Sc	BSCCBCSYCM	9.Geology	BSCCBCSGEOYCM	101-105
10	B.Sc	BSCCBCSYCM	10.Mathematics	BSCCBCSMATYCM	115-117
11	B.Sc	BSCCBCSYCM	11.Microbiology	BSCCBCSMICYCM	122-124
12	B.Sc	BSCCBCSYCM	12.Physics	BSCCBCSPHYYCM	127-129
13	B.Sc	BSCCBCSYCM	13.Sericulture	BSCCBCSSERYCM	133-136
14	B.Sc	BSCCBCSYCM	14.Statistics	BSCCBCSSTAYCM	145-149
15	B.Sc	BSCCBCSYCM	15.Zoology	BSCCBCSZOOYCM	156-160
			Language disciplines: **Compulsory (One)**: 1(a)English, BSCCBCSENGYCM This is included as one of the four ability Enhancement compulsory courses		

			<u>Optional any one (Nine):</u> 1(b)Kannada, BSCCBCSKANYCM 2(c)Hindi, BSCCBCSHINYCM 3(d) Sanskrit, BSCCBCSSANYCM 4(e) Malayalam, BSCCBCSTAMYCM 5(f) Persian, BSCCBCSPERYCM 6(g) Tamil, BSCCBCSARAYCM 7(h)French, BSCCBCSFREYCM 8(i)Arabic, BSCCBCSARAYCM 9(j)Malayalam, BSCCBCSMALYCM This is included as one of the four ability Enhancement compulsory courses		
Compulsory two AECC					
			Environmental Studies	BSCCBCSICNYCM	
			Indian Constitution	BSCCBCSESTYCM	
Skill Enhancement Courses (Four) (SEC 1 and 3): the ones specified below are Compulsory : Other two are department specific ones as SEC2and SEC4					
			SEC1/3: Disaster Management	BSCCBCSCOMYCM	
			SEC1/3: Computer Application	BSCCBCSDIMYCM	
2	B.C.A	BCACBCSYCM	**One** - Bachelor of Computer applications	BCACBCSCOAYCM	171-175
3	B.B.A	BBABCSYCM	**One** - Bachelor of Business Administration	BBACBCSMANYCM	187-194

1. Program: Bachelor of Science (B.Sc.)
Program Code: BSCCBCSYCM

PROGRAM COURSE OBJECTIVES:

Objective all Bachelor of Science degree program is

1. To train critical thinking.
2. To develop effective communication
3. To train good social interaction.
4. To become effective citizenship.
5. To have environmental concerns.
6. To motivate them for self-directed and lifelong learning process.
7. To develop belongingness to our locality and nation.

PROGRAM COURSE OUTCOME:

Students of all B.Sc. degree Programs at the time of graduation will be able to develop.

1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions, (intellectual, organizational, and personal) from different perspectives.

2. **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

3. **Social Interaction**: Elicit views of others, mediate, disagreements and help reach conclusions in group settings.

4. **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

5. **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

6. **Self Directed learning**: The ability to engage in independent and life-long learning in the context of socio-technological changes which gives them self-directed and lifelong learning capabilities.

7. Belongingness: The importance of locally available resources and knowledge with pride and this helps them to think locally and act globally and have belongingness to our nation.

2. Program: Bachelor of Computer Applications (BCA)
Program Code: BCACBCSYCM

PROGRAM COURSE OBJECTIVES:

1. To provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software.
2. To provide the students with options to specialize in legacy application software, system

software or mobile applications.

PROGRAM COURSE OUTCOME: Students will able to:

1) Recognize and appreciate the role of computing in a wide variety of activities such as applications of Modern society, including commerce, education and communication.
2) Analyse a given problem and develop an algorithm to solve the problem.
3) Demonstrate the basic technicalities of creating word document, creating power point presentation, design spreadsheet for office use.
4) Develop the software projects by understanding the client requirement.
5) Define fundamental account concept, conventions & terminologies.
6) Implement the software models in various programming languages like C, C++, VB. Net, Java Construct in the right way.
7) Master the basic concept and understand the database management system.
8) Acquire options to pursue MCA/ M.Sc.-CS/IT/ MBA/ MS (IT).
9) Become a responsible citizen with sensitivity towards environmental concerns.

3. Program: Bachelor of Business Administration (BBA)
Program Code: BBACBCSYCM

PROGRAM COURSE OBJECTIVES:

1. To Understand of Business Functions
2. To Provide Global Perspectives
3. To Develop Critical and Analytical Thinking Abilities
4. To Develop Interpersonal Skill
5. To Create Social Sensitivity in understanding CSR
6. Demonstrate sensitivity to social, ethical and sustainability issues
7. To Develop Entrepreneurship Insight
8. To prepare students for managerial positions in business and industry.
9. To develop entrepreneurial skills
10. To develop critical thinking and analysing skills
11. To inculcate ethical values, corporate social responsibilities and sustainable business practices.
12. To provide an environment that facilitates all-round development of the student's personality
13. To foster thinking minds that are sensitive to societal needs and issues thus making them good human beings and responsible members of the society.
14. To understand the problems faced by the business sector in the Current scenario.

PROGRAM COURSE OUTCOME:

1. Acquiring Conceptual Clarity on Various Functional Areas
2. Demonstrating ability to evolve strategies for organizational benefits

3. Develop analytical ability for Decision Making
4. Demonstrate the ability to develop models / frameworks to reflect critically on specific business contexts
5. Demonstrate capability in Oral and Written Communication
6. Demonstrate Ability to work in Groups
7. Demonstrate capability in understanding social cues for decision making
8. Develop ethical practices and values for Better Corporate Governance.

Bachelor of Science (Basic/Hons.)Degree in Biochemistry
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I, II, III and IV Semesters

Sem.	Discipline Core/ Open Elective Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Chemical Foundations of Biochemistry-1 (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Volumetric Analysis (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Biochemistry in Health and Diseases (3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Chemical Foundations of Biochemistry-2 (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Qualitative and Quantitative Analysis (0+0+2)	**4**	**2**	**25**	**25**
	OE-2: Nutrition and Dietetics (3+0+0)	**3**	**3**	**40**	**60**
III	DSC= 3 BIO-ORGANIC CHEMISTRY	**4**	**4**	**40**	**60**
	DSCP-3 : BIO-ORGANIC CHEMISTRY	**4**	**2**	**25**	**25**
	OE-1: BIOCHEMICAL TECHNIQUES	**3**	**3**	**40**	**60**
	OE-2: HORMONES-BIOCHEMISTRY AND FUNCTION	**3**	**3**	**40**	**60**

IV	DSC-4 ANALYTICAL BIOCHEMISTRY	**4**	**4**	**40**	**60**
	DSCP- 4 ANALYTICAL BIOCHEMISTRY	**4**	**2**	**25**	**25**
	OE-1 BIOCHEMICAL TOXICOLOGY	**3**	**3**	**40**	**60**
	OE-2: PLANT BIOCHEMISTRY	**3**	**3**	**40**	**60**

Programme Outcome:

- To create interestin Biochemistry and appreciation for chemical basis of biological processes.
- To inculcate the spiri to finquiry and value of system aticstudy of a disipline.
- Provide a general under standing of there lated disciplines with aholistic knowledge generation in biological sciences.
- To provide anin-depth understanding of chemical reaction mechanism sin biological processes.
- To provide a flavor of historical developments of enzymes and their applications in research, diagnostics and various industries.
- 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.
- Develop problem solving and analytical skills through case studies, research papers and hands-on-experience.
- To appreciate biochemical mechanistic basis of physiological processes, metabolism under normal andpathological conditions importance and levels of metabolic regulations.
- To apply and effectively communicate scientific reasoning and data analysis in bothwritten and oral forms. They will be able to communicate effectively with well- designed posters and slides intalks aimed at scientific audiences as well as the general public.
- To bridge the knowledge and skill gap between academic out and industry requirements.
- To give students experience inconducting independent, hypothesis-driven, biological research, project planning and management
- To provide skills to publish research findings, and awareness of IP rights, and scientific publication ethics and problems of plagiarism.
- To prepare competenthuman resource with better knowledge, hands-on- experience and scientific attitude, at national and global levels for career sin research and development, academia and Pharma-, biotech-and agro-, and food processing industries.

Program Learning Outcome: The learning outcome-based curriculum is specific in terms of changes in cognitive and psychomotor behaviour of students. Biochemistry Honors course is intended to provide a broad framework enabling students to acquire askill set that helps them

understand and appreciate the field of biochemistry. The structure or design of this frameworks hall ensure a high standard of the Honors degree in Biochemistry at national level. The program specification is intended as a reference point for prospective students, current students, academic indelivering the program and realizing its objectives. Keeping in pace with the development altrends in Biochemistry and allied areas, itis expected that the students undertaking Biochemistry (Honors) course become conversant with the essence of Biochemistry and exhibit certain levels of learning outcomes as proposed below;

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;

I SEMESTER

Course Outcome: This will inculcate confidence and clarity of mind in students to understand the chemistry of Biomolecules, and Biological reactions. Aptitude. Critical thinking. Subject clarity. Analytical Skill.

Open Elective Course:

OE-1: BIOCHEMISTRY IN HEALTH AND DISEASES (THEORY): 3 Credits

42 Hrs.

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 and non-communicable diseases; Health promotion and treatments for various diseases and disorders.

II SEMESTER

DSC-2: CHEMICAL FOUNDATIONS OF BIOCHEMISTRY-2 (THEORY):

4 Credits **56 Hrs.**

Course Outcome: These topics will enable students to understand the fundamentals of chemical processes in biological systems; Aptitude, Critical thinking, Subject clarity, Analytical Skill.

DSCP-2: QUALITATIVE AND QUANTITATIVE ANALYSIS (PRACTICAL):

2Credits **56 Hrs.**

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

Open Elective Course:

OE-2: NUTRITION AND DIETETICS (THEORY): 3 Credits 42 Hrs.

Course Outcome: On completion of this course, the students will be able to;

- The student will gain knowledge about energy requirements and the Recommended Dietary Allowances.
- The student will understand the functions and role of macro nutrients, theirrequirements and the effect of deficiency and excess.
- The student learns the impact of various functional food so nour health.
- The student will be able to apply basic nutrition knowledge in making foodschoices and obtaining an a dequate diet.
- The student gains competence inconnecting the role of various nutrientsinmaintaining health and learn to enhance traditional recipes.

SEMESTER III

Course outcome:

These topics will enable students to understand the fundamentals of organic chemistry pertinent to their importance in understanding biochemical reactions.

Course outcome program outcome	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	X	X	X	X								
Critical thinking		X										
Subject clarity	X	X				X	X	X		X		X
Analytical skill	X				X	X	X	X	X			X

SEMESTER III

Practical III

COURSE TITLE : BIO-ORGANIC CHEMISTRY

Course outcome:

This course aims to familiarize students with the principles of organic chemistry and basic qualitative analysis of organic compounds. Course objective is to provide experimental practice of preparation of organic compounds and extraction of biologically important compounds.

SEMESTER III : OPEN ELECTIVE 1

COURSE TITLE. : BIOCHEMICAL TECHNIQUES

Course outcome:

- These topics will enable students to develop competence in handling various chromatographic, electrophoretic and isotopic techniques and apply them in isolating and characterizing different biological molecules.

SEMESTER III

OPEN ELECTIVE 2

COURSE TITLE : HORMONES-BIOCHEMISTRY AND FUNCTION

Course outcome: These topic will enable the students to:

- Understand the function of hormones and their regulation.
- Know how hormonal systems act in an integrated manner to regulate overall body functions.
- Understand how failure of these normal physiologic functions and integrations are associated with some endocrine disorders.

SEMESTER IV

COURSE TITLE : ANALYTICAL BIOCHEMISTRY

1. Understand the concept of biological sample preparation
2. Appreciate chemistry and application of analytical instruments.
3. Get acquainted with care and maintenance of equipment and chemicals.
4. Understand clinically relevant biochemical analysis of all biochemical components i.e., proteins, electrolytes, hormones etc.,
5. Have basic knowledge of clinical and forensic analytical methods and their principles.

Course outcome programoutcome	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	X	X	X	X								
Critical thinking		X				X						
Subject clarity	X	X						X				X
Analytical skill					X	X	X	X	X	X	X	X

SEMESTER IV

PRACTICALS IV

COURSE TITLE : ANALYTICAL BIOCHEMISTRY

Course outcome: This course aims to provide experimental practice of analytical techniques in Biochemistry. Upon successful completion, students should develop skills in handling instruments and understand its application in research work.

1. Sourcing and handling biological samples. Develop skill and proficiency in basic techniques
2. Centrifugation
3. Chromatography
4. Electrophoresis and
5. Spectroscopy

SEMESTER IV
OPEN ELECTIVE 1: BIOCHEMICAL TOXICOLOGY

COURSE TITLE:. BIOCHEMICAL TOXICOLOGY

Course outcome: This open elective course offered to various streams gives basic idea about biochemical basis of various effects of toxins/ pharmaceuticals and an outline of process involved in toxicity testing and drug dosing.

- Categorize the classes of toxicants/drugs and know specific examples
- State the routes of exposure to toxins/drugs;
- Explain the processes of absorption, metabolism and elimination of toxins/drugs; and
- Explain environmental and physiological factors that affect toxicant metabolism

SEMESTER IV

OPEN ELECTIVE 2: PLANT BIOCHEMISTRY

COURSE TITLE: PLANT BIOCHEMISTRY

Course outcome : These topics will enable the students to

- Understand the plant cell, photosynthesis, transporters, and
- Important primary metabolites. Illustrate plant growth regulators, plant's responses to various biotic and abiotic stresses.
- Explain about plant secondary metabolites and their functional importance.

B.Sc., BIOCHEMISTRY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
1	V	DSE-1A	Metabolism II & Molecular Biology	4:0:2	6	2021-22
2		DSE-1B	Molecular Basis of Infectious Diseases	4:0:2	6	2021-22
3	V Sem (any one)	SEC-1	Genetic Engineering	2:0:0	2	2021-22
		SEC-2	Bioinformatics	2:0:0	2	2021-22
4	VI	DSE-2A	Nutrition and Clinical Biochemistry	4:0:2	6	2021-22
5		DSE-2B	Plant Biochemistry	4:0:2	6	2021-22
	VI Sem (any one)	SEC-3	Immunology and Cell Biology	2:0:0	2	2021-22
6		SEC-4	Genetics	2:0:0	2	2021-22

DSC: Discipline Specific Core Course
DSE: Discipline Specific Elective
SEC: Skill Enhancement Course

V SEMESTER
DSE-1: Metabolism II & Molecular Biology

Course Objectives:

- To understand the basic aspects of metabolic pathways and regulation of biomolecules.
- To study and understand the structural and functional aspects of mitochondrial electron transport chain in detail.
- To gain deeper insights on metabolic pathways and their associated biological processes at molecular level.

Course Outcome:

- Students will acquire the concept of anabolism, catabolism, anapleurotic reactions, redox balance etc. and the role of high energy compounds in the cell.
- They will acquire knowledge related to regulation of various pathways.
- The role of lipids as storage molecules and structural component of bio membranes will be understood in detail.
- Students will learn about importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions will be understood.
- Students will gain knowledge about the fundament aspects of photosynthesis

and its associated processes in depth.

- To emphasizes on metabolic disorders at molecular level.
- Students will learn about importance of DNA, RNA and Protein syntheses in both prokaryotes and eukaryotes and other aspects of molecular biology.
- To learn the regulatory aspects of metabolism for better understanding of molecular biology and therapeutic applications.

DSE-2: Molecular Basis of Infectious Diseases

Course Objectives:

- Molecular Basis of Infectious Diseases builds on fundamental principles of human diseases taught in immunology.
- This will be achieved by focusing on the underlying molecular basis or 'molecular mechanisms' of the disease process in humans.
- Core topics and Research challenges in Pathology are presented as themed Modules.
- Practicals will use examples of 'state-of-the-art' research techniques that address molecular mechanisms presented in lectures, primarily in the context of inflammation and immunopathology.
- Students will have opportunities for interactive learning and engagement in tutorial, practical and research laboratory settings.
- Upon course completion, students should have a better understanding of molecular mechanisms that underlie chronic human disease and research topics in the areas of inflammation and immunopathology

Course Outcome:

- The students will describe and distinguish between the causes, pathogenic molecular mechanisms, macroscopic and microscopic appearances and clinical consequences of inflammation, immune responses to infection, allergy, autoimmunity, and effects of systemic inflammation on cardiovascular, gastrointestinal and respiratory systems.
- Demonstrate capabilities in teamwork and communication within collaborative teams.
- Discuss and debate state-of-the-art research and concepts of disease.
- Engage in research integrated learning and work integrated learning via mentorship by a research scientist.
- Understand and explain the relevance of laboratory techniques and analysing outcomes in the diagnosis of human disease.

SEC-1: Genetic Engineering

Course Objectives:

- The objective of the course is to familiarize the students with the basic concepts in genetic engineering;
- To acquaint the students to versatile tools and techniques employed in genetic engineering and recombinant DNA technology;

- To appraise them about applications genetic engineering.

Course Outcome:

- This course teaches RDNA technology techniques and their application in the field of genetic engineering
- They learn about plasmids, vectors and gain knowledge on the construction of cDNA libraries
- Student of this course have knowledge on gene manipulation, gene expression, etc which prepares them for further studies in the area of genetic engineering

SEC-2: Bioinformatics

Course Objectives:

- To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis
- This paper will also introduces the students to concepts in bioinformatics
- The student will be able to apply basic principles of biology, computer science and mathematics to address complex biological problems.

Course Outcome: After completion of the course, the students will:

- Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
- Explain about the methods to characterise and manage the different types of Biological data.
- Classify different types of Biological Databases.
- Introduce to the basics of sequence alignment and analysis.
- Overview about biological macromolecular structures and structure prediction methods.

VI SEMESTER

DSE-1: Nutrition and Clinical Biochemistry

Course Objectives:

- The Students will develop skills of performing basic biochemical tests important in clinical investigations.
- The Students will also develop familiarity with biochemical laboratory techniques,
- The paper will introduce students to various practical aspects of enzymology and their correlation in disease conditions.

Course Outcome:

1. After the completion of the course the students will have a better understanding on chemical properties of nutrients and other dietary constituents with scientific approach by describing their functions at cellular and molecular levels.
2. The course will also provide an in-depth knowledge about how a clinical investigation of laboratory tests in humans (such as body fluids) are used for diagnosis of diseases and its therapeutic purposes.

DSE-2: Plant Biochemistry

Course Objectives:

- The students will understand the biochemistry plant defence mechanism,
- Identify the toxic compounds in plants
- Describe the kinetics and characterisation of enzymes
- Identify the detoxification mechanisms.
- Students will be provided with an education that leads to comprehensive understanding of the principles and practices of biochemistry.

Course Outcome: On the completion of the course, students will be able to:

- In this course, students will extend their knowledge of biochemistry fundamentals and will learn about important metabolic processes taking place in plants.
- acquire a detailed knowledge about photosynthesis, metabolism of saccharides, metabolism of nitrogen compounds and about molecular mechanisms of signalisation and regulation.
- In laboratory, they will master the most important instrumental techniques required for work in biotechnological and other chemical laboratories.

SEC-3: Immunology and Cell Biology

Course Objectives:

- The students will demonstrate the basic knowledge of immunological processes at a cellular and molecular level
- Also define central immunological principles and concepts
- The students will also outline, compare and contrast the key mechanisms and cellular players of innate and adaptive immunity and how they relate.
- Elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses.
- The students will outline key events and cellular players in antigen presentation, and how the nature of the antigen will shape resulting effector responses.
- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
- Students will understand how these cellular components are used to generate and utilize energy in cells
- Students will understand the cellular components underlying mitotic cell division.
- Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.
- These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

Course Outcome: After completing the course, the student will be able to:

- Demonstrate the basic knowledge of immunological processes at a cellular and molecular level
- Define central immunological principles and concepts
- Outline, compare and contrast the key mechanisms and cellular players of innate and adaptive immunity and how they relate
- Elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses
- Outline key events and cellular players in antigen presentation, and how the nature of the antigen will shape resulting effector responses.
- Describe the evolution, diversity and replication of cells.
- Explain the role of compartmentalization and signalling in cellular biology.
- Interpret and explain key experiments in the history of cell biology.
- Evaluate and apply knowledge of modern techniques in cellular biology.

SEC-4: Genetics

Course objectives:

- The students will understand the inheritance and expression of human blood groups.
- The students will also understand the genetic terminology required to be able to function well in the transfusion laboratory.
- The students will study the clinical relevance of genetic concepts.
- Additionally, they will gain knowledge of Internet genetics resources.
- Knowledge of current developments and trends in applying genetics to transfusion medicine will also be understood by the students.
- The students will also gain knowledge on historical perspective of how genetics has evolved.

COURSE OUTCOME: on the completion of the course, the students will be able to:

- Relate the structure and function of the DNA molecule to its functional role in encoding genetic material.
- Apply the principles of inheritance as formulated by Mendel.
- Apply the principles of extensions to Mendelian inheritance, including multiple allelism, lethal alleles, gene interactions, and sex-linked transmission.
- Analyze genetic data using statistical procedures.
- Describe normal chromosome number, structure, and behaviour in human cells, and understand the cause and effect of alterations in chromosome number and/or structure.
- Understand how to identify and classify mutations in DNA.
- Describe the basic aspects of the flow of genetic information from DNA to proteins.
- Explain and make deductions about gene regulation with emphasis on the lacoperon model.

Bachelor of Science (Basic/Hons.)Degree in Biotechnology
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I, II, III and IV Semesters

Sem.	Discipline Core/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Cell Biology and Genetics (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Cell Biology and Genetics (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Biotechnology for human welfare (3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Microbiological Methods and Techniques (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Microbiological Methods and Techniques (0+0+2)	**4**	**2**	**25**	**25**
	OE-2: Applications of Biotechnology in Agriculture (3+0+0)	**3**	**3**	**40**	**60**

Semester III & IV

Semester	Course code	Course Category	Theory/ Practical	Credits	Paper Title	Marks	
						S.A	I.A
3	**BTC: 103**	DSC-3	Theory	3	Biomolecules	60	40
			Practical	2	Biomolecules	25	25
		OE-3	Theory	3	Nutrition and Health	60	40

4	**BTC:104**	DSC-4	Theory	3	Molecular Biology	60	40
			Practical	2	Molecular Biology	25	25
		OE-4	Theory	3	Intellectual Property Rights	60	40

I SEMESTER

Programme outcome:

Competencies need to be acquired by a candidate securing B.Sc. (Basic) or B.Sc. (Hons)degree in Biotechnology. At the end of the course the student should be able to:

- Demonstrating the Laboratory skills in cell biology, basic and applied microbiologywith an emphasis on technological aspects.
- Understanding concepts of Biotechnology and demonstrate knowledge acquired in interdisciplinary skills in cell biology, genetics. biochemistry, microbiology, and molecular biology.
- 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.
- Critically analyze the environmental issues and apply the biotechnology knowledge gained for conserving the environment and resolving the problems.
- 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.
- Apply knowledge and skills of immunology, bioinformatics, computational modelling of proteins, drug design and simulations to test the models and aid in drug discovery.
- Critically analyze, interpret data, and apply tools of bioinformatics and multi omics in various sectors of biotechnology including health and Food.
- Demonstrate communication skills, scientific writing, data collection and interpretation abilities in all the fields of biotechnology.
- Learning and practicing 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.
- Exploring the biotechnological practices and demonstrating innovative thinking in addressing the current day and future challenges with respect to food, health, and environment.
- Thorough knowledge and application of good laboratory and good manufacturing practices in biotech industries.
- Understanding and application of molecular biology techniques and principles in for ensic and clinical biotechnology.

- Demonstrate entre preneur ship abilities, innovative thinking, planning, and setting up small-scale enterprises or CROs.

II SEMESTER

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

- Would be able to comprehend the structure of a cell with its organelles.
- Can explain the organization of genes and chromosomes, chromosome morphologyand its aberrations.
- Can distinguish between the structure of prokaryotic and eukaryotic cell.

III SEMESTER

Program Name	**BSc Biotechnology**		Semester	**Third Sem**
Course Title	**Biomolecules**			
Course No.	**BTC: 301**	**DSC -3T**	No. of Theory Credits	**4**
Contact hours	**56 hrs**		Duration of ESA/Exam	**2.5 Hours**
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Pre-requisite (s):

Course Outcomes (COs): At the end of the course the student should be able to:

1. Acquire knowledge about types of biomolecules, structure, and their functions
2. Will be able to demonstrate the skills to perform bioanalytical techniques
3. Apply comprehensive innovations and skills of biomolecules to biotechnology field

Course Title	**Biomolecules**		Practical Credits	**2**
Course No.	**BTC:301**	**DSC-3P**	Contact hours	48 h

Program Name	**BSc Biotechnology**		Semester	**Third Sem**
Course Title	**Nutrition and Health**			
Course Code		**OE-3**	No. of Theory Credits	**3**
Contact hours	**Lecture**	42 h	Duration of ESA/Exam	**2.5 Hours**
	Practical	-		
Formative Assessment Marks		40	Summative Assessment Marks	60

Course Pre-requisite(s):
Course Outcomes (COs): At the end of the course the student should be able to: 1. Study the concepts of food, nutrition, diet and health 2. To apply the best practices of food intake and dietary requirements 3. Acquire knowledge about various sources of nutrients and good cooking practices

IV SEMESTER

Program Name	**BSc Biotechnology**		Semester	**Fourth Sem**
Course Title	**Molecular Biology**			
Course No.	**BTC: 401**	**DSC -4T**	No. of Theory Credits	**4**
Contact hours	**56 hrs**		Duration of ESA/Exam	**2.5 Hours**
Formative Assessment Marks	40		Summative Assessment Marks	60
Course Pre-requisite (s):				
Course Outcomes (COs): At the end of the course the student should be able to: 1. Study the advancements in molecular biology with latest trends. 2. Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids. 3. Aware about the basic cellular processes such as transcription, translation, DNA replication and repairmechanisms.				

Course Title	**Molecular Biology**		Practical Credits	**2**
Course No.	**BTC: 401**	**DSC-4P**	Contact hours	48

Program Name	**BSc Biotechnology**		Semester	**Fourth Sem**
Course Title	**Intellectual Property Rights**			
Course Code		**OE-4**	No. of Theory Credits	**3**
Contact hours	**Lecture**	42 h	Duration of ESA/Exam	**2.5 Hours**
	Practical	-		
Formative Assessment Marks	40		Summative Assessment Marks	60

Course Pre-requisite(s):
Course Outcomes (COs): At the end of the course the student should be able to: 1. Knowledge about need and scope of Intellectual property rights 2. Acquire knowledge about filing patents, process, and infringement 3. Knowledge about trademarks, industrial designs, and copyright

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	2. Biotechnology , BSCCBCSBITYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- Biotechnology is an undergraduate course aims to impart knowledge to the students on application of biotechnology in various fields such as medical, environmental, industrial, agricultural and many more.
- The main motto is to create biotechnological awareness.
- To encourage students a critical appreciation of the integrated nature of biotechnological problems.
- To make them realise that the biotechnological problems are global.
- To induce the spirit of competitiveness.
- To impart specialised knowledge and skills to students in particular areas of the national or regional biotechnological issues.

PROGRAMME SPECIFIC COURSE OUTCOME:

After successful completion of B.Sc. Biotechnology Course:

- Graduates in biotechnology will be eligible for pursuing higher education, M.Sc. programs in Biotechnology and also in the different field of life science.
- Graduates will exhibit contemporary knowledge in Biotechnology and students will be eligible for doing jobs in pharmaceutical and biotechnological Industry.
- Graduates will be able to understand the potentials, and impact of biotechnological innovations on environment and their implementation for finding sustainable solution to issues pertaining to environment, health sector, agriculture, etc.
- Graduates will be able to design, conduct experiments, analyze and interpret data for investigating problems in BT and allied fields.
- Graduates will be able to work individually as well as in team to survive in multidisciplinary environment.
- Graduates will possess oral and written communication skills.

B.Sc., BIOTECHNOLOGY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
1	V	DSE-1A	Molecular Biology & Genetic	4:0:2	6	2021-22

			Engineering			
		DSE-1B	Genomics & Proteomics	4:0:2	6	2021-22
2	V	SEC-2	Biotechnology & Human Welfare	2:0:0	2	2021-22
3	VI	DSE-2A	Microbial, Environmental Biotechnology & Bioinformatics	4:0:2	6	2021-22
		DSE-2B	Bioprocess Technology	4:0:2	6	2021-22
4	VI	SEC-4	Entrepreneurship Development	2:0:0	2	2021-22

DSC: Discipline Specific Core Course
DSE: Discipline Specific Elective
SEC: Skill Enhancement Course

V SEMESTER

DSE-1A: Molecular Biology & Genetic Engineering

Course Objectives:

- To understand from cells to organelles to molecules, the understanding of various biological processes.
- To explain genome organization in higher organisms.
- To describe kinetic classes of DNA and Gene families.
- To understand the steps involved in recombinant DNA technology.
- To explain the construction of DNA & c DNA library and their applications
- Mutations, proto-oncogenes, oncogenes and tumour suppressor genes, physical, chemical and biological mutagens; types of mutations; intra-genic and inter-genic suppression.

Course Outcome:

- Student should be equipped to understand three fundamental aspects in biological phenomenon: a) what to seek; b) how to seek; c) why to seek?
- Students gain basic knowledge about Molecular biology, genetic engineering.
- Students get a valuable knowledge about the theoretical knowledge of various technologies relating to molecular biology and genetic engineering.
- In conjunction with the practicals the students will be able to take up minor biological research as well as placement in the relevant biotech industries.

DSE-1B: Genomics & Proteomics

Course Objectives:

- To understand from cells to organelles to molecules, and genome organization in higher organisms.
- To describe kinetic classes of DNA and Gene families.
- To explain the construction of DNA & c DNA library and their applications

- To learn about basics of gene and genomics, and proteins and proteomics
- Overview of genomics – definition, complexity and classification; need for genomics level analysis; methods of analyzing genome at various levels – DNA, RNA, protein, metabolites and phenotype.

Course Outcome:

- Students get knowledge to explain principles of basic methods of genomic and proteomic analysis.
- Students learn to propose appropriate methods for analysis of given sample type with respect to purpose of analysis.
- Students get a valuable knowledge about the theoretical knowledge of various technologies relating to genomics and proteomics.
- In conjunction with the practicals, the students will be able to take up minor biological research as well as placement in the relevant biotech industries.
- They get opportunities for investment relating to areas of genomics and proteomics small scale industries and laboratories which boost the economy which means that there will be more jobs and new sources of income.

SEC-2: Biotechnology & Human Welfare

Course Objectives:

- To understand contemporary knowledge in Biotechnology and students will be eligible for doing jobs in pharmaceutical and biotechnological Industry.
- To gain knowledge in the potentials, and impact of biotechnological
- To understand innovations on environment and their implementation for finding sustainable solution to issues pertaining to environment, health sector, agriculture, etc.
- To design, conduct experiments, analyze and interpret data for investigating problems in BT and allied fields.
- To work individually as well as in team to survive in multidisciplinary environment.
- To possess oral and written communication skills.

Course Outcome:

- Students will be flexible path of personal and professional development that is suited for entry into a wide range of biotechnology industries and research enterprises.
- Students get a valuable knowledge in the area which includes both medical areas such as vaccine and drug development, industrial activities such as hormone manufacturing using large scale cell culture or drug synthesis using enzyme catalysis.
- Students will also gain knowledge in non-medical applications such as waste treatment and biofuel production.

VI- Semester

DSE-2A: **Microbial and Environmental Biotechnology and Bioinformatics**

Course Objectives:

- These papers throw light upon the biotechnological approaches relating to application of microorganisms and its application for betterment of environment in various aspects.
- Appreciate their relevance for investigating specific contemporary biological questions;
- Critically analyse and interpret results of their study.
- These papers will also educate students about the fundamental concepts of bioprocess technology and its related applications, thus preparing them to meet the challenges of the new and emerging areas of biotechnology industry.
- To develop an understanding of basic theory of computational tools.
- To acquire working knowledge on computational tools and methods.
- This paper gives an overview of microbial and environmental biotechnology, and bioinformatics which play an important role in the protection of human health as well as the environment.

Course Outcome:

- Students learn about biotechnological application of microorganisms for protection of environment which play a key role for betterment of human health as well as the environment.
- Appreciate their relevance for investigating specific contemporary biological questions;
- Critically analyse and interpret results of their study.
- Appreciate relevance of microorganisms from industrial context.
- Carry out sterioichiometric calculations and specify models of their growth
- Give an account of design and operations of various fermenters
- Present unit operations together with the fundamental principles for basic methods in production technique for bio-based products.
- Calculate yield and production rates in a biological production process, and also interpret data;
- Give an account of important microbial/enzymatic industrial processes in food and fuel industry develop an understanding of basic theory of these computational tools.
- Gain working knowledge of computational tools and methods.
- Students gain entrepreneurial skills, understand the various operations involved in venture creation

Students identify scope for entrepreneurship in biosciences and utilize the schemes promoted through knowledge centres and various agencies.

- The students will also gain knowledge pertaining to management which will also help them to build up a strong network within the industry.

SEC-4: Entrepreneurship Development

Course Objectives:

- To gain basic knowledge about the selection of a product, line, design and development processes, economics on material and energy requirement
- To gain knowledge on basic regulations of excise such as demand for a given product,

feasibility of its production under given constraints of raw material, energy input, financial situations export potential etc.

- To understand the business opportunities which may be available in various fields of biotechnology such as medical biotechnology, industrial biotechnology, environmental biotechnology etc.
- To gain invaluable knowledge about bio-ethics, business strategy, business plan preparation and so on.

Course Outcome: Upon completion of this program, graduates will be able to:

- Demonstrate a fundamental comprehension of business opportunity evaluation.
- From the perspective of a prospective investor.
  Identify the most recognized sources of potential funding and financing for business start ups and/or expansion.

Bachelor of Science (Basic/Hons.) Degree in BotanyChoice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Microbial Diversity and Technology (4+0+0)	4	4	40	60
	DSCP-1: Microbial Diversity and Technology (0+0+2)	4	2	25	25
	OE-1: Plants and Human Welfare (3+0+0)	3	3	40	60
II	DSC-2: Diversity of Non-Flowering Plants (4+0+0)	4	4	40	60
	DSCP-2: Diversity of Non-Flowering Plants (0+0+2)	4	2	25	25
	OE-2: Plants and Human Welfare (3+0+0)	3	3	40	60

I SEMESTER

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

- Understand the fascinating diversity, evolution, and significance of micro organisms.
- Comprehend the systematic position, structure, physiology and life cycles of microbes and their impact on humans and environment.
- Gain laboratory skills such as microscopy, microbial cultures, staining, identification, preservation of microbes for their applications in research and industry.

Open Elective Course:

OE-1: PLANTS AND HUMAN WELFARE (THEORY): 3 Credits 42 Hrs.

Course Outcome:

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

- To make the students familiar with economic importance of diverse plants thatoffer

resources to human life.

- To make the students known about the plants used as-food, medicinal value andalso plant source of different economic value.
- To generate interest amongst the students on plants importance in day today life, conservation, eco system and sustainability.

II SEMESTER

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

- Understand the diversity and affinities among Algae, Bryophytes, Pteridophytes and Gymnosperms.
- Understand the morphology, anatomy, reproduction and life cycle across Algae, Bryophytes, Pteridophytes and Gymnosperms, and their ecological and evolutionary significance.
- Obtain laboratory skills/explore non-flowering plants for their commercial applications.

Open Elective Course:

OE-2: PLANT PROPAGATION, NURSERY MANAGEMENT AND GARDENING

(THEORY): 3 Credits 42 Hrs.

Course Outcome: On completion of this course, the students will be able to;

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

III Semester

Theory: Discipline Specific Core Course (DSCC)

Title of the Course and Code:

BOT-A-3.1: PLANT ANATOMY AND DEVELOPMENTAL BIOLOGY

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lecture Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT-A-3.1	DSCC	Theory	04	04	56 hrs	2hrs	40	60	100

Course Outcomes:

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

1. Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.
2. Skill development for the proper description of internal structure using botanical terms,**t**

heir identification and further classification.

3. Induction of the enthusiasm on internal structure of locally available plants.
4. Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.
5. Observation and classification of the floral variations from the premises of college and house.
6. Understanding the various reproductive methods sub-stages in the life cycle of plants
7. Observation and classification of the embryological variations in angiosperms.
8. Enthusiasm to understand evolution based on the variations in reproduction among plants.

Semester - 3
Practical: Discipline Specific Core Course
(DSCC)Title of the Course and Code:
BOT-A-3.2: PLANT ANATOMY AND DEVELOPMENTAL BIOLOGY

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures Hours /Semester	Durationof Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT-A-3.2	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

III Semester
Open Elective Course (OEC - 3)
(OEC for other students)
Paper: Community Forestry
Code: OEC-3.1

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.1	**OEC**	**Theory**	**03**	**03**	**42 hrs**	**2 hrs**	**40**	**60**	**100**

Learning outcomes:

After completion of the course, the students will be able to;

- Understand community forestry and its conservation
- Examine the use of trees and community forestry
- Interpret the role of indigenous / tribal people in conservation of forest
- Examine the role of various community forestry conservation programs
- Measure the different properties of trees such as wood volume, age, height, volume etc.

III Semester
Open Elective Course (OEC - 3)
(OEC for other students)
Paper: Algal Cultivation and Applications
Code: OEC-3.2

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.2	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

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

- Understand core concepts and fundamentals of various levels of algal growth
- Translate various algal technologies for benefit of ecosystem
- Demonstrate algal growth in different types of natural water.
- Analyze emerging areas of Algal Biotechnology for identifying commercial potentials of algal products & their uses.

III Semester
Open Elective Course (OEC - 3)
(OEC for other students)
Paper: Landscaping and Gardening
Code: OEC-3.3

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.3	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After the completion of this course the learner will be able to:

- Apply the basic principles and components of gardening
- Conceptualize flower arrangement and bio-aesthetic planning
- Design various types of gardens according to the culture and art of bonsai
- Distinguish between formal, informal and free style gardens
- Establish and maintain special types of gardens for outdoor and indoor land scaping

SEMESTER IV

Title of The Course: Ecology and Conservation Biology

Course No	Type of Course	Theory/ Practical	Credits	Instruction Hour Per week	Total No. Lectures/ Hours/ Semester	DurationOf Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOTA-4.1	DSCC	Theory	04	04	56 hrs	2 hrs	40	60	100

Practical: Discipline Specific Core Course (DSCC)

Title of the Course and Code: BOT-A-4.2:

ECOLOGY AND CONSERVATION BIOLOGY

CourseNo.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Durationof Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT-A-4.2	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

Open Elective Course (OEC - 4)

(OEC for other students)

Paper: Plant Diversity and Human Welfare

Code: OEC-4.1

Course No.	**Type of Course**	**Theory / Practical**	**Credits**	**Instruction hour per week**	**Total No. of Lectures / Hours / Semester**	**Duration of Exam**	**Formative Assessment Marks**	**Summative Assessment Marks**	**Total Marks**
OEC-4.1	**OEC**	**Theory**	**03**	**03**	**42 hrs**	**2 hrs**	**40**	**60**	**100**

Learning outcomes:

After the completion of this course, the learner will be able to:

- Develop understanding of the concept and scope of plant biodiversity
- Identify the causes and implications of loss of biodiversity
- Apply skills to manage plant biodiversity
- Utilize various strategies for the conservation of biodiversity
- Concept ualize the role of plants in human welfare with special reference to India

IV Semester
Open Elective Course (OEC - 4)
(OEC for other students)
Paper: Medicinal Plants in Health Care
Code: OEC-4.2

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4.2	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

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

- Recognize the basic medicinal plants
- Apply techniques of conservation and propagation of medicinal plants.
- Setup process of harvesting, drying and storage of medicinal herbs
- Propose new strategies to enhance growth of medicinal herbs considering the practical issues pertinent to India.

IV Semester
Open Elective Course (OEC - 4)
(OEC for other students)
Paper: Floriculture Code: OEC-4.3

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4.3	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After completing this course the learner will be able to;

- Develop conceptual understanding of gardening from historical perspective.
- Analyze various nursery management practices with routine garden operations.
- Distinguish among the various Ornamental Plants and their cultivation.
- Evaluate garden designs of different countries.
- Appraise the landscaping of public and commercial places for floriculture.
- Diagnoses the various diseases and uses of pests for ornamental plants.

V & VI semester

	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	3. Botany , BSCCBCSBOTYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To bring awareness of plant wealth around us which has to be protected with utmost care
- To make them understand the diversity of plant kingdom
- To make them understand morphology, anatomy, cell biology, microbiology related to plants, physiology, molecular biology genetics, plant propagation, plant breeding evolution of plants
- To train them to enter into higher studies, teaching, research, and industry related profession in botanical science.
- To prepare them to competitive examinations like KPSC, UPSC and IFS etc

PRAGRAM SPECIFIC COURSE OUTCOME:

- Student will become the torch bearers of conservation of plant wealth
- They will become competent in naming the common plants around them which the general public usually will be interested.
- In-depth study of plant science sub disciplines help them to enter into the institutes which require specific skill sets
- Many students enter into B.Ed programs which generates many good teachers
- Students after completion of the course get opportunities for higher studies in plant science in India and abroad or job opportunities related to plant science as well as in general service fields.

B.Sc., BOTANY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-1A	Taxonomy, Economic Botany and Ethno botany	4:0:2	6	2021-22
		DSE-1B	Cell biology, plant breeding and plant propagation	4:0:2	6	2021-22
6	V	SEC-1	Mushroom Cultivation and Biofertilizers	2:0:0	2	2021-22
		SEC-2	Plant Tissue Culture	2:0:0	2	2021-22
7	VI	DSE-2A	Genetics, Genetic engineering and evolution	4:0:2	6	2021-22
		DSE-2B	Plant biotechnology, biodiversity and conservation	4:0:2	6	2021-22
8	VI	SEC-3	Horticulture	2:0:0	2	2021-22

		SEC-4	Herbal technology	2:0:0	2	2021-22

DSC: Discipline Specific Core Course
DSE: Discipline Specific Elective
SEC: Skill Enhancement Course

V SEMESTER

DSE-1A: Taxonomy, Economic botany & Ethnobotany DSE-1B Cell Biology, Plant Breeding & Plant Propagation

Course Outcome:

1. To study the types of classification- Artificial, Natural, Phylogenetic and Recent trends in Taxonomy
2. To acquire the knowledge about Botanical Survey of India (BSI), Herbarium,
3. Brief study of the Economic products of Angiosperms and Ethnobotany
4. To study the ultra structure of cell organelles
5. To acquire the knowledge of underlying principles of different microscopes
6. To learn the principles, techniques and applications of Plant Breeding
7. To learn the principles, techniques and applications of Plant propagation

VI SEMESTER

DSE-2A: Genetics, Genetic engineering & Evolution DSE-2B: Plant Biotechnology, Biodiversity & conservation

Course Outcome:

1. To acquire the knowledge on chemistry, structure, types of genetic material and protein synthesis
2. To learn the concepts of gene and mechanism of gene regulation
3. To acquire the knowledge on principles, techniques and applications of Plant Biotechnology
4. To understand methods of gene transfer in Recombinant DNA technology
5. Applications of Biotechnology in Human welfare, IPR, Biosafety and Bioethics
6. To understand the principles, tools and techniques of Genetic Engineering
7. To learn the principles, techniques and applications of Plant Breeding
8. To acquire the knowledge of Biodiversity, conservation and biolegislations.
9. To study the geographical distribution of plants
10. To acquire the knowledge and techniques of Plant Propagation and Horticulture
11. To understand the concept of Evolution, theories and evidences

Bachelor of Science (Basic/Hons.) Degree in Chemistry
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Chemistry-1 (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Chemistry-1 Practical(0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Chemistry In Daily Life(3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Chemistry-2 (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Chemistry-2 Practical(0+0+2)	**4**	**2**	**25**	**25**
	OE-2: Molecules of Life (3+0+0)	**3**	**3**	**40**	**60**

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

- To create enthusiasm among students for chemistry and its application in various fields of life.
- To provide students with broad and balanced knowledge and understanding of keyconcepts in chemistry
- 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.
- To develop in students the ability to apply standard methodology to the solution of problems in chemistry
- To provide students with knowledge and skill towards employment or higher education in Analytical chemistry or multi-disciplinary areas involving chemistry.
- To provide students with the ability to plan and carryout experiments independently and assess the significance of outcomes and to cater to the demands of chemical Industries of well-trained graduates
- To develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
- To instill 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.

Learning/Course Outcomes:

After studying this course student willbe able to understand:

- The concepts of chemical analysis, accuracy, precision and statistical data treatment.
- Prepare the solutions after calculating the required quantity of salts inpreparing the reagents/solutions and dilution of stock solution.
- Describe the dual nature of radiation and matter; dual behavior of matter and radiation, deBroglie'sequations, He is enberg uncertain typrinciple and their related problems.
- Quantum mechanics. Derivation of Schrodinger's wave equation. Radial and angular Orbital shapes of s,p,d and fatomicorbitals, nodalplanes. Electronic configurations of the atoms.
- Pauli'sex clusion principle, Hund's rule, Aufbau's principle and its limitation.
- The concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming.
- The Concept of aromaticity, resonance, hyper conjugation, etc.
- Explain bond properties , electron displacement effects (inductive effect, electro metric effect, resonance effect and Hyper conjugation effect). steric effect and their applications inexplaining acidic trength of carboxylic acids, sbasicity of amines.
- Understand basic concept of organic reaction mechanism, types of organic reactions.
- Understand the preparation and reactions of alkanes.
- Understand the stability and conformational analysis of cycloalkanes.
- Understand the concept of resonance, aromaticity and anti-aromaticity.
- Describe relative strength of aliphatic and aromatic carboxylic acids.
- Explain the existence of different states of matter interm so balance between inter molecular forces and thermal energy of the particles. Explain the laws governing behavior of ideal gases and real gases. Understand cooling effect of gas on a diabatic expansion.
- Understand the conditions required for liquefaction of gases. Realize that there is continuity in gaseous and liquids state.
- Understand the properties of liquids interms of inter molecular attractions.
- Understand the existence of different states of matter interm so balance between intermolecular forces and thermal energy of the particles. Explain the laws governing behavior of ideal gasesandrealgases. Understand cooling effect of gas on adiabatic expansion.
- Understand the conditions required for liquefaction of gases. Realizeth at the reiscontinuity in gaseous and liquid state.
- Understand the properties of liquids interms of intermoleculars attractions.

DSCP-1:CHEMISTRY-1 (PRACTICALS): 4 Credits; 56 Hrs.

Learning/Course Outcomes: After studying this course and performing theexperiments setinit, student willbe able to understand:

- Basic concepts involved intitrimetric analysis, primary standard substances, preparation of standard solutions.

- Explain the principles of acid-base, redoxandio do metrictitrations.
- Workout the stoi chiometry relations based on the reactions involved in thetitrimetric analysis.
- Describe the significance of organic quantitative analysis.
- Understand the preparation of organic compounds involving addition, substitution,hydrolysis, diazotization and condensation reactions.

Open Elective Course (OE)

OE-1: CHEMISTRY IN DAILY LIFE: 3 Credits; 42 Hrs.

Learning/Course Outcomes: On completion of the course students will be able to:

- Understand the chemical constituents in various day to day materials using by acommon man.
- Understand the chemical constituents in vitamins, soaps and detergents.
- Understand the renewable chemical energy resources.
- Understand different types of polymers and their applications.
-

II SEMESTER

Learning/Course Outcomes: After studying this course student will be able to:

- Understand principles of titrimetric analysis.
- Understand principles of different type's titrations. Titration curves for all types ofacid–base titrations.
- Gain knowledge about balancing redoxequations, titration curves, theory ofredoxindicators and applications.
- Understand titrationcurves, indicators for precipitation titration sin volving silver nitrate-Volhard's and Mohr's methods and their differences.
- Indicators for EDTA titrations - theory of metal ion indicators. Determination ofhardness of water.
- Understand periodic table, classification and properties of spd and f blockselements.
- Understand different scales for the measurement of electro-negativity and factorsaffectingit.
- Understand chemistry of the hydrides, carbides, oxides and halides of group13-17.
- Understand nucleophilic substitution at saturated carbon, energy profile diagram.
- Stereo chemistry and factors affecting SN1 and SN2 reactions.
- Aromatic electrophilic substitution reactions; nitration, sulfonation Friedel-Crafts.
- Understand liquid crystals, classification with examples.
- Understand the different forms of solids, laws of crystallography, miller indices and its calculation, X-ray diffraction studies. Bragslaw and its

equation.

- Defects insolids, properties of glasses and concept of liquid crystals.

DSCP-2:CHEMISTRY-2 (PRACTICALS): 4 Credits; 56 Hrs.

Learning/Course Outcomes: After studying this course and performing theexperiments setinit, student will be able to understand:

- Basic concepts involved intitrimetric analysis, primary standard substances,preparation of standard solutions.
- Explain the principles of acid-base, redox and iodo metric titrations.
- Describe the significance of inorganic quantitative analysis.
- Determine of density followed by the determination of viscosity and surfacetension of different liquid samples.
- Determination of partitionco efficient of different liquid mixtures.
- Determination of rate constantin the decomposition reaction of hydrogen peroxide.

Open Elective Course (OE)

OE-2: MOLECULES OF LIFE 3 Credits; 42 hrs.

Course/Learning Outcomes: On completion of the course students will be able to:

- Acquire knowledge about different types of sugars and their chemical structures.
- Identify different types of amino acids and determine the structure of peptides.
- Explain the actions of enzymes in our body and interpret enzyme inhibition.
- Predict action of drugs. Depict the biological importance of oils and fats. Importance of lipids in the metabolism. Differentiate RNA and DNA and their replication. Explain production of energy in our body.

III SEMESTER

DSC-3: Chemistry-III

(L:T:P = 4:0:0) Contact Hours: 56 Credits: 4 Workload: 4 Hours/Week

Course Objectives:

1. Inter relationship among frequency, wavelength and wave number and importance ofvalidation parameters of an instrumental method will be taught.
2. Principle, instrumentation and applications of spectrophotometer, nephelometry and turbidometry will be taught.
3. Principle, types and applications of solvent extraction will be taught
4. The concept of mechanism and its importance will be taught to the student.
5. Concept and importance of intermediates in organic chemistry will be taught takingproper examples.
6. The various techniques for identification of reaction mechanism will be taught to

thestudent taking proper examples.

7. Different types of bonding in molecules/compounds/ions.
8. The theoretical and experimental aspects of chemical kinetics including basic theoriesof reaction rates and methods of determining order.
9. Electrochemistry dealing with electrolytes in solution. Conductance measurementsand applications. Concept of ionic mobility and their determination.

Course Speific Outcomes: After the completion of this course, the student would be able to;

1. Understand the importance of fundamental law and validation parameters in chemical analysis.
2. Apply solvent extraction method for quantitative determination of metal ions in different samples.
3. Utilize the ion-exchange chromatography for domestic and industrial applications.
4. Explain the mechanism for a given reaction.
5. Predict the probable mechanism for a reaction.
6. Explain the importance of reaction intermediates, its role and techniques of generatingsuch intermediates.
7. Predict the nature of the bond formed between different elements.
8. Identify the possible type of arrangements of ions in ionic compounds.
9. Write Born - Haber cycle for different ionic compounds.
10. Relate different energy parameters like, lattice energy, entropy, enthalpy and solvation energy in the dissolution of ionic solids.
11. Explain covalent nature in ionic compounds.
12. Understand the concept of rate of a chemical reaction, integrated rate equations, energy of activation and determination of order of a reaction based on experimental data.
13. To know the different types of electrolytes, usefulness of conductance and ionic mobility measurements.
14. To determine the transport numbers.

DSC-3: Chemistry-III Practical

(L:T:P = 0:0:2)	**Contact Hours: 56**	**Credits: 2**	**Workload: 4 Hours/Week**

Course objectives: To attain practical knowledge about:

1. Analytical skills in detecting the constituents present in unknown samples by systematically carrying out the qualitative analysis.
2. The methods of determining rates of chemical reactions.
3. Designing electrochemical cells and making measurements related to it.
4. Determination of physical characteristics of electrolytes using conductivity measurements in solution.
5. Adsorption phenomenon, mechanism and basic models to explain adsorption.
6. Simple techniques like conductometry to obtain physicochemical parameters of electrolytes.

Course Specific outcomes: At the end of the course student would be able to;

1. Understand the chemical reactions involved in the detection of cations and anions.
2. Explain basic principles involved in classification of ions into groups in semi-micro qualitative analysis of salt mixture
3. Carryout the separation of cations into groups and understand the concept of common ion effect.
4. Understand the choice of group reagents used in the analysis.
5. Analyze a simple inorganic salt mixture containing two anions and cations
6. Use instruments like conductivity meter to obtain various physicochemical parameters.
7. Apply the theory about chemical kinetics and determine the velocity constants of various reactions.
8. Learn about the reaction mechanisms.
9. Interpret the behavior of interfaces, the phenomena of physisorption and chemisorption's and their applications in chemical and industrial processes.
10. Learn to fit experimental data with theoretical models and interpret the data

Part A: **Inorganic Chemistry Practicals**

Qualitative semi-micro analysis of mixtures containing 2 anions and 2 cations. Emphasis should be given to the understanding of different reactions.

The following cations and anions are suggested.

Cations: NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Al^{3+}, Fe^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Zn^{2+}, Mn^{2+}, Ba^{2+}, Ca^{2+}, Sr^{2+}, Mg^{2+}, Na^+, K^+ and Li^+.

Anions: CO_3^{2-}, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, BO_3^{3-}, SO_4^{2-}, $C_2O_4^{2-}$ and PO_4^{3-}.

Spot tests and flame tests to be carried out wherever possible.

Part B: **Physical Chemistry Practicals**

1. Determination of the enthalpy of neutralization of a strong acid with strong base.
2. Verification of Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.
3. Study of kinetics of potassium persulphate and potassium iodide volumetrically.
4. Determination of velocity constant (k) for acid catalyzed hydrolysis of methyl acetatevolumetrically.
5. Determination of velocity constant for the saponification of ethyl acetate (a = b) volumetrically.
6. Determination of equivalent conductivity of strong electrolyte and verification of DHO equation using meter bridge.
7. Determination of dissociation constant of weak acid by conductivity method using meter bridge (or conductivity meter).
8. Conductometric titration of strong acid and strong base.
9. Conductometric titration of weak acid and strong base.
10. Determination of the hydrolysis constant of aniline hydrochloride by conductometric method.

11. Determination of solubility product of spari ngly soluble salt by conductometric method.

DSC-4: Chemistry-IV semester

(L:T:P = 4:0:0) Contact Hours: 56 Credits: 4 Workload: 4 Hours/Week

Course Objectives:

1. Principle, instrumentation and applications of spectrophotometry, nephelometryand turbidometry will be taught.
2. Principle, types and applications of solvent extraction will be taught.
3. Concept of stereochemistry and its importance will be taught.
4. **The various projection formulae and the techniques of designating the molecules in to R/ S and D /** L will be taught taking proper examples.
5. The theory and concept of Cis-, trans- isomerism and its importance and thetechniques to differentiate between them will be taught taking examples.
6. The structures of molecules/compounds/ions based on different models/theories.
7. Properties of compounds based on bonding and structure.
8. The fundamentals of thermodynamics including the laws, the concept of entropy andfree energy functions and their applications.
9. The concepts of surface chemistry, catalysis and their applications.

Course Specific Outcomes: After the completion of this course, the student would be able to;

1. Understand the importance of fundamental law and validation parameters inchemical analysis.
2. Know how different analytes in different matrices (water and real samples) can be determined by spectrophotometric, nephelometric and turbidimetric methods.
3. Explain the importance of Stereochemistry in predicting the structure and propertyof organic molecules.
4. Predict the configuration of an organic molecule and able to designate it.
5. Identify the chiral molecules and predict its actual configuration.
6. Write the M.O. energy diagrams for simple molecules.
7. Differentiate bonding in metals from their compounds.
8. Learn important laws of thermodynamics and their applications to variousthermodynamic systems.
9. Understand adsorption processes and their mechanisms and the function andpurpose of a catalyst.
10. Apply adsorption as a versatile method for waste water purification.

DSC-4: Chemistry-IV Practical

(L:T:P = 0:0:2) Contact Hours: 56 Credits: 2 Workload: 4 Hours/Week

Course objectives:

1. To impart skills related to preparation of stock and working solutions and handlingof instrumental methods.
2. To know the principle of colorimetric analysis and construction of calibration plot.
3. To understand the chemistry involved in colorimetric determination of metal ions and anions.
4. To determine R_f values of different metal ions present in a mixture.
5. To impart knowledge on the importance of functional groups in organic compounds.
6. Techniques to identify the functional groups in a compound by performing physicaland chemical tests.
7. To record its melting point/boiling point.
8. To prepare suitable derivative for that compound and to characterize it.

Course Specific outcomes: After the completion of this course, the student be able to

1. Understand the importance of instrumental methods for quantitative applications.
2. Apply colorimetric methods for accurate determination of metal ions and anions inwater or real samples.
3. Understand how functional group in a compound is responsible for its characteristic properties.
4. Learn the importance of qualitative tests in identifying functional groups.
5. Learn how to prepare a derivative for particular functional groups and how to purify it.

PART-A: Analytical Chemistry Practicals

1. Colorimetric determination of copper using ammonia solution.
2. Colorimetric determination of iron using thiocyanate solution.
3. Colorimetric determination of nickel using DMG solution.
4. Colorimetric determination of titanium using hydrogen peroxide.
5. Colorimetric determination of nitrite in a water sample (diazo coupling Reaction/Griess reagent.
6. Colorimetric determination of phosphate as ammonium phosphomolybdate.
7. Determination of R_f values of two or three component systems by TLC.
8. Separation of different metal ions by paper chromatography/ Solvent extraction of iron using oxine solution (demonstration).

PART-B: Organic Chemistry Practical

Qualitative analysis of mono and bifunctional Organic compounds: Benzoic acid, Salycilic acid, *p*-Nitro benzoic acid, Anthranilic acid, p-Chloro benzoic acid, *o*-Cresol, *p*-Cresol, Resorcinol, *o*- Nitrophenol, *p*-nitophenol, *o*-Nitro aniline, *p*-Nitroaniline, *p*-Toluidine, *p*-Chloroaniline, *p*- Bromoaniline, Ethyl Salicylate, Salicylaldehyde, Acetophenone, Urea, Thiourea, Aniline, Benzldehyde, acetanilide, Naphthalene, Chlorobenzene, *p*-Dichlorobenzene, *p*-Nitro toluene, Benzamide etc. (At least 6-8 compounds to be analyzedin a semester).

Open Elective Course
III SEMESTER

OEC-3: Atomic Structure, Bonding and Concepts in Organic Chemistry
(L:T:P = 3:0:0) Contact Hours: 42 Credits: 3 Workload:3Hours/Week

Course Objectives:

1. To develop an understanding of principles of atomic structure.
2. To know the importance of quantum numbers, writing of electronic configurationsand representation of orbitals.
3. To develop an understanding of the periodic trends.
4. To understand the nature of bonding and to predict the shapes of molecules.
5. To construct MO energy level diagrams and predict the properties of molecules.
6. To understand the formation of sigma and pi bonds and the bond strength.
7. To study the classification of organic reactions.
8. To learn nomenclature preparation and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds.

Course Specific Outcomes: On completion of the course the student will learn and be ableto understand/explain;

1. The concept of atomic structure, significance of quantum numbers, filling of electrons of atoms/ions in various orbitals as per rules.
2. The trends in periodic properties.
3. The structures of ionic solids, applications of B-H cycle, solubility of compoundsand consequences of polarization of ions.
4. The shapes of molecules/ions based on VSEPR theory.
5. The construction of MO energy level diagrams and prediction of propertiesof molecules/ions like bond order, bond energies, bond lengths and magnetic properties.
6. The formation of sigma and pi bonds and the bond strength.
7. The classification of organic reactions.
8. Nomenclature preparation, and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds.

IV SEMESTER

OEC-4: Electrochemistry, Corrosion and Metallurgy
(L:T:P = 3:0:0) Contact Hours: 42 Credits: 3 Workload:3Hours/Week

Course Objectives: This course will deal with

1. Types of conductance, concept of electrolytes, electrolysis, redox reactions and EMF.
2. Concept of different types of electrochemical cells, Types of electrodes and electrode potential. Application of electrochemical series.
3. Basic principles and applications of conductometric, potentiometric and pH titrations.
4. Different types of Batteries their principle construction and working - lead-acid storage and lithium ion battery. Study of Fuels cells.
5. Concept of corrosion, types of corrosion and its prevention by different

methods. Introduction to electroplating.

6. Introduction to ores and minerals, extraction of metals from their ores, and purification. Eg., Manganese, Titanium and Uranium. Study of alloys, classification, production and uses of alloys.

Course Specific Outcomes: Upon completion of the course students will be able to;

1. Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions.
2. Learn the different types of electrochemical cells, their symbolical representation and application of electrochemical series.
3. Apply conductometric, potentiometric and pH titrations.
4. Know the principle, construction and working of batteries.
5. Understand different types of corrosion and its prevention by different methods.
6. Learn the methods of extraction of metals from their ores and purification.

V & VI semester

Sl. No	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCYCM	4. Chemistry, BSCCBCSCHEYCM

Course Outcome:

- Students will understand why instrumental estimation is superior to other previously learnt conventional methods.
- Students learn about how conductance depends on size of ion and learn about how redox reaction is occurring by change in potential.
- Students verify Beer's – Lamberts law and helpful in determine estimation of metal ions.
- Students develop the skills of handling the different electrodes.
- Students able to differentiate different type of electrodes.

B.Sc., CHEMISTRY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
1	V	DSE-1A	Chemistry paper-1	4:0:2	6	2021-22
		DSE-1B	Chemistry paper-II	4:0:2	6	2021-22
2		SEC-1	Applied Chemistry I	2:0:0	2	2021-22
3	VI	DSE-2A	Chemistry paper-III	4:0:2	6	2021-22
		DSE-2B	Chemistry paper-IV	4:0:2	6	2021-22
4		SEC-3	Applied Chemistry II	2:0:0	2	2021-22

V SEMESTER DSE
Chemistry paper-I

Course Objectives:

- To understand the key features of coordination compounds, including: - the naming, types of ligands and physical methods to determine the complex ions.
- To study about the shapes and structures of coordination complexes and types of isomers and metal-ligand bonding in coordination compounds.
- To study about classification of carbohydrates and heterocyclic compounds.
- To study about the structural elucidation of tarpenes and alkaloids.
- To Acquire basic knowledge about the laws of spectrophotometry, photochemistry and crystallography.

- To study about the photodegradation properties of ZnO photocatalyst and basic concept of band theory.
- Study of basic concepts and applications of molecular spectroscopy related with rotational, vibrational, raman and electronic spectra.

Course Outcome:

- Students will able to use Valence Band Theory and Crystal Field Theory to understand the magnetic properties of coordination compounds
- Students will understand the use of spectroscopic methods for qualitative and quantitative analysis.
- Understanding of heterocyclic chemistry which includes various methods for ring synthesis and application of those methods for the preparation of specific groups of heterocyclic systems. Students will get the knowledge about theoretical uses of spectrophotometer and photochemistry.
- Degradation of organic dye-Indigo Carmine can be understood by students which will help to purify the industrial wastewater.
- Students are able to understand basic principle, selection rule for rotational vibrational and Raman spectra.

V SEMESTER PRACTICALS I

Course Objectives:

- To understand the basic principles and advantages of gravimetric analysis and how it is better than any other methods learnt previously
- To develop the skill in handling the delicate apparatus like crucible and accuracy of weighing
- To learn about filtration and ignition technique in better way
- To study about the ore estimation and alloy estimations.

Course Outcome:

- Student will understand why gravimetric estimation is superior to other previously learnt volumetric estimation
- Students learn the technique of filtration and ignition
- Student develops skill to handle and weighing small compounds accurately
- Student learn about metal ion concentration in micro quantity which is helpful for industrial process and metallurgical process
- Students understand and know about source, estimation and application of ores.

VI SEMESTER DSE

Chemistry paper-III

Course Objectives:

- To extract metals through metallurgical operations and their uses.
- To learn about the properties and uses of abrasives, propellants, refractories and

explosives to understand the Photochemical reaction and mechanism of carbonyl compounds

- To learn about organic polymers, basic pericyclic reactions and depth stereochemistry concepts.
- To understand the in depth knowledge about the electrochemistry including derivations and applications.
- To understand the basic introduction about the amino acids and nucleic-acids and types of drugs and vitamins.
- To learn about the organic chemical spectroscopy methods and its applications.

Course Outcome:

- After completion of the course, the learner can be able to understand the basic principle of laws of electrochemistry, chemical cells and their function.
- Students will able to understand the properties of electrodes, EMF measurement, and potentiometric titrations.
- The learner can be able to understand the mechanism of polymer material formation, Molecular weight and structure property relationship
- The students will able to determine the cell constant, Equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- Conductometric titrations of acids and bases can be understood by the students.
- The in depth knowledge about the organic spectroscopy will gain by students by learning UV, IR and NMR Spectroscopy.

Applied Chemistry-IV

Course Objectives:

- To understand the concept of Alloys and Classification of Alloys
- To understand the production, of Ferro alloys, Ferro chrome, ferromanganese, etc.
- To understand the Concept Polymer and Classification of polymers and Properties of Polymers.
- To Study and understand and General characteristics Bio-Inorganic Chemistry and essential and traces of elements in biological process.
- To learn Cosmetics and general study and preparation and uses.
- To Study the Daily products and Milk definition and general composition –physico chemical changes
- To understand the Electrochemical cells and Batteries and Classification, Characterization of electro chemical cells and Batteries.
- To Know the Concept of Biophysical chemistry and Electrophoresis and application etc.
- To learn Enzymes and correlation with drug action and mechanism of enzyme and role of biological reaction etc.
- To Study of Lipids and classification of lipids etc.

Course Outcome:

- The students will able to choose alloys for various types of applications

- The students will learn the structure and classification of polymers
- Able to explain the fundamentals concepts Bio-Inorganic Chemistry
- Able to explain Cosmetics and general study and preparation and uses.
- Able to Understand the term of Daily products and Milk definition and general composition– physico chemical changes.

VI SEMESTER Practical– II:

PHYSICAL CHEMISTRY EXPERIMENTS (INSTRUMENTAL)

Course Objectives:

- To understand how instrumental methods are better than conventional methods learnt in previous years.
- To develop the accuracy in plotting graph and learn idea about unit conversion.
- To understand some important terms like equivalent conductance, dissociation constant practically.
- To understand how conductometry linked to rate of reaction.
- To understand how different electrodes works, and how they are.
- To understand how Beer‘s -Lamberts law practically applied for the concentration of metal ion determine in ppm level.

Bachelor of Science (Basic/Hons.) Degree in ComputerScience
Choice Based Credit System (CBCS) With Multiple Entries
And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Computer Fundamentals and Programming in C (4+0+0)	4	4	40	60
	DSCP-1: C Programming (0+0+2)	4	2	25	25
	OE-1: Office Automation (3+0+0)	3	3	40	60
II	DSC-2: Data Structures using C(4+0+0)	4	4	40	60
	DSCP-2: Data structures (0+0+2)	4	2	25	25
	OE-2: C Programming Concepts(3+0+0)	3	3	40	60

Course objectives: The present Curriculum Framework for BSc degrees is intended to facilitate the students to achieve the following.

- To build up an indulgent and knowledge of the basic theory of Computer Science and Information Technology with good basis on theory, systems and applications such as algorithms, data structures, data handling, data communication, computation and analysis.
- To develop the capability to use this knowledge to analyse new situations in the application domain including software tiny tools.
- To gain indispensable 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.

Programme Outcomes: The Bachelor of Computer Science (Basic/Hons) program makes possible students to accomplish following additional attributes besides the afore-mentioned attributes, by the time of graduation:

- The ability to apply skill set in computing with strong programming and mathematics skills, as well as wide ranging skills in project management, effectivepresentations and team work.
- Run by contemporary trends in industrial/research settings and there by innovate novel solutions to existing problems.
- The capability to apply the knowledge and understanding noted skills to the analysis of a given information handling problems.
- The skill to work independently on a generous software project and as an effective team member.
- 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.
- 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.
- 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.
- Application Systems Knowledge: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
- Communication: Must have a reasonably good communication knowledge both in oral and writing.
- Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the internality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
- Lifelong Learning: Should become an independent learner. So, learn to learn ability.
- Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

I SEMESTER

Course Outcomes: 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.

II SEMESTER

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

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphsare 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, records, 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 andsearching.

Open Elective Course (OE)

Course Outcomes:

- Confidently operate Desktop Computers to carry out computational tasks.
- Understand working of Hardware and Software and the importance of operatingsystems.
- 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.

III &IV semester

Model Curriculum Structure
(B.Sc. Schema)

Program: B.Sc. (Basic and Honors) **Subject: Computer Science**

1. **Computer Science as MAJOR with another Subject as MINOR (Table IIA of Model Curriculum)**

2. **Computer Science as MAJOR with another Subject also as MAJOR (Table IIIA of Model Curriculum)**

3. **Computer Science as MINOR with another Subject as MAJOR (As per Table IIA of Model Curriculum)**

Sem	Discipline Specific Core Courses(DSC)	Hour / Week		DS Elective Courses	Hours/ Week
		Theory	Lab		
III	**DSC-3:** Object Oriented Programming in JAVA	4			
	DSC-3 Lab: JAVA Programming Lab		4		
IV	**DSC-4:** Database Management Systems	4			
	DSC-4 Lab: DBMS Lab		4		

Computer Science :
Skill Enhancement Course: SEC for B.Sc. & other Subject Students
SEC Model-2
Semester: III/IV

Course Title: Artificial Intelligence	Course Credits: 2
Total Contact Hours: 13 hours of theory and 26 hours of practical	Duration of ESA: 01 Hour
Formative Assessment Marks: 25 marks	Summative Assessment Marks: 25 marks

Course Outcomes (Cos):

At the end of the course, students will be able to:

- Appraise the theory of Artificial intelligence and list the significance of AI.
- Discuss the various components that are involved in solving an AI problem.
- Illustrate the working of AI Algorithms in the given contrast.
- Analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
- Apply the AI concepts to build an expert system to solve the real-world problems.

Model Syllabus for B.Sc. (Basic and Honors), Semesters III and IV

Semester: III

Course Title: Object Oriented Programming in Java	Course code: DSC3
Total Contact Hours: 52	Course Credits: 04
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (Cos):

At the end of the course, students will be able to:

• Explain the object-oriented concepts and JAVA.

- Write JAVA programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.
- Implement Classes and multithreading using JAVA.
- Demonstrate the basic principles of creating Java applications with GUI.

Course Title: Java Programming Lab	Course code: DSC3 Lab
Total Contact Hours: 52	Hours/week: 04
Formative Assessment Marks: 25	Course Credits: 02
Exaım Marks: 25	Duration of Exam: 03 Hours

Course Outcomes (Cos):

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

- Implement Object Oriented programming concept using basic syntaxes of control Structures
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Demonstrates how to achieve reusability using inheritance

- Demonstrate understanding and use of interfaces, packages, different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common user interface components to design GUI in Java using Applet & AWT along with response to events

Semester: IV

Course Title: Database Management System	Course code: DSC4
Total Contact Hours: 52	Course Credits: 04
Formative Assessment Marks: 40	
Summative Assessment Marks: 60	Duration of SEE/Exam: 02 Hours

Course Outcomes (COS):

At the end of the course, students will be able to:

- Explain the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-world problem
- Convert an ER diagram to a database schema and deduce it to the desired normal form.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Explain the transaction processing and concurrency control techniques.

Course Title: DBMS Lab	Course code: DSC4 Lab
Total Contact Hours: 52	Hours/week: 04
Formative Assessment Marks: 25	Course Credits: 02
Exam Marks: 25	Duration of Exam: 03 Hours

Course Outcomes (Cos):

Student would be able to create tables, execute queries

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table

Open Elective for III & IV Semester
Python Programming Concepts

Course Title: Python Programming Concepts	Course Credits: 3 (3L+OT+0P)
Semester: III/IV	Duration of SEE: 02 Hour
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (Cos):

• Explain the fundamentals of Computers.
• Explain the basic concepts of Python Programming.

• Demonstrate proficiency in the handling of loops and the creation of functions.
• Identify the methods to create and store strings.

Fundamentals of Multimedia

Course Title: Fundamentals of Multimedia	Course Credits: 3 (3L+OT+0P)
Semester. III/IV	Duration of SEE: 02 Hour
Total Contact Hours: 42	SEE: 60 Marks. IA: 40 Marks

Course Outcomes (COS):

• Students will learn about multimedia, which is a field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (video), animation, audio and any other media where every type of information can be represented, stored, transmitted and processed digitally.

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	5. Computer Science , BSCCBCSCOMYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To impart basic knowledge in computer science
- To give the skills required related to computer science
- To make the students aware of the various facets of computer science
- To make the students ready for placements in various software and other companies which need computer science skill sets

PRAGRAM SPECIFIC COURSE OUTCOME:

- After completing this program specific discipline the students
- Get basic knowledge of computer science and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various software companies and regularly enter to higher studies also.

B.Sc., COMPUTER SCIENCE

Course details-Computer Science (UG)-2020-2021 onwards (Revised CBCS)

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction
1	V, VI any one each sem	DSE-1A/ DSE-1B/ DSE-1C/ DSE-2A/ DSE-	Numerical and Statistical Analysis	4:0:2	6	2021-22
			Computer Graphics and Animation	4:0:2	6	2021-22
			Data Communication and Computer	4:0:2	6	2021-
			Web Programming	4:0:2	6	2021-22
			NET Programming	4:2:0	6	2021-
			Software Engineering	4:0:2	6	2021-22
			System Software and Operating Systems	4:0:2	6	2021-22
2	V or VI	SEC-1/SEC3	Computer Applications	2:0:0	2	2021-22
3	V and VI	SEC 2 and SEC4 Without	DTP (Page Maker and Corel Draw)	1:0:1	2	2021-
			Cyber Security	1:0:1	2	2021-
			Accounting Software (Tally)	1:0:1	2	2021-

	Any One	repetition	Android Programming	1:0:1	2	2021-22

DSC: Discipline Specific Core Course
DSE: Discipline Specific Elective
SEC: Skill Enhancement Course

COURSE OUTCOME: Electives for both Vth and VIth semesters
(DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C)
(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

V SEMESTER
DSE1A: Numerical and statistical analysis

Course Objectives: Students will try to learn:

- To develop the mathematical skills of the students in the areas of numerical methods.
- To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, nterpolation
- To lay foundation of computational mathematics for post-graduate courses specialized studies and research.

Course Outcome: On successful completion of the course students will be able to:

- Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
- Apply various interpolation methods and finite difference concepts.
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
- Work numerically on the ordinary differential equations using different methods through the theory of finite differences.

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

DSE1B: Computer graphics and animation

Course Objectives: Students will try to learn:

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- To learn the basic principles of 3- dimensional computer graphics.
- Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
- To comprehend and analyze the fundamentals of animation, virtual reality, underlying

technologies, principles, and applications.

Course Outcome: Students will able to:

- To list the basic concepts used in computer graphics.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its related technologies.
- To understand a typical graphics pipeline.
- To design an application with the principles of virtual reality

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

DSE1C: Data communication and computer networks

Course Objectives: Students will try to learn:

- Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
- Study Session layer design issues, Transport layer services, and protocols.
- Gain core knowledge of Network layer routing protocols and IP addressing.
- Study data link layer concepts, design issues, and protocols.
- Read the fundamentals and basics of Physical layer, and will apply them in real time applications.

Course Outcome: Students will able to:

- Describe the functions of each layer in OSI and TCP/IP model.
- Explain the functions of Application layer and Presentation layer paradigms and Protocols.
- Describe the Session layer design issues and Transport layer services.
- Classify the routing protocols and analyze how to assign the IP addresses for the given network.
- Describe the functions of data link layer and explain the protocols.
- Explain the types of transmission media with real time applications

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

VI SEMESTER

DSE2A: Web programming

Course Objectives: Students will try to learn:

- Understand the principles of creating an effective web page
- Develop skills in analyzing the usability of a web site.
- Learn the language of the web: HTML and CSS.

Course Outcome: Students will able to:

- To Create Web-Pages Effectively.

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

DSE2B: Net programming

Course Objectives: Students will try to learn:

- OOPs using C#.NET
- Learn data access mechanism provided .net
- Create a web application using .net
- Developing the website & application
- Dot Net IDE Component Framework.
- Programming concepts in .Net Framework.

Course Outcome: Students will able to:

- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.
- Performing Database operations for Windows Form and web applications.

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

DSE2C: Software engineering

Course Objectives: Students will try to learn:

- Knowledge of basic SW engineering methods and practices, and their appropriate application.
- Describe software engineering layered technology and Process frame work.
- A general understanding of software process models such as the waterfall and evolutionary models.
- Understanding of software requirements and the SRS documents.
- Understanding of the role of project management including planning, scheduling, risk management, etc.
- Describe data models, object models, context models and behavioural models.
- Understanding of different software architectural styles.
- Understanding of software testing approaches such as unit testing and integration testing.
- Describe software measurement and software risks.
- Understanding on quality control and how to ensure good quality software.

Course Outcome: Students will able to:

- Select and implement different software development process models.
- Extract and analyze software requirements specifications for different projects.
- Develop some basic level of software architecture/design.

- Apply standard coding practices.

(One among DSE-1A/ DSE-1B/ DSE-1C and DSE-2A/ DSE -2B/ DSE-2C in V/VI SEMESTER)

DSE2C: System software and operating systems

Course Objectives: Students will try to learn:

- To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
- To study the need for special purpose operating system with the advent of new emerging Technologies

Course Outcome: Students will able to:

- Describe the important computer system resources and the role of operating system in their management policies and algorithms.
- Understand the process management policies and scheduling of processes by CPU
- Evaluate the requirement for process synchronization and coordination handled by operating system
- Describe and analyze the memory management and its allocation policies.
- Identify use and evaluate the storage management policies with respect to different storage management technologies. 6. Identify the need to create the special purpose operating system.

Bachelor of Science (Basic/Hons.) Degree in Electronics
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
BOARD OF STUDIES: PROCEEDINGS

Details of Course of Study: I and II Semesters

Sem.	Discipline Core/ Open Elective Paper	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
	(L+T+ P)				
I	DSC-1: Electronic Devices and Circuits (4+0+0)	4	4	40	60
	DSCP-1: Electronic Devices and Circuits (0+0+2)	4	2	25	25
	OE-1: Fundamentals of Electronics and Domestic Wiring (3+0+0)	3	3	40	60
	OE-2: Domestic Equipment Maintenance (3+0+0)	3	3	40	60
II	DSC-2: Analog and Digital Electronics (4+0+0)	4	4	40	60
	DSCP-2: Analog and Digital Electronics (0+0+2)	4	2	25	25
	OE-3: Fundamentals of Semiconductor Devices (3+0+0)	3	3	40	60
	OE-4: Renewable Energy and Energy Harvesting (3+0+0)	3	3	40	60
	OE-5: PCB Design and Fabrication (3+0+0)	3	3	40	60

I SEMESTER

Course objectives:

The objectives of the Course are to enable the student to understand Principle ofoperation of passive components.

- Basics principles of network theorems.
- Analysis of Electronic circuits Construction, operation and applications of semi conductor diode, BJT and special purpose devices
- Number systems, Boolean laws and methods of simplifications of Boolean expressions
- Course Outcomes at the end of this course, students will be able to explain the principles and behavior of basic semi conductor devices.
- Analyse basic networks using network theorems.
- Apply the concepts to realize the circuits. As per the requirement build simple electronic circuits used in various applications.
- Evaluate the critical internal parameters of semi conductor devices for the given standard device models. Demonstrate the working of analog and digital circuits as per the specifications.

DSCP-1: ELECTRONIC DEVICES AND CIRCUITS (PRACTICALS): 4 Credits 56 Hrs.

Course Objectives: The objectives of the Course are to enable the student get the hands-on training on the Working principles of Electronics Instruments and components.

- Analyse Electronic circuits by applying Network theorems
- Understand the I-V characteristics of Diode, BJT, and other semi conductor devices
- Design and construct the biasing, amplifier, resonant circuits and to understand their behaviour.
- Simplify Boolean Expressions and construct the circuits to verify the truth table.

Open Elective Courses (OE)

OE-1: FUNDAMENTALS OF ELECTRONICS AND DOMESTIC WIRING: 3 Credits 48 Hrs.

Course Objectives: The objectives of the Course are to enable the student tounderstand

- Ability to gain the knowledge of basic electronics and electronic components.
- Ability to analyse various components behaviour in AC and DC circuits.
- Ability to get the knowledge of electrical wiring and safety precautions.
- Provide students with learning experiences that develop broad knowledgeand

understanding of key concepts of electrical and electronics.

- Provide students with skills that enable them to get employment in various organisations, industries, and turn as entrepreneurs.

OE-2: DOMESTIC EQUIPMENT MAINTENANCE: 3 Credits 48 Hrs.

Course Objectives: The objectives of the course are

- To enable the students to understand the working principle of domesticequipments.
- Identify the common faults that occurs in the domestic equipment.
- Able to carry out minor repairs in the equipments.
- Understand the technical specifications of the equipments.

II SEMESTER

Course objectives: The objectives of the Course are to enable the student to understand Principle of operation active devices like, BJT, FET, Op-Amp, UJT, SCR, etc., Understand different applications of op-amp.

- Analysis of Electronic circuits.
- Construction, operation and applications oscillators.
- Digital Logic Families and their comparison.
- Understand, analyse and simply combinational and sequential digital logic circuits.
- Course Outcomes At the end of this course, students will be able to explain the working principles of semiconductor devices like JFET, MOSFET, UJT, SCR, Diac and Triac.
- Design and build the circuits to understand the applications of op-amp.
- Demonstrate and understand the working of combinational and sequential logic circuits.

DSCP-1: ELECTRONIC DEVICES AND CIRCUITS (PRACTICALS): 4 Credits 56 Hrs.

Course Objectives: The objectives of the Course are to enable the students to have hands on training and understanding of the following I-V characteristics of special devices like Principle of operation active devices like, BJT, FET, Op-Amp, UTJ, SCR, etc.,

- Understand different applications of op-amp,
- Know about the working of sinusoidal and non-sinusoidal oscillators.
- Working of Combinational and Sequential Digital circuits.
- Understand the concept and working of ADC and DAC

Open Elective Courses (OE)

OE-3: FUNDAMENTALS OF SEMICONDUCTOR DEVICES: 3 Credits 48 Hrs.

Course Objectives: The objectives of the Course are to enable the student tounderstand

- Ability to gain the knowledge of Semi conductors devices.
- Ability to get the applications of semi conductor devices.
- Provide students with learning experiences that develop broad knowledgse andunderstanding of semi conductor devices and its applications.

Course Objectives: The objectives of the course are

- To enable the students to understand the importance of non-conventionalenergy systems
- Understand the method of energy harvesting using solar energy, wind energy,hydro energy, etc.
- Know the principle of operation of piezoelectric effect and its use in energy harvesting
- Get the knowledge on electromagnetic energy harvesting methods.

OE-5: PCB DESIGN AND FABRICATION: 3 Credits 48 Hrs.

Course Objectives: Upon the completion of this course, students will demonstrate theability to:

- Understand basics of PCB designing.
- Apply advance techniques, skills and modern tools for designing and fabrication ofPCBs.
- Apply the knowledge and techniques to fabricate Multilayer, SMT and HDIPCB.
- Understand concepts of Packaging.

III &IV semester

Program Name	**BSc in Electronics**	Semester	**Third Semester**
Course Title	**Programming in C and Digital Design using Verilog (Practical)**		
Course Code:	**DSCP. ELE 3**	No. of Credits	**2**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**
Note: Minimum of 5 programs to be written and executed in each section			

Section – A: Digital Design Using Verilog

1) Realization of gates using verilog.
2) Simplification of Boolean expressions and realization using verilog.
3) Realize Adder/Subtractor (Full/Half) circuits using verilog data flow description.
4) Realize the following code converters using verilog.
   a) Gray to Binary and vice-versa.
   b) Binary to excess 3 and vice-versa.
5) To realize 4-bit ALU using verilog.
6) To realize using verilog description: 8:1 multiplexer, 8:3 encoder.
7) To realize using verilog description: 1:8 Demultiaplexer, 3:8 decoder.
8) To realize using verilog description flip flops:
   a) JK - type (b) SR type (c) T-type (d) D-type.
9) To realize counters: Up/down (BCD & Binary) using verilog description.
10) Modeling of Universal shift registers.

Section - B: List of C–Programs

1) Programme to perform arithmetic operation (Addition or subtraction).
2) Programme to read radius of a circle and find area and circumference of circle.
3) Programme to read three numbers and find the biggest of three (using nested-if).
4) Programme to calculate factorial of a given number.
5) Programme to read percentage of marks and to display appropriate message.
6) Programme to check for prime number.
7) Programme to generate n-primes.
8) Programme to find roots of quadratic equation (Demonstration of switch case statement).
9) Programme to read and display matrix elements.
10) Programme to read and display array elements.
11) Find the gross salary of an employee
12) Remove all vowels from a string

Program Name	**BSc in Electronics**		Semester	**Fourth Semester**
Course Title	**Electronic Communication-I (Theory)**			
Course Code:	**DSC. ELE 4**		No. of Credits	**4**
Contact hours	**60 Hours**		Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Objectives:

On completion of the course, Student will be able:

- To understand the communication system, principle and working of communication system, means and medium of communication.
- To understand the principle and working of different modulation and demodulation techniques.
- To understand the Principle and working of Antenna, Waveguides, Transmission lines, and RADAR
- To understand the basics of Satellite and Optical Fiber communication

Course outcomes:

- After studying this course, students will be able to:
- Know the basic concept of Analog Communication.
- Understand the principle of Analog Communication.
- Know the Various modulation techniques involved in radio communication before the transmission.
- Know different detection process involved in receiver.
- Basic knowledge about Satellite Communication, Optical fiber communication system and RADAR.

Program Name	**BSc in Electronics**		Semester	**Fourth Semester**
Course Title	**Electronic Communication-I (Practical)**			
Course Code:	**DSCP. ELE 4**		No. of Credits	**2**
Formative Assessment Marks	**25**		Summative Assessment Marks	**25**
Note: Minimum of 10 Experiments are to be performed using hardware and simulation.				

V & VI semester

Sl.No	Program	Program Code	No of Program specific disciplines with code
1	**B.Sc.**	**BSCCBCSYCM**	6. **Electronics, BSCCBCSELEYCM**

PRAGRAM SPECIFIC COURSE OBJECTIVES:

1. To pass on advanced and comprehensive knowledge in the area of Electronic Science
2. To train the students to be inquisitive and think in an innovative way
3. To impart basic and translational research skills with technical excellence and make them research and industry ready

PRAGRAM SPECIFIC COURSE OUTCOME:

1. In depth knowledge gained during the course of three years helps the students to join the higher courses or industries as beginners.
2. Helps the students to answer the questions with confidence in competitive examination
3. Develop practical skills along with their theory components,
4. They develop entrepreneurial skills with the help of skill-based courses and alumni interaction
5. Overall goal is reached towards Professional Competence

B.Sc., ELECTRONICS

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-1A	Electronics instrumentation	3:0:1	4	2021-22
		DSE-1B	VHDL	3:0:1	4	2021-22
6		SEC-1	Electrical Circuits and Network Skills	2:0:0	2	2021-22
		SEC-2	Design & Fabrication of Printed Circuit Boards	2:0:0	2	2021-22
7	VI	DSE-2A	Photonic devices and power Electronics	3:0:1	4	2021-22
		DSE-2B	Digital Signal Processing	3:0:1	4	2021-22
8		SEC-3	Computer Networks	2:0:0	2	2021-22
		SEC-4	Internet and Java Programming	2:0:0	2	2021-22

DSC: Discipline Specific Core Course

DSE: Discipline Specific Elective
SEC: Skill Enhancement Course

V SEMESTER

DSE-1A: ELECTRONICS INSTRUMENTATION

Course Objectives: This course will enable students to:

1. Define and describe accuracy and precision, types of errors, statistical and probability analysis.
2. Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters. ·
3. Describe functional concepts and operation of various Analog and Digital measuring instruments.
4. Describe and discuss functioning and types of Oscilloscopes, Signal generators, AC and DC bridges.
5. Recognize and describe significance and working of different types of transducers.

Course Outcome: After studying this course, students will be able to:

1. Describe instrument measurement errors and calculate them.
2. Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.
3. Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period,
4. Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
5. Utilize AC and DC bridges for passive component and frequency measurements.

DSE-2A: VHDL

Course Objectives: This course will enable students to:

1. Learn different VHDL constructs.
2. Familiarize the different levels of abstraction in VHDL.
3. Understand timing and delay Simulation.
4. Learn VHDL at design levels of data flow, behavioural and structural for effective modelling of digital circuits.
5. Study the concepts of generics, configuration and sub-programs.
6. Get an introduction to Verilog.

Course Outcome: At the end of this course, students should be able to:

1. Write VHDL programs in gate, dataflow, behavioural and structural modelling levels of Abstraction.
2. Write simple programs in VHDL in different styles.
3. Design and verify the functionality of digital circuit/system using test benches.

4. Identify the suitable Abstraction level for a particular digital design. ·
5. Perform timing and delay Simulation.

SEC-1: Electrical Circuits and Network Skills

Course Objectives:

The objectives of the course are to enable the student to Understand the basic principles of electricity, drawing and symbols, motors, electrical wiring.

- Basics principles of electricity.
- Analysis of Electronic circuits measuring instruments such as DMM, ammeter and voltmeter.
- Apply the concepts to realize the circuits. As per the requirement build simple electronic circuits used in various applications.
- Analyse basic Electrical Drawing, Symbols and Electrical Circuits.
- To study the working principles of Generators and Transformers.
- To study and analyze the electric motors and its protection.

Course Outcomes: After successfully studying this course, students will:

- Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and three-phase circuits in sinusoidal steady state.
- Be able to acknowledge the principles of operation and the main features of electric machines and their applications.
- Be able to acquire skills in using electrical measuring devices.
- Be aware of electrical hazards and able to implement basic actions to avoid unsafe work conditions.
- Be able to check the condition and repair the motors.
- Be able to electrical wiring for single phase and three phase.

SEC-2: Design and Fabrication of Printed Circuit Boards

Course Objectives:

The objectives of the Course are to enable the student to understand design and construction of PCB

- Basics principles of PCB design.
- Analysis of Electronic components identification of PCB.
- To study electronic components are mounted on PCB.
- To frame the layout of fabrication on PCB.
- The analysis of Laminates and Photo printing and Etching and Soldering.

Course Outcomes:

- Understand the need for PCB Design and steps involved in PCB

Design and Fabrication process.

- Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools.
- Understand the terminology used in industrial PCB manufacture.

VI SEMESTER

DSE-2A: Photonic devices and power Electronics

Course Objectives: This course will enable students:

1. To understand the classification of photonic devices like LEDs, LCDs, Photo detectors, Photoconductors and Solar Cells.
2. Understand the working of various power devices like SCR, DIAC, TRIAC POWER MOSFET and IGBT.
3. Study and analysis of thyristor circuits with different triggering techniques.
4. Learn the applications of power devices in controlled rectifiers.
5. Study of power electronics circuits under different load conditions.

Course Outcome: After studying this course, students will be able to:

1. Determine the wavelength of different light.
2. Understand the application of various photonic devices.
3. Describe the characteristics of different power devices and identify the applications.
4. Determine the output response of a thyristor circuit with various triggering options.
5. Determine the response of controlled rectifier with resistive and inductive loads.

DSE-2B: Digital Signal Processing

Course Objectives: This course will enable students to:

1. Understand the mathematical description of continuous and discrete time signals and systems.
2. Analyze the signals in time domain using convolution difference/differential equations
3. Classify signals into different categories based on their properties. ·
4. Analyze Linear Time Invariant (LTI) systems in time and transform domains.
5. To study the bilinear transformation, digital filters and DSP processor.

Course Outcome: At the end of the course, students will be able to:

1. Classify the signals as continuous/discrete, periodic/a periodic, even/odd, energy/power and deterministic/random signals. ·
2. Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
3. Compute the response of a Continuous and Discrete LTI

system using convolution integral and convolution sum.

4. Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis.
5. Compute Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.
6. Compute the DFT for the given sequence formula method, and Using FFT.
7. Design of simple IIR digital Butterworth filters.

COMPUTER NETWORKS

Course Objectives:

The objectives of the Course are to enable the student to understand the basic principles on data communication, net works, transmission media, OSI model and WEB Basics principles of electricity

- Analysis basic concepts of different networks connections
- Analysis basic concepts of different transmission medium
- To study the working principles multiplexing and error detections
- To study and analyze the different OSI models
- To study the different networking and internetworking devices
- To learn the WEB and browser architecture

Course Outcomes: After successfully studying this course, students will:

- Be able to systematically analyze networks connections.
- To understand different transmission media
- Be able to develop the multiplexing circuits and error detection
- To understand architecture of different OSI models
- Be able to design the WEB and Browser Architecture

Internet and Java Programming

Course Objectives:

The objectives of the Course are to enable the student to Understanding the Internet and file handling

- Basics ideas on internet and hardware requirements for internet connections
- Analysis of data using commands in the language.
- To study file handling in Java
- The analysis of Laminates and Photo printing and Etching and Soldering

Course Outcomes:

- Understand the need for internet and hardware requirements.
- Familiarize different data types, flow chart, operations
- Understand the different models on java
- Understand the file handling

Bachelor of Science (Basic/Hons.) Degree in EnvironmentalScience
Choice Based Credit System (CBCS) With Multiple Entries
And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Divisions of Environment (4+0+0)	4	4	40	60
	DSCP-1: Water quality analysis(0+0+2)	4	2	25	25
	OE-1: Environmental Conservation Movements (3+0+0)	3	3	40	60
	OE-2: Environment and Sustainable Agriculture(3+0+0)	3	3	40	60
	OE-3: Environmental Pollution(3+0+0)	3	3	40	60
II	DSC-2: Ecology– Theory andPractice (4+0+0)	4	4	40	60
	DSCP-2: Ecological analysis(0+0+2)	4	2	25	25
	OE-4: Climate Change and ItsImplications (3+0+0)	3	3	40	60
	OE-5: Environment and PublicHealthin Contemporary Society (3+0+0)	3	3	40	60
	OE-6: Wildlife and Conservation (3+0+0)	3	3	40	60

Programme outcome: By the end of the Programme the students willbe able to develop:

- Disciplinary knowledge in fields related to Environmental Science
- Systemic and critical thinking with reference to environment-people-economic-development attributes
- Problem identification skills and sustainable solution provisioning
- Analytical reasoning and appropriate inter pretation skills
- Self-directed learning efficiencies leading to a productive lifelong learning process
- Research-related skills such as review of literature, design of experiments, statistical competence, report writing and prepare target specific communicationpackages
- Cooperation/Teamwork
- Reflective thinking
- Multi disciplinary competence catering to environmental sustainability

I SEMESTER

Programme Specific Objectives:

- To develop competency inunderstanding the inter relatedness of the divisions of the Environment.
- To instill an introductory knowledge of the divisions of Environment and develop necessary analytical skills to characterise the irvariations.
- To motivate and inspireto acquire contemporary understanding and skills leadingto issue identification.
- To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entrepreneurialopportunities.

Programme outcomes:

- Demonstrate anentry level competence in understanding the environmentaldivisions and associated processes.
- Demonstrate the ability to carryout water quality analys is in the laboratory and interpret the results.
- Ability to understand and appreciate the role of environmental para meter sin specific day-to-day activities.
- Be able to understand the demands and function inwork environment dealing with environmental systems.

II SEMESTER

Programme Specific Objectives:

- To develop competency inunderstanding the ecological principles governing the biosphere.

- To instill a knowledge of the Ecology and develop necessary analytical skills to understand the ecological systems.
- To motivate and inspire to acquire contemporary understanding and skills leadingto issue identification.
- To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entre preneurial opportunities.

Programme outcomes:

- Demonstrate an entry level competence in understanding the ecological dynamics and their influence on humans and anthropogenic end eavours.
- Demonstrate the ability to carryout ecological analysis in fieldconditions/laboratories and make appropriate judgements.
- Ability to understand and appreciate the role of ecology and system dynamics inspecific habitats/agroeco systems.
- Be able to understand the demands and function in work environment dealing with environmental systems.

B.Sc. (Basic/Hons.) Semester 3

Title of the Course: **ES 3T1 – NATURAL RESOURCES AND MANAGEMENT**

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
4	**52**	**2**	**52**

Programme Specific Objectives	
PSO 1	To develop the understanding of role of natural resources in economicand ecological development.
PSO 2	To instill a knowledge of quantifying and evaluating contribution ofnatural resources management in human development.
PSO 3	To motivate and inspire to acquire contemporary understanding andskills leading to issue identification and management of natural resources.
PSO 4	To inculcate creativity and innovative spirit in the domain of human-development and natural resource utilisation efficiency.
Programme Outcomes	
PO 1	Demonstrate competence in understanding the significance of naturalresources in economic/ecological development.
PO 2	Demonstrate the ability to carry out the process of identification of, data procurement and interpretation with reference to natural resources.

PO 3	Ability to understand and appreciate the role of quantification ofresource use pattern in contemporary/sustainable developmentparadigms.
PO 4	Be able to understand the demands of data analysis and reporting innatural resource management domain.

ES 3P1 – MINERALOGY, PETROLOGY, ENERGY RESOURCES AND MEDICINALPLANTS

(Total Teaching Hours = 52; Total Credits = 2)

ES 3OE3: WOMEN AND ENVIRONMENT

Number of Theory Credits	Number of lecture hours/semester
3	**42**

ES 3OE3: ENVIRONMENTAL DISASTERS AND MANAGEMENT

Number of Theory Credits	Number of lecture hours/semester
3	**42**

B.Sc. (Basic/Hons.) Semester 4

Title of the Course: **ES 4T1 – BIODIVERSITY, WILDLIFE AND CONSERVATION**

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/ semester
4	**52**	**2**	**52**

Programme Specific Objectives	
PSO 1	To develop competency in understanding biodiversity and wildlife.
PSO 2	To instill a knowledge about human interactions with uncultivated varieties and develop necessary analytical skills to appreciate theseinteractions.
PSO 3	To motivate and inspire to acquire contemporary understanding andskills leading to issue identification and conservation.
PSO 4	To inculcate creativity and innovative spirit in identifying appropriateconservation tools and their timely implementation.
Programme Outcomes	

PO 1	Demonstrate competence in understanding the ecological, social andlegal dimensions of biodiversity and wildlife.
PO 2	Demonstrate the ability to carry out data collection procedures andanalysis in field conditions/laboratories and make appropriate interpretations.
PO 3	Ability to understand and appreciate the role of biodiversity in specificnatural habitats and agroecosystems.
PO 4	Be able to develop competence and academic skills in contributingtowards biodiversity and wildlife conservation.

ES 4P1 – BIODIVERSITY ASSESSMENT AND ECOSYSTEM SERVICES

(Total Teaching Hours = 52; Total Credits = 2)

ES 4OE4: ENVIRONMENT AND SUSTAINABLE AGRICULTURE

Number of Theory Credits	Number of lecture hours/semester
3	**42**

ES 4OE4: INITIATIVES FOR ENVIRONMENTAL MANAGEMENT

Number of Theory Credits	Number of lecture hours/ semester
3	**42**

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	**B.Sc.**	**BSCCBCSYCM**	**7. Environmental Science BSCCBCSENVYCM**

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To impart basic knowledge in Environmental science
- To give the skills required related to Environmental science
- To make the students aware of the various facets of Environmental Science
- To make the students ready for placements in Environmental related organisations

PRAGRAM SPECIFIC COURSE OUTCOME:

- After completing this program specific discipline the students
- Get basic knowledge of Environmental science and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various organizations and companies and they regularly enter to higher studies also.

B.Sc., ENVIRONMENTAL SCIENCE

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-1A	Environmental microbial technology	4:0:2	6	2021-22
		DSE-1B	Natural resource management and sustainability	4:0:2	6	2021-22
6		SEC-1	Industrial safety, health and environment	2:0:0	2	2021-22
7	VI	DSE-2A	Environmental pollution analysis, control & management	4:0:2	6	2021-22
		DSE-2B	Environmental legislation and policy	4:0:2	6	2021-22
8		SEC-2	Watershed Management	2:0:0	2	2021-22
9		AECC 3A	Environmental Studies	3:0:0	3	2021-22

V SEMESTER

DSE-I: Environmental Microbial Technology

Course Objectives:

- The course focuses on the variety of microbes, their habitats and interactions and their significance.
- It gives a wide vision on the spread of various diseases through microbes and a proper treatment for the disease.
- The paper presents an objective view of the application of biotechnological aspects in tackling the environmental problems.
- The course also provides knowledge on how to avoid the use of hazardous pollutants and wastes that affect the natural resources and the environment.

Course Outcome:

- Students get a valuable knowledge about the role of microbes in the environment.
- They are also exposed to the various effects of microbes on the environment and how it can be reduced.
- Students will get to know how the contaminated soil might be corrected or remedied on-site or loaded into containers and transported for treatment.
- It is a good platform for them to learn and transform plants into biofuels.
- Develop procedures to convert waste into biogas or other cleaner sources of energy.
- This study explains the contributions of bioenergy and how it can offer to reduce the use of fossil fuels in cities.
- They get opportunities for investment in biofuels which boosts the growth of economy which means that there will be more jobs and new sources of income.

V SEMESTER

DSE/T- Paper -2: Natural Resource Management and Sustainability

Course Objectives: This paper enable the students to gain/understand/obtain /Learn the knowledge about

- Natural resources and their reserves;
- Various types of natural resources, their conservation and management strategies;
- Mineral resources and environmental effects of mineral extraction
- Approaches towards resource management

Course Outcome:

Students get an extensive knowledge on natural resources, their types and conservation and management are

- Appreciate attributes of natural resource use and management
- Understand the complexity of natural resource and issues, and sustainability
- Apply theories and methods with interdisciplinary approach towards natural resource management
- Critically examine the gap in the resource availability, use, and conservation.
- Appreciate ideas of sustainable development.
- Critically examine the interlink between development and the environment.

V SEMESTER

SEC/T- Paper -1, INDUSTRIAL SAFETY, HEALTH AND ENVIRONMENT

Course Objectives: This paper enables the students to gain/understand/obtain/Learn the knowledge about

- Define, categorize and explain hazards;
- Health hazards associated with occupational health hazards and ergonomics;
- Origin of fire, their detection and extinguishing methods;
- First aid techniques for various casualties;
- Selection and maintenance of personal protective equipment;
- Management associated with occupational health and safety;
- Various legislative measures associated with industrial safety;

Course Outcome:

- Students are able to apply the knowledge of occupational health and safety in industrial sector
- Ability to provide industry with inputs on health and safety.
- Able to learn about Fire and other Hazards and its implications.
- Able to learn the first aid use and application.
- Learn and disseminate issues related to occupational health and hazards. CO4 Protocol development for an industry on disaster prevention, health issues, safety measures and environment management.

VI SEMESTER

DSE/T- Paper –1,

Environmental Pollution Analysis, Control & Management

Course Objectives: This paper enables the students to gain/ understand/obtain the knowledge about

- Air pollutants, their sampling techniques, control and management;
- Water pollutants, their sampling techniques, control and management;
- Noise pollution, thier control and management;
- Solid waste, it's collection and management
- Environmental impact assessment which is the project of policies, plans, and

programs, which are related to the proposed program associated with the organ of the state.

- An overview of Environmental laws which plays an important role in the protection of human health as well as the environment.

Course Outcome: After studying this Course, the students are able to:

- Students get broad knowledge on various types of pollution, their control and management.

- Students learn that pollution prevention can reduce environmental damages with suitable action.
- They can analyse the pollutants qualitatively and quantitatively and based on the results action can be taken.
- EIA study will ensures that the potential problems are foreseen and addressed at an early stage in project planning and design, to achieve sustainable development.
- Students understand the role of the Environmental Law, to make sure that the practices used in the environment do not cause harm to the environment, human or animal health.

VI SEMESTER

DSE/T- Paper - 2, Environmental Legislation and Policy

Course Objectives: This paper enable the students to gain/ understand/obtain the knowledge about

- Achieve knowledge about the history of environmental legislation in the ancient time;
- Legal terminologies associated with environmental legislation;
- Various legislative instruments/acts;
- Role of government bodies in management of various types of pollution;
- Various case studies related to environmental laws;

COURSE OUTCOME:

- Students are able to apply the knowledge of environmental legislation to control and monitor environmental pollution
- This paper introduces students to the legal structure of India and fundamentals of Environmental legislation and policy making.
- Each unit will help the students to develop basic concepts of environmental legislation and policy making in India and around the world.
- They get the knowledge about the judicial response to environmental issues in India and world.

8.

VI SEMESTER

SEC/T paper 2: Watershed Management

COURSE OBJECTIVES: This paper enables the students to gain/understand/obtain/ Learn the knowledge about

- Basic concept of watershed.
- Approaches and practices of sustainable watershed management.
- Integrated watershed management.
- Use modern techniques in watershed management.
- Techniques of flood and drought management and water conservation.

COURSE OUTCOME: Students are able to apply the knowledge about:

- watershed management in curbing the floods and droughts
- To control damaging runoff and degradation and thereby conservation of soil and water.
- To protect, conserve and improve the land of a watershed for more efficient and sustained production.
- To protect and enhance the water resources originating in the watershed.
- To check soil erosion and reduce the effect of sediment yield on the watershed.
- To moderate infiltration of rainwater.
- To improve and increase the production of timbers, fodder and wildlife resources.
- To enhance the groundwater recharge, wherever applicable.

Bachelor of Science (Basic/Hons.)Degree in Food Science &Nutrition
Choice Based Credit System (CBCS) With Multiple Entries
And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Human Physiology(4+0+0)	4	4	40	60
	DSCP-1: Human Physiology(0+0+2)	4	2	25	25
	OE-1: Basics of Food Science(3+0+0)	3	3	40	60
	OE-2: Basics of Nutrition(3+0+0)	3	3	40	60
II	DSC-2: Fundamentals of Human Nutrition (4+0+0)	4	4	40	60
	DSCP-2: Fundamentals of Human Nutrition (0+0+2)	4	2	25	25
	OE-3: Healthy Lifestyle(3+0+0)	3	3	40	60
	OE-4: Culinary Science(3+0+0)	3	3	40	60

I SEMESTER

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

- Gain the basic knowledge of human anatomy and physiology.
- Define the main structures composing human body.
- Explains structure and functions of cells, tissues and organs, systems of the humanbody
- Relates structure and functions of tissue.
- Provides excellent preparation for careers in the health professions

and/orbiomedical research.

Open Elective Course (OE):

OE-1: BASICS OF FOOD SCIENCE(THEORY): 3 Credits 42 Hrs.

Objectives:

- Its scope is to help and gain knowledge on Food groups and food commodities,
- To Understand the nutritional composition of foods

Learning Outcomes:

- It helps to know different types of food commodities and their importance.
- To learn the macro and micronutrients content of food commodities.

OE-2: BASICS OF NUTRITION(THEORY): 3 Credits 42 Hrs.

Objectives:

- Its scope is to help and gain knowledge of Nutrients.

Learning Outcomes:

- It helps to know about the use of different nutrients and their functions.

DSC-2: FUNDAMENTALS OF HUMAN NUTRITION (THEORY): 4 Credits;56 Hrs.

Course Outcome:

- Gain knowledge in basic terminology, aspects of nutrition & functions of food inhealthy life sustenance
- Understand function of nutrients, dietary sources, consequences of deficiency and excess
- Understand the food composition and concept of energy balance
- Equip with knowledge and understanding on importance of water
- Understand the nutritional management of deficiency disorders.

Open Elective Course (OE):

OE-3: HEALTHY LIFE STYLE (THEORY): 3 Credit; 42 Hrs.

Course Outcome: On completion of this course, the students will be able to;

- Gain knowledge on healthy life styles.
- Understand the relationship between different nutrients and their importance.
- Understand the personal hygiene; environmental Hygiene.

OE-4: CULINARY SCIENCE (THEORY): 3 Credit; 42 Hrs.

Course Outcome:

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

- Gain knowledge on aims and objectives of cooking.
- Understand the Conservation of nutrients and their importance to life.
- Understand the personal hygiene; environmental Hygiene; food storage and causesof contamination.

3rd and 4th Semester

Contents of Courses for B.Sc. (Hons.) in Food Science and Nutrition as Major Subject

Model II A

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

Abbreviation for FSNDSCT1.1 /FSNDSCP1.1

FSN – Food Science and Nutrition; DSC – Discipline Core; T – Theory/ P – Practical; 1 – First Semester; .1 – Course 1

Syllabus for 3rd and 4th Semester

B Sc Food Science & Nutrition

Semester III

Course Title: **FOOD SCIENCE AND NUTRITION / Principles of Food Science**	
Total Contact Hours: 56+56	Course Credits:4+2
Formative Assessment Marks: 40	Test1+Test2=2Hrs
Summative Assessment Marks: 60	Duration of ESA/Exam: 03Hrs

Course Pre-requisite(s): Students who have passed Pre-University Board of Examination or Equivalent board with science subjects are eligible for the undergraduate degree B.Sc in Food Science and Nutrition.

Objectives:

- To obtain knowledge on different food groups and their contribution to nutrition.
- To provide understanding about composition and nutritive value of food and knowledge relevant to processing, shelf life extension and reduction of toxins.
- To gain knowledge on food safety, hazards and designing of new food products

Course Outcomes (COs):

At the end of the course the student gains the knowledge on:

- Basic concepts of Food Science
- Food groups, food commodities and their structure

B. Sc Semester 3

Title of the Course: Food Science & Nutrition

Course : DSC 3.1 Principles of Food Science		**Course 2 OE: A) Food Adulteration B) Common Nutritional Problems**	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
04	**56**	**03**	**42**

Course 3.2 OE A) Food Adulteration

Food Adulteration

Objectives

- Its scope is to help and gain knowledge on food adulterants in food commodities
- To understand certain skills of detecting adulteration of common foods

Learning Outcomes

- It helps to extend the knowledge to other kinds of adulteration, detection and remedies
- To learn basic laws and procedures regarding food adulteration and consumer protection

Course 3.2 OE B) Common Nutritional Problems

Objectives

- Its scope is to help and gain knowledge of Nutrients

Learning Outcomes

- It helps to know about the use of different nutrients and their deficiencies.
- It helps to study about the Nutritional Programs

urse Title: **FOOD SCIENCE AND NUTRITION- Course 2.OE-A) Food Adulteration and B) Common Nutritional Problems**	
Total Contact Hours: 42	Course Credits:3
Formative Assessment Marks: 40	Test1+ Test 2=2Hrs
Summative Assessment Marks: 60	Duration of ESA/Exam: 03Hrs

Semester 4

Course 4.1: DSC- Life Cycle Nutrition (Credits 4+2)

Course Outcomes (Cos):

1. Gain knowledge in basic terminology, aspects of nutrition & functions of food throughout the life cycle
2. Understand methods of assessing nutrition status

Title of the Course: Food Science & Nutrition

Course 4.1: DSC- Life Cycle Nutrition		**Course 4.2 OE A) Food Safety and Hygiene B) Indian Traditional foods**	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
04	**56**	**03**	**42**

Course 4.1: **FOOD SCIENCE AND NUTRITION / Life Cycle Nutrition**	
Total Contact Hours: 56+56	Course Credits:4+2
Formative Assessment Marks: 40	Test1+Test2=2Hrs
Summative Assessment Marks: 60	Duration of ESA/Exam: 03Hrs

Course 4.2. Open Elective – A) Food Safety & Hygiene

Course Outcomes (COs):

1. To study the types of hazards associated with food
2. To gain knowledge on food regulations (national as well as international)
3. To understand the design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Course 4.2.OE- B) Indian traditional foods (credits 3/42hrs)

Course Outcomes (COs):

1. Gain knowledge on diversities of foods and food habits of India
2. Understand the patterns in India with focus on traditional foods.

Course Title: **FOOD SCIENCE AND NUTRITION- Course 4.2 OE-A)Food Safety & Hygiene and B) Indian Traditional Foods**	
Total Contact Hours: 42	Course Credits:3
Formative Assessment Marks: 40	Test1+Test2=2Hrs
Summative Assessment Marks: 60	Duration of ESA/Exam: 03Hrs

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	8.Food and Nutrition BSCCBCSFSNYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To provide students with the knowledge of basic terminology and several aspects of nutrition and the functions of food in healthy life sustenance;
- To ensure that students are familiar with the food classification, nutrition during special conditions and role of special functional food;
- To equip students with knowledge and understanding of modern aspects of nutritional science and novel food usage.
- To build competent professional in Food Science and Processing and work in Food Research Laboratories, Research institutes, baking industry, dairy industry, etc.
- To build competent professional Nutrition & Dieticians in hospitals and specialty clinics and for Sports nutrition. Thereby, the professionals can find job prospects in the field as Nutrition and Diet consultants in Food service organizations like Hotels, Hospitality services, Geriatric homes and also as administrators of Industrial canteens and other specialties.

PRAGRAM SPECIFIC COURSE OUTCOME:

- A successful completion of this course will enable students to: summarize and critically discuss/ understand both fundamental and applied aspects of food science and nutrition.
- They will be able to explain functions of specific nutrients in maintaining health, identifying nutrient specific foods and apply principles from the various facets of food science and related disciplines to solve practical as well as real-world problems.
- Use current information technologies to locate and apply evidence-based guidelines and protocols and get imparted with critical thinking to take leadership roles in fields of health, food research laboratories, dietetics, special nutritional needs and nutritional counseling.

B.Sc., FOOD SCIENCE AND NUTRITION

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Food Preservation Technology	4:0:2	6	2021-22
		DSE-IB	Diet Therapy	4:0:2	6	2021-22
6	V	SEC-2	Any one of the below mentioned	2:0:0	2	2021-22
		SEC-E1	Food Packaging Technology	2:0:0	2	2021-22
		SEC- E2	Baking Technology	2:0:0	2	2021-22
		SEC- E3	Home Based Catering	2:0:0	2	2021-22
		SEC- E4	Sports Nutrition	2:0:0	2	2021-22
7	VI	DSE-2A	Food Chemistry and Food Biotechnology	4:0:2	6	2021-22
		DSE-2B	Applied Nutrition	4:0:2	6	2021-22
8	VI	SEC-4	Any one of the below mentioned	2:0:0	2	2021-22
		SEC- F1	Food Safety and Quality Testing	2:0:0	2	2021-22
		SEC- F2	Dairy Technology	2:0:0	2	2021-22
		SEC-F3	Institutional Food Service Management	2:0:0	2	2021-22
		SEC- F4	Critical Care Nutrition	2:0:0	2	2021-22

Bachelor of Science (Basic/Hons.) Degree in Earth Science (Geology)
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020(2021-22 Batch Onwards)

Program Outcomes: Discipline knowledge: After the completion of the BSc Course (Degree/Honors), the students will be learning the basics and important aspects of all branches of Earth Sciences mentioned in the preamble; which will enable them to apply their acquired knowledge.

1. Problem Solving: After going through 6 or 8 semesters curricula the students will be able to understand and decipher majority of the geological processes and their effects.
2. Ethics on Profession, Environment and Society: As the subject Geology is related to Earth its resources and processes the students will be taught to acquire ethics to maintain the integrity while dealing with data collection, compilation, and interpretation and finding solutions.
3. Lifelong Learning and Entrepreneurship: Geology is regarded as a technical subject one can start their own consultancy so, they will become an independent entrepreneur and hence learning will be lifelong.
4. Motivation to take up Higher Studies: Inspiration to continue towards advanced studies in Geology and Research.

Open Elective (OE) Courses: OE courses are offered to the candidates of either the same program or other undergraduate programs as decided by the competent authority of the University of Mysore and the candidate who opts for OE in Earth Science has to choose one OE from the pool in each semester. The OE courses, in addition to enhancing the knowledge on the Earth's processes and helps to acquire skills for entrepreneurship.

Concept note, abbreviation explanation, coding, eligibility for admission to the course, duration of the course, course pattern, medium of instruction, attendance, internal assessment, mode of examination, duration of examination, results of the candidates and carry over are as per the provision made in the NEP regulations of University of Mysore and Yuvaraja's College (autonomous).

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Earth System	**4**	**4**	**40**	**60**

	Science - Fundamentals (4+0+0)				
	DSCP-1: Maps, Sediment Soil, Field Visit (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Crystallography, Mineralogy and Economic Mineral (3+0+0)	**3**	**3**	**40**	**60**
	OE-2: Pedology (3+0+0)	**3**	**3**	**40**	**60**
	OE-3: Basics of Earth System Science (3+0+0)	**3**	**3**	**40**	**60**
	OE-4: Geohazards and Mitigation Strategies (3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Basics of Crystallography, Minerology and Petrology (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Crystallography, Minerology and Petrology (0+0+2)	**4**	**2**	**25**	**25**
	OE-5: Medical Geology (3+0+0)	**3**	**3**	**40**	**60**
	OE-6: Industrial Minerals (3+0+0)	**3**	**3**	**40**	**60**
	OE-7: Paleobiology (3+0+0)	**3**	**3**	**40**	**60**
	OE-8: Gems and Ornamental Stones (3+0+0)	**3**	**3**	**40**	**60**

I SEMESTER

DSC-1: EARTH SYSTEM SCIENCE – FUNDAMENTALS (THEORY)

4 Credit; 56 Hrs.

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

1. Explain the origin and internal structure of the Earth.
2. Explain the conceptual and dynamic aspects of land form development.
3. Learn the relevance of applied aspects of Geomorphology in various fields.
4. Formulate conceptual and analytical descriptions of geodynamic processes such as

volcanism, earthquake and formation of ocean.

DSCP-1: MAPS, SOIL & FIELD VISIT (PRACTICAL)

2 Credits 56 Hrs.

Course Outcome:

- Students learn the preparation of various kinds of maps.
- Students learn the skill of detecting the changes in the land use/land cover of aregion and study its impacts, suggest remedial measures.
- Students get acquainted with the soil properties, types, characteristics andremediation of soil.

Open Elective Course (OE)

OE-1: CRYSTALLOGRAPHY, MINERALOGY AND ECONOMIC MINERAL (THEORY)

Credits :2 42 Hrs.

Course Outcome:

- Studying the basics of mineralogyand crystallography helps inunderstanding and building the overall knowledge in Geology.
- The students will be able to identify common rock-forming minerals andhand specimens as well as in thin sections.
- The students get familiarized with the instruments used to analyse inorganic compounds.

OE-2: PEDOLOGY (THEORY): 3 Credits 42 Hrs.

Course Outcome: The students will be able to learn the processes of formation of soil, its classification, texture and structure, soil characteristics of each textural and structural class.

OE-3: BASICS OF EARTH SYSTEM SCIENCE (THEORY): 3 Credits 42 Hrs.

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

- Explain the origin and internal structure of theEarth.
- Explain the conceptual and dynamic aspects of land form development.
- Learn the relevance of applied aspects of Geomorphology in various fields.

OE-4: GEOHAZARDS AND MITIGATION STRATEGIES (THEORY):

3 Credits 42 Hrs.

Course Outcome: After completing the course, student

- Can understand the geology behind natural disasters.
- Will understand the origin and occurrence of geohazards and evaluate the prediction

and mitigations.

- ❖ Can understand the causes, threats, impact, magnitude and intensity of thenaturalhazards.
- ❖ Will be able to qualitatively estimate risk, and envisagerisk-appropriatemitigation strategies.

II SEMESTER

DSC-2: BASICS OF CRYSTALLOGRAPHY, MINERALOGY AND PETROLOGY (THEORY): 3Credits 56 Hrs.

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

- ❖ To understand the states of matter, atomic arrangement in crystals, andclassification of crystals based on crystal symmetry.
- ❖ To understand the characteristics of common rock-forming minerals.
- ❖ To acquire knowledge on different types of rocks, their distinction from each otherand the rock cycle.
- ❖ To understand the occurrence and distribution of rocks in India.

DSCP-2: CRYSTALLOGRAPHY, MINERALOGY AND PETROLOGY (PRACTICAL)

2 Credits 56 Hrs.

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

- ❖ To understand the states of matter, atomic arrangement in crystals, andclassification of crystals based on crystal symmetry
- ❖ To understand the characteristics of common rock-forming minerals
- ❖ To acquire knowledge on different types of rocks, their distinction from each otherand the rock cycle.
- ❖ To understand the occurrence and distribution of rocks in India.

Open Elective Course (OE):

OE-5: MEDICAL GEOLOGY(THEORY): 3 Credits 42 Hrs.

Course Outcome: The course provides a basic understanding of geogenic and anthropogenic distribution of trace elements, its cyclic movement through the abiotic-biotic environment and their toxic effects on human health and that of flora and fauna.

OE-6: INDUSTRIAL MINERALS(THEORY): 3 Credits 42 Hrs.

Course Outcome: This course is a good opportunity for most of science and social science students not only to know about the mineral resources of India starting the principles of rock formation including minerals genesis during the rock formation and after their formation.

- Students exit with a certificate course will have skills to work in quarrying, mining, rock polishing, cement, silica/glass, sand mining, brick, ceramic, pottery and refractory industries.
- They will be exposed to start their own entrepreneurship. Similarly, students exit with a diploma, to Honors degree will be benefited work/carryout research in the interdisciplinary science to get original ideas and look for new reserves.

OE-7: PALEOBIOLOGY (THEORY): 3 Credits 42 Hrs.

Course Outcome: At the end of the course, students understand the types of invertebrate fossils, their mode of preservation, examination of the fossils, methodologies for the reconstruction of the past through evolutionary studies.

OE-8: GEMS AND ORNAMENTAL STONES (THEORY): 3 Credits 42 Hrs.

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

- To understand mineralogy and genesis of gem stones.
- To identify main physical and optical techniques used in the gems characterisation.

NEP – 2020For III and IV semesters
Bachelor of Science (Basic/Honors)
Degree with EarthScience as Major/Minor having Practicals
PROGRAMME STRUCTURE
Earth Science as Core subject: III and IV semesters

Semester	Discipline Core (DSC) (Credits) (L+T+P)	Credits	Discipline Specific Elective (DSE) / Open Elective (OE) (Credits)(L+T+P)
III	**A3 Theory (4 credits)** (4+0+0) Principles of Stratigraphy & Palaeontology **P3 Practicals (2 credits)** (0+0+2) Stratigraphy & Palaeontology	4+2	**OE-3 (3 credits)** (3+0+0) i) Dimensional Stone Technology ii) Marine Geology iii) Climatology iv) Watershed Management
IV	**A4 Theory (4 credits)** (4+0+0) Structural Geology and Hydrogeology **P4 Practicals (2 credits)** (0+0+2) Hydrogeology and Structural Geology	4+2	**OE-4 (3 credits)** (3+0+0) i) Geology and Society ii) Geophysical Exploration iii) Geostatistics iv) Geotourism
Exit option with Certificate			

COURSE-WISE SYLLABUS
III Semester Theory

Year	2021-22	**Course Code: ES301** **Course Title: PRINCIPLES OF STRATIGRAPHY AND PALAEONTOLOGY**	**Credits**	**4**
Sem	III		Hours	56
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 40		Summative Assessment Marks: 60	Duration of ESA: 2hrs.	
Course Outcomes		At the end of the course the student should be able to: • Understand fossils, types, fossilization process and modes of preservation, economically important fossils, geotourismrelated fossils. • Understanding the origin and evolution of lifeon the Earth. • Learn rich mineral deposits like petroleum, coal, and other minerals associated with fossils. Understanding the paleoclimate and Paleo environment.		

Year	**2021-22**	**Course Code: ES302** **Course Title: Stratigraphy&Palaeontology**	**Credits**	**02**
Sem	**III**		**Hours**	**48**
Course Pre-requisites, if any		**NA**		
Formative Assessment Marks: 25		Summative Assessment Marks: 25	Duration of ESA: 3 hrs.	
Course Outcome		Students learn the preparation of various kinds of stratigraphic maps.Students learn the skill of identifying various fossils, deduce Palaeo environmental condition.		

III SEMESTER PRACTICAL

III Semester, OPEN-ELECTIVE SYLLABUS (OE-9)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**III**	**Course Title: Dimention Stone Technology**	**Hours**	**42**
Course Pre-requisites, if any		NA		

Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA: 3 hrs.
Course Outcomes	**Course out comes:** After completing the course, the student will be able to understandthe importance of Ornamental rocks and their reserves. Basics of Quarrying techniques, commercial values, cutting andpolishing, and marketing of the ornamental stones. Also some knowledge on the environmental impacts of stone industry.	

III Semester, OPEN-ELECTIVE SYLLABUS (OE-10)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**III**	**Course Title: Marine Geology**	**Hours**	**42**
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	Marine resources – Oceans and Seas. Mineral deposits in the deep sea like metals, petroleum, coal, phosphorites, metallic nodules. Marine life and their economic importance.			

III Semester, OPEN-ELECTIVE SYLLABUS (OE-11)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**III**	**Course Title: Climatology**	**Hours**	**42**
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	**Skills, employability and entrepreneurship:** The above subject is very relevant to the current processes operating on the Earth System that has implications on the society. In India, this subject is quite rarely studied at graduate level, quite often included in M.Sc./P.G. courses such as Meteorology, Agriculture, Geography, Oceanography, and at M.Tech. Courses in Climatology/Meteorology and Atmospheric Science. Since weather is highly dynamic, it requires skill's to understand to a maximum extent from the multidisciplinary perspectives. The main purpose of this course is to create interest among young and talented students from multidiscipline. This study is also useful for predicting the extreme variability of weather including what has happened in the History of the Earth. Students pass out from this subject have opportunities for employment and also study advance courses offered in different CSIR, DST, R and D labs., and private organizations.			

III Semester, OPEN-ELECTIVE SYLLABUS (OE-12)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**III**	**Course Title: Watershed Management**	**Hours**	**48**
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	After completing the course, the student will be able to understand the importance of water resources both – Surface and subsurface water, water harvesting, water conservation, watershed planning and management. It also helps to understand the role of remote sensing, water law and NGOs.			

IV SEMESTER

Year	**2021-22**	**Course Code:**	**Credits**	**4**
Sem.	**IV**	**Course Title: Structural Geology and Hydrogeology**	**Hours**	**56**
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	At the end of the course the student should be able to: • Students will understand the natural structures and rock mechanics. • It helps to understand various primary and secondary structures occurring in rocks. Students will know about the water cycle, ground water related issues, water conservation, estimation of ground water and also quality.			

IV SEMESTER PRACTICALS

Year	**2021-22**	**Course Code:**	**Credits**	**02**
Sem	**IV**	**Course Title: Hydrogeology and Structural Geology**	**Hours**	**48**
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 25	Summative Assessment Marks: 25		Duration of ESA: 3 hrs.	

Course Outcomes	At the end of the course the student should be able to: 1. To prepare rainfall maps 2. To calculate the water quality parameters and its spatial maps 3. To surveying. 4. To understand the measurement of determination of attitude of the beds.

IV Semester
OPEN-ELECTIVE SYLLABUS (OE-13)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**IV**	**Course Title: Geology and Society**	**Hours**	**42**
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	Course outcomes: The challenges and opportunities posed by the climate change, resource demands andconflicts, and natural disasters (due to man-made structures as well as natural climatechange) point to the importance of studying transdisciplinary nature of the earth processes and their implications to our society. This interdisciplinary nature of Earth Science draws a special attention from the students with other branches of science. From this interdisciplinary optional course on Earth and Social Science, students gain an understanding of natural processes and the impact the distribution and use ofnatural resources such as water, fossil fuels, and critical minerals for economic growth. It also facilitates the understanding natural hazards such as climate change, landslides, tsunami induced coastal erosions, thermal Disturbances in sea water &sea food, and earthquakes.			

IV Semester
OPEN-ELECTIVE SYLLABUS (OE-14)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**IV**	**Course Title: Geophysical Exploration**	**Hours**	**42**
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 2 hrs.	
Course Outcomes	To study the physical properties of the Earth and application of physics in Geoscience. To understand subsurface features and structures for better understanding of subsurface of the Earth. To understand the various geophysical techniques and their field setup. To understand the geophysical data processing and interpretation			

IV Semester
OPEN-ELECTIVE SYLLABUS (OE-15)

Year	**2021-22**	**Course Code:**	**Credits**	3
Sem.	IV	**Course Title: Geostatistics**	**Hours**	42
Formative Assessment Marks: 30	Summative Assessment Marks: 70		Duration of ESA: 3 hrs.	
Course Outcomes	Candidate will be exposed to the basics of geostatistics, which helps in the analysis of survey data, reserves data, and cluster analysis including factor analysis and contouring. Such statistical analysis can be used in mining industries and hydrogeology.			

IV Semester
OPEN-ELECTIVE SYLLABUS (OE-16)

Year	**2021-22**	**Course Code:**	**Credits**	**3**
Sem.	**IV**	**Course Title: Geotourism**	**Hours**	**42**
Formative Assessment Marks: 30	Summative Assessment Marks: 70		Duration of ESA: 2 hrs.	
Course Outcomes	To understand the beauty and rarity of the geological features, landscapes, mountains, geysers, rock monuments, national parks, Fossils parks, etc. To understand the preservation of the geological features and monuments. Propagating the importance of these geological features to the common man.			

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	9.Geology BSCCBCSGEOYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To impart basic knowledge in Geology
- To give the skills required related to Geology
- To make the students aware of the various facets of Geology
- To make the students ready for placements in various organizations like Geological survey of India and other companies which need skill sets of geology
- To enable to set their own consultancy/start ups

PRAGRAM SPECIFIC COURSE OUTCOME:

After completing this program specific discipline the students

- Get basic knowledge of Geology and this helps them to go for higher studies and do better in their profession
- Trained with skills required for their higher studies and jobs
- Students are placed in various organizations and regularly enter to higher studies also.
- Students have started their consultancy services

B.Sc., GEOLOGY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Economic geology	4:0:2	6	2021-22
		DSE-IB	Engineering geology and hydrogeology, Engineering geology	4:0:2	6	2021-22
6	V/VI	SEC-1/3	Disaster Management	2:0:0	2	2021-22
		SEC 2	Remote Sensing And GIS	2:0:0	2	2021-22
		DSE-2A	Gemology, Environmental Geology and Medical Geology	4:0:2	6	2021-22
		DSE-2B	Structural geology and exploration geology	4:0:2	6	2021-22

7	VI	DSE-2C	Remote sensing, GIS, disaster and natural hazards management	2:0:0	2	2021-22
		DSE-2D	Mining Geology and Remote Sensing	2:0:0	2	2021-22
8	VI	SEC 4	Industrial Earth Materials And Gemology	2:0:0	2	2021-22

V SEMESTER

DSE-IA- DSE/T- 1: Economic Geology

COURSE OUTCOME:

By the end of this course the student will have learnt about the distribution of mineral deposits both metallic and non-metallic, techniques of mineral exploration and exploitation, estimation of ore reserves, environmental impact of mining, and the importance conservation of mineral resources. Upon completion of this course, the student will acquire all knowledge and skills required for himself/herself becoming a mining geologist.

DSE-IB: DSE/T- 2: Engineering Geology and Hydrogeology

Engineering Geology

COURSE OUTCOME:

Upon completion of the course the student will become aware of the importance of geological studies and its applicability to various engineering problems.
The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.

Hydrogeology

COURSE OUTCOME:

On completion of the course, the student will have gained an understanding of hydrogeological concepts, exploration, exploitation and recharge of groundwater and methods of monitoring groundwater quality and sources of pollution.
Students will be able to acquire skills of systematic hydrogeological surveys and water quality Monitoring.

SEC/T- 1: DISASTER MANAGEMENT

COURSE OUTCOME:

Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface

and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.

Students will be able to test and evaluate water quality for drinking and agricultural use. They will also have knowledge about various natural disasters

COURSE OUTCOME:

Remote Sensing:

The course is meant to address the fundamental techniques used for remote sensing. At the end of this course, the student will be appraised with all the theoretical knowledge, information and skills to use Remotely Sensed data for geological applications.

After completion of this course, the student will be well versed with the world of Remote Sensing and the applications and Interpretation of data related to geosciences.

GIS

This course provides a theoretical and practical, hands-on approach to spatial database design and spatial data analysis with Geographical Information Systems as applied to the various fields of geosciences.

The course provides knowledge of the fundamentals of GIS theory, and the stages of developing and using a GIS platform of various geological applications. It also promotes proficiency in the use of the GIS softwares for visualization, query, mapping, and analytical purposes.

VI SEMESTER

DSE-2A: DSE/T- 3: Gemology, Environmental Geology & Medical Geology

Gemology:

COURSE OUTCOME:

The basic idea is to make students well versed with the different terminologies used in the gem industry and to provide skills to become a successful gemmologist.

The students will acquire skills which will be useful to them in the gem industry.

Environmental Geology:

COURSE OUTCOME:

Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.

Students will be able to test and evaluate water quality for drinking and agricultural use. They will also have knowledge about various natural disasters.

Medical Geology

COURSE OUTCOME:

On completion of the course the student will be able to understand the distribution of trace elements and its cyclic movement through the abiotic-biotic environment and their influence on human

health, flora and fauna.

The course provides a basic understanding or geogenic and anthropogenic distribution of trace elements, their toxic effects on human health and that of flora and fauna.

VI SEMESTER

DSE-2B: DSE/T- 4: Structural Geology and Exploration Geology Structural Geology:

COURSE OUTCOME:

The course deals with geological structures resulting from the action of these forces on rocks. The student will gain knowledge of the geometry of the rock structures, understand the mechanism of the evolution of rock structures and its application in the field.

The students learn the skills of identifying different structure and measurements using Brunton compass. This is fundamental to geological mapping. This course also helps to know how to use structures and help students appreciate the dynamic nature of the Earth lithosphere. Learn how to read geologic maps and solve simple map problems using strike and preparations of cross sections.

Exploration Geology:

COURSE OUTCOME:

The course provides the student essential and basic concepts of mineral expiration techniques and the art and science of mining mineral resources. Geophysics deals with methodologies for extracting geological information out of geophysical datasets generated from different petrophysical properties. In Geophysical exploration the student will gain first-hand knowledge dealing with the principles and their significance

This course tries to impart skills related to Geology in mining and enable him/her to perform duties of a geologist at the mining site. The students will acquire skills to use GPS, Electrical Resistivity and other methods for exploration. These have wide application in mineral exploration, groundwater studies, petroleum geology, etc.

VI SEMESTER

DSE-2C: DSE/T- 5: Remote Sensing, GIS Disaster and Natural Hazards Management Remote Sensing:

COURSE OUTCOME:

The course is meant to address the fundamental techniques used for remote sensing. At the end of this course, the student will be appraised with all the theoretical knowledge, information and skills to use Remotely Sensed data for geological applications.

After completion of this course, the student will be well versed with the world of Remote Sensing and the applications and Interpretation of data related to geosciences.

GIS:

COURSE OUTCOME:

This course provides a theoretical and practical, hands-on approach to spatial database design and spatial data analysis with Geographical Information Systems as applied to the various fields of geosciences.

The course provides knowledge of the fundamentals of GIS theory, and the stages of developing

and using a GIS platform of various geological applications. It also promotes proficiency in the use of the GIS softwares for visualization, query, mapping, and analytical purposes.

Disaster and Natural Hazards Management

COURSE OUTCOME:

Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment. Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.

Students will be able to test and evaluate water quality for drinking and agricultural use.

They will also have knowledge about various natural disasters.

DSE-2D: DSE/T- 6: Mining Geology and Mineral Processing

COURSE OUTCOME:

By the end of this course the student would have learnt about techniques of mineral exploration and exploitation, estimation of ore reserves, environmental impact of mining, and the importance conservation of mineral resources.

Upon completion of this course, the student will acquire all knowledge and skills required for himself/herself becoming a mining geologist.

Bachelor of Science (Basic/Hons.) Degree in Mathematics Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Algebra-I andCalculus-I (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Theory based Practical's on Algebra-I andCalculus–I (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Optional Mathematics–I(3+0+0)	**3**	**3**	**40**	**60**
	OE-2: Business Mathematics–I(3+0+0)	**3**	**3**	**40**	**60**
	OE-3: Mathematical Aptitude–I (3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Algebra–II(Number Theory) and Calculus-II (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Theory based Practical's on Algebra–II(Number Theory) andCalculus–II (0+0+2)	**4**	**2**	**25**	**25**
	OE-5: Optional Mathematics–II(3+0+0)	**3**	**3**	**40**	**60**
	OE-6: Business Mathematics-II(3+0+0)	**3**	**3**	**40**	**60**
	OE-7: Mathematical Aptitude–II(3+0+0)	**3**	**3**	**40**	**60**

Programme outcome: The student graduating with the Mathematics shouldbe able to

- **Disciplinary Knowledge**:Bachelor degree in Mathematics is the culminationof in-depth knowledge of Algebra, Calculus, Geometry, differential equations and sever

alother branches of pure and applied mathematics. This also leads to study the related areas such as computerscience and other all ied subjects.

- **Communication Skills**: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will ead to the proficiency in analytical reasoning which can be used for modeling and solving ofreal life problems.
- **Critical thinking and analytical reasoning:** The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of reallife problems.
- **Problem Solving**:The Mathematical knowledge gained by the students through this programmed evelopanability to analyzethe problems, identify and define appropriate computing requirements for its solutions. This programme enhances student's overall development and also equip them with mathematical modelling ability, problem solving skills.
- **Researchrelated skills:**The completing this programmed evelop the capability of inquiring about appropriate questions relating to the Mathematical concepts indifferentareas of Mathematics.
- **Information/digitalLiteracy**:The completion of this programme will enablethe learner to use appropriate softwares to solve system of algebraice quation and differentiale quations.
- **Self–directedlearning**: The student completing this program will develop an ability of working independently and to make anin-depthstudy of various notions of Mathematics.
- **Moral and ethical awareness/reasoning:** : The student completing this program will develop an ability to identify unethical behavior such as fabrication, falsification or misinter pretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and Mathematical studies inparticular.
- **Lifelong learning**:This programme provides self- directed learning and lifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real word problems.
- Ability to peruseadvanced studies and research inpure and applied Mathematical sciences.

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I SEMESTER

Course Outcomes:This course will enable the students to:

- Learn to solve system ofline are quations.
- Solve the system of homogeneous and non- homogeneous linear of *m*equationsin*n* variable sbyusing concept of rank of matrix.
- Students will be familiar with the techniques of integration and differentiation offunction with real variables.
- Students learn to solve polynomialequations.
- Learn toapplyReduction formulae.
- Learn *Free and Open Source Software (FOSS)* tools for computer programming.
- Solve problem on algebra and calculus theory studiedin MATDSCT1.1by

using FOSSsoftware's.

- Acquire knowledge of applications of algebra and calculus through FOSS.

Open Elective Course (OE):

OE-1: OPTIONAL MATHEMATICS–I (THEORY): 3 Credits 42 Hrs.

Course Learning Outcome: This course will enable the studentsto;

- Learntosolvesystemoflinearequations.
- Solve the systemofhomogeneous and non-homogeneous mlineare quations by using the concept of rank of matrix.
- Students willbe familiar with the techniques of differentiation of functionwith real variables.
- Identify and apply the intermediate evalue the orems and L'Hospitalrule.Learn to apply Reduction formulae.

OE-2: BUSINESS MATHEMATICS-I (THEORY): 3 Credits 42 Hrs.

Course Learning Outcome: This course will enable the studentsto;

- Translate there alword problems through appropriate mathematical modellling.
- Explain the concepts and use equations, formulae and mathematical expressionand relationship in a variety of context.
- Finding the extreme evalues of functions.
- Analyze and demonstrate the mathematical skill require in mathematicallyintensiveareasin economics and business.

OE-3: MATHEMATICAL APTITUDE-I (THEORY):3 CREDITS 42 HRS.

Course Learning Outcome: This course will enable the students to;

- Students have a strong base in the fundamental mathematical concepts.
- Grasp the approache sandstrategies to solve problems with speed and accuracy.
- Gain appropriate skills to succeedin preliminary selection process for recruitment.

II SEMESTER

Course Learning Outcomes:This course will enable the students to:

- Learn the concept of Divisibility.
- Learn about prime and composite numbers.
- Learn the concept of congruences and its applications.
- Identify and apply the intermediate value the orems and L'Hospitalrule.
- Understand the concept of differentiation and fundamental the or emsindifferentiation and various rules.
- Find the extreme values of functions of two variables. Students learn to find are asand volumes using integration.
- Learn *Free and Open Source Software (FOSS)* tools for computer programming.

- ❖ Solve problem on algebra and calculus by using FOSS software's.
- ❖ Acquire knowledge of applications of algebra and calculus through FOSS.

Open Elective Course (OE):

OE-4: OPTIONAL MATHEMATICS–II (THEORY): 3 Credits 42 Hrs.

Course Learning Outcome: On completion of this course, the students will be able to;

- ❖ Learn the concept of Divisibility.
- ❖ Learn about prime and composite numbers.
- ❖ Learn the concept of congruences and its applications.
- ❖ Under stand the concept to differentiation and fundamental theoremsin differentiation and various rules.
- ❖ Find the extreme evalues of functions of two variables.
- ❖ To understand the concepts of multiple integrals and their applications.

OE-5: BUSINESS MATHEMATICS-II (THEORY): 3 Credits 42 Hrs.

Course Learning Outcome: This course will enable the students to;

- ❖ Integrate conceptin internation albusiness concept with functioning of globaltrade.
- ❖ Evaluate the legal, social and economic environment of business.
- ❖ Apply decision-support tools to business decision making.
- ❖ Will be ableto apply knowledge of business concepts and functions inanintegrated manner.

OE-6: MATHEMATICAL APTITUDE-II (THEORY): 3 Credits 42 Hrs.

Course Learning Outcome: This course will enable the students to;

- ❖ Have a strong base in the fundamental mathematical concepts.
- ❖ Grasp the approaches and strategies to solve problems with speed and accuracy. Gain appropriate skills to succeed in preliminary selection process forrecruitment.

III &IV semester

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 the studentswill be able to :

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 this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real lifeproblems.
PO 4	**Problem Solving**: The Mathematical knowledge gained by the studentsthrough this 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:** The completing this programme develop the capability of inquiring about appropriate questions relating to theMathematical concepts in different areas of Mathematics.
PO 6	**Information/digital Literacy**: The completion of this programme will enable the learner to use appropriate softwares to solve system of algebraicequation and differential equations.
PO 7	**Self – directed learning** : The student completing this program willdevelop 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 this 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**: This programme provides self directed learning andlifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solvingreal word problems.
PO 10	Ability to peruse advanced studies and research in pure and appliedMathematical sciences.

Contents of Courses for B.A./ B.Sc. with Mathematics as Major Subject &B.A./B.Sc.

(Hons) Mathematics

Model IIA

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
III	MATDSCT3.1	Theory	4	Algebra - III and Differential Equations – I	60	40
	MATDSCP3.1	Practical	2	Theory based Practical's on Algebra -III and Differential Equations – I	25	25
	MATOET3.1 MATOET3.2	Theory Theory	3	Discrete Mathematics – I Mathematical Aptitude – III	60	40

IV	MATDSCT4.1	Theory	4	Real Analysis - I and Differential Equations – II	60	40
	MATDSCP4.1	Practical	2	Theory based Practical's on Real Analysis - I and Differential Equations – II	25	25
	MATOET4.1 MATOET4.2	Theory Theory	3	Basics of Number Theory Mathematical Aptitude – IV	60	40

1. Scheme of Admission: As per the University rules.
2. Eligibility: As prescribed by the University.
3. Scheme of Examination: Continuous assessment.
   questions.

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**
			__-		
					SEMINAR

III	MATDSCT3.1	PO 1, PO 4, PO7,		SEMINAR	
		PO 8			
					QUIZ
IV	MATDSCT4.1	PO 1, PO 4, PO7,	MATDSCT3.1	PROJECT	
		PO 8		BASED	
				LEARNING	ASSIGNMENT

Credit Distribution for B.A./B.Sc.(Honors) with Mathematics asMajor in the 3rd Year
(For Model IIA)

Subject	Semester	Major/ Minor in the 3rd Year	Credits					
			Discipline Specific Core (DSC)	Open Elective (OE)	Discipline Specific Elective (DSE)	AECC & Languages	Skill Enhancement Courses (SEC)	Total Credits
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.Meth1 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 – III

MATDSCT 3.1: Algebra - III and Differential Equations – 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
- enhance learning in Algebra and Differential Equations.
- apply the concepts of algebra in practical problems.
- solve various differential equations of practical interest.

MATDSCP 3.1: Practical's on Algebra - III andDifferential Equations – 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 problem on algebra and differential equations studied in **MATDSCT 3.1** by

using FOSS software's.

- Acquire knowledge of applications of algebra and differential equations through FOSS

Open Elective Course
(For Students of all Streams)

MATOET 3.1: Discrete Mathematics	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Totat Teaching Hours: 42 Hours	**Max. Marks: 100 (S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- know the concept of set theory.
- know graph theory which helps in decision making in various capacities in organization.
- Enhance the knowledge towards Electronics and computer science.

Open Elective
(For Students of all Streams)

MATOET 3.2: Mathematical Aptitude-III	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Totat Teaching Hours: 42 Hours	**Max. Marks: 100 (S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- have a strong base in the fundamental mathematical concepts.
- grasp the approaches and strategies to solve problems with speed and accuracy
- gain appropriate skills to succeed in preliminary selection process for recruitment

SEMESTER – IV

MATDSCT 4.1: Real Analysis – I and Differential Equations – II	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Totat Teaching Hours: 56 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- enhance learning in Analysis and Differential Equations.
- apply the concepts of analysis in practical problems.
- solve various differential equations of practical interest.

PRACTICAL

MATDSCP 4.1: On Number Theory 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 problem on real analysis and differential equations by using FOSS software's.
- Acquire knowledge of applications of real analysis and differential equations through FOSS

Open Elective

(For Students of all Streams)

MATOET 4.1: Basics of Number Theory	
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

- Know the expansion of sum of two numbers with positive integral powers.
- General method of proving the statement.
- Learn the concept of Divisibility.
- Learn about prime and composite numbers.
- Learn the concept of congruences and its applications.

Open Elective

(For Students of all Streams)

MATOET 4.2: Mathematical Aptitude – IV	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Totat Teaching Hours: 42 Hours	**Max. Marks: 100 (S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- have a strong base in the fundamental mathematical concepts.
- grasp the approaches and strategies to solve problems with speed and accuracy
- gain appropriate skills to succeed in preliminary selection process for recruitment

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	**B.Sc.**	**BSCCBCSYCM**	1. **Mathematics BSCCBCSMATYCM**

PRAGRAM SPECIFIC COURSE OBJECTIVES:

1) To equip students knowledge to learn and explain mathematics on their own.
2) To ensure students read and understand mathematical ideas in real _ world problems.
3) To provide students with the knowledge of mathematics necessary for their employment.
4) To build competent professionals in mathematics having experience in using technology to address mathematical ideas.
5) To provide students with the knowledge to read, write and understand basic proofs and problem solving skills.

PRAGRAM SPECIFIC COURSE OUTCOMES:

1) A successful completion of the course will enable the students to demonstrate the ability to effectively utilize variety of techniques and strategies of fundamental and advarced mathematics in daily life.
2) Students will be able to demonstrate the ability to analyse data and draw appropriate conclusions in varies branches of mathematics and related disciplines in solving practical as well as real world problems.

B.Sc., MATHEMATICS

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Algebra, Analysis and Integral transforms	5:0:1	6	2021-22
		DSE-IB	Applied Mathematics – I	5:0:1	6	2021-22
6	V	SEC-1	Statistics and Probability	2:0:0	2	2021-22
7	VI	DSE-2A	Linear Algebra and Complex Analysis	5:0:1	6	2021-22
		DSE-2B	Applied Mathematics – II	5:0:1	6	2021-22
8	VI	SEC-2	Graph Theory	2:0:0	2	2021-22

V SEMESTER

DSE1A: Algebra, Analysis and Integral Transforms

COURSE OUTCOME:

- This course is concerned with the Ring theory and Field extension to develop computational skill in abstract Algebra.
- Learn about Riemann integrability of bounded functions and Algebra of R-integrable functions.
- This course gives an introduction to the application of applied Mathematics that is Laplace Transformation and Inverse Laplace Transformations.

DSE1B: Applied Mathematics – I

COURSE OUTCOME:

- This course aims to provide detailed description of Fourier series & Fourier transforms.
- The optimal value or the best solution can be found through the optimization process.

SEC 2: Statistics and Probability

COURSE OUTCOME:

- The optimal value or the best solution can be found through the optimization process.

II SEMESTER

DSE2A: Linear Algebra and Complex Analysis

COURSE OUTCOME:

- The main objective is to introduce basic notions in Linear algebra that are often used in Mathematics and other Science
- This deals with the structure of Complex number field.
- Learn to work with a cantour integral using fundamental theorem of Calculus and Cauchy's integral formula.
- Determine if an integral is improper by identifying if one or both of the limits of integration is infinite.

VI SEMESTER

DSE2B: Applied Mathematics – II

COURSE OUTCOME:

- By numerical methods how to solve integrals.
- The main aim is to makes students familiar with extreme of functional through Calculus of variation.
- This course determines the solution to a Linear problem.
- The optimal value or the best solution can be found through the optimization process.

VI SEMESTER

SEC 4: Graph Theory

COURSE OUTCOME:

- By numerical methods how to solve integrals.
- The main aim is to makes students familiar with extreme of functional

through Calculus of variation.

- This course determines the solution to a Linear problem.
- The optimal value or the best solution can be found through the optimization process.

Bachelor of Science (Basic/Hons.) Degree in Microbiology
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	Discipline Core/ Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: General Microbiology(4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: General Microbiology(0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Microbial Technologyfor Human Welfare (3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Microbial Biochemistryand Physiology (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Microbial Biochemistry and Physiology(0+0+2)	**4**	**2**	**25**	**25**
	OE-2: Environmental and Sanitary Microbiology(3+0+0)	**3**	**3**	**40**	**60**

Programme outcome: By the end of the program the students willbe able to:

- Knowledge and understanding of concepts of microbiology and its application inpharma, food, agriculture, beverages, nutraceutical industries.
- Understand the distribution, morphology and physiology of microorganisms and demonstrate the skills in aseptic and ling of microbesincluding is olation, identification and maintenance.
- Competent to apply the knowledge gained for conserving the environment and resolving the environmental related issues.
- Learning and practicing professional skills in handling microbes and contaminantsin laboratories and production sectors.
- Exploring the microbial world and analyzing the specific benefits and challenges.
- Applying the knowledge acquired to undertake studies and identify specific remedial measures for the challenge sin health, agriculture, and foods ectors.

- Thorough knowledge and application of good laboratory and good manufacturing practices inmicrobial quality control.
- Understanding biochemical and physiological aspects of microbes and developing broader perspective to identify innovative solutions for present and future challenges posed by microbes.
- Understanding and application of microbial principles in forensic and working knowledge about clinical microbiology.
- Demonstrate the ability to identify ethical issues related to recombinant DNA technology, GMOs, intellectual property rights, biosafety and biohazards.
- Demonstrate the ability to identify key question sin microbiological research, optimizere search methods, and analyze outcomes by adopting cientific methods, there by improving the employability.
- Enhance and demonstrate analytical skills and apply basic computational and statistical techniques in the field of microbiology.
- Thorough knowledge and understanding of concepts of microbiology.
- Learning and practicing professional skills inhandling microbes.
- Thorough knowledge and application of good laboratory and good manufacturing practices in microbialquality control.

I SEMESTER

Programme outcome:

- Knowledge and understanding of concepts of microbiology.
- Learning and practicing professional skills in handling microbes.
- Thorough knowledge and application of good laboratory and good manufacturingpractices inmicrobial quality control.

II SEMESTER

Programme outcome: Thorough knowledge and understanding of concepts of microbiology and its and application in different microbiological industries.

III &IV semester

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.

Course Outcomes(COs): At the end of the course the student should be able to:
1. Knowledge about microbes and their diversity
2. tudy, characters, classification and economic importance of prokaryotic and eukaryotic microbes.
3. Knowledge about viruses and their diversity

Course Title	**Microbial Diversity**		Practical Credits	**2**
Course No.	**MBL-103**	**DSC-3P**	Contact hours	

Program Name	**B.Sc. Microbiology**		Semester	**Third Semester**
Course Title	**Microbial Entrepreneurship**			
Course Code		**OE-3**	No. of Theory Credits	**3**
Contact hours	**Lecture**		Duration of ESA/Exam	**Hours**
	Practical			
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Pre-requisite(s):
Course Outcomes (COs): At the end of the course the student should be able to: 1. Demonstrate Entrepreneurial skills 2. Acquire knowledge industrial Entrepreneurship 3. Acquire knowledge about Healthcare Entrepreneurship

Program Name	**B. Sc Microbiology**		Semester	**Fourth Semester**
Course Title	**Microbial Enzymology and Metabolism**			
Course No.	**MBL:104**	**DCS-4T**	No. of Theory Credits	**4**
Contact hours	**56hrs**		Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Pre-requisite(s):

Course Out comes (COs): At the end of the course the student should be able to:

1. Differentiating concepts of chemoheterotrophic metabolism and chemolithotrophic metabolism.
2. Describing the enzyme kinetics, enzyme activity and regulation.
3. Differentiating concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms

Course Title	**Microbial Enzymology and Metabolism**		Practical Credits	**2**
Course No.	**MBL:104**	**DSC-4P**	Contact hours	

Program Name	**B.Sc. Microbiology**		Semester	**Fourth Semester**
Course Title	**Human Microbiome**			
Course Code	**OE-4T**		No. of Theory Credits	**3**
Contact hours	**Lecture**		Duration of ESA/Exam	**Hours**
	Practical			
Formative Assessment Marks	**40**		Summative Assessment Marks	**60**

Course Pre-requisite(s):

Course Outcomes (COs): At the end of the course the student should be able to:

1. Articulate a deeper understanding on biological complexities of human microbiome
2. Understand broader goals of biological anthropology.
3. Compare and contrast the micro biome of different human body sites and impact human health promotion

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	11. Microbiology BSCCBCSMICYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To reveal and explore basic and modern knowledge in the area of invisible microbial world
- To up skill the students intellectual and encourage their critical as well as innovative way of thinking
- To train students for academics, research, industries as well as for entrepreneurship by directing their fundamental theory and practical research skills with technical excellence.

PRAGRAM SPECIFIC COURSE OUTCOME:

- Knowledge acquired over the course of three years aids students in rapidly acclimating to the work environment such trainees, researcher, teaching and entrepreneur.
- Supports student's confidence in answering questions during competitive exams and interviews.
- Acquire sufficient information to suggest research ideas with the help of the subject teacher.
- Gain enough knowledge to propose research ideas with guidance from the concerned subject teacher.
- Apply learned practical skills and approach along with their theory concepts, when selected for various positions in both academic institutions and R & D programs of industries.
- Build entrepreneurial skills through skill-based courses and networking with alumni.
- Professional Competence is attained through the development of effective communication and interactive skills for teaching the subject at the graduate and postgraduate levels.

B.Sc., MICROBIOLOGY

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year

5	V	DSE-IA	Environmental Microbiology & Agricultural Microbiology	4:0:2	6	2021-22
		DSE-IB	Advances in Microbiology, Biostatistics, and IPR	4:0:2	6	2021-22
6	V	SEC-1 (any one)	Microbial Quality Control in Industries	2:0:0	2	2021-22
			Microbial analysis of air and water	2:0:0	2	2021-22
7	VI	DSE-2A	Immunology & Medical Microbiology	4:0:2	6	2021-22
		DSE-2B	Biophysics and Bioinformatics	4:0:2	6	2021-22
8	VI	SEC-2 (any one)	Practical skills in Biology & Microbiology	2:0:0	2	2021-22
			Management of Microbial diseases	2:0:0	2	2021-22

V SEMESTER

DSE-IA: Environmental Microbiology

COURSE OUTCOME:

- Appreciate the diversity of microorganism and microbial communities inhabiting a multitude of habitats and occupying a wide range of ecological habitats.
- Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection and characterization
- Competently explain various aspects of environmental microbiology and microbial ecology and to become familiar with current research in environmental microbiology.
- Understand various biogeochemical cycles – Carbon, Nitrogen, Phosphorus cycles etc. and microbes involved
- Understand various plant microbes interactions especially rhizosphere, phyllosphere and mycorrhizae and their applications especially the biofertilizers and their production techniques
- Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation
- Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission
- Comprehend the various methods to determine the sanitary quality of water and sewage treatment methods employed in waste water treatment.
- The taxonomic, ecological, and genetic relationships among microorganisms, including such topics as nutrient cycling, microbial diversity, and the biotechnological application of microorganisms to solve environmental problems.

VI SEMESTER

DSE-2A: **Immunology and Clinical Microbiology**

COURSE OUTCOME:

- Demonstrate and understanding of key concepts in immunology along with overall organization of the immune system.
- Describe significance of maintaining a state of immune tolerance sufficient to prevent the emergence of autoimmunity.
- To understand tumor Immunology and help the students to understand its immune prophylaxis and immune therapy.
- To make them understand the salient features of serological (antigen antibody reactions) & its uses in diagnostics and various other studies.
- Learn about immunization and their preparation and its importance
- Demonstrate the underlying principles and mechanism involved in Chemotherapy and antimicrobial resistance mechanisms.
- Course provides learning opportunities in the basic principles of medical microbiology and infectious disease.
- Know the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body.
- It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases and use of lab animals in medical field.
- To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue and explain the methods of microorganisms control, e.g. chemotherapy and vaccines.
- Solve problems in the context of this understanding. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.

Bachelor of Science (Basic/Hons.) Degree in Physics Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Mechanics & Properties of Matter (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Physics-1 (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Energy Sources (2+1+0)	**3**	**3**	**40**	**60**
	OE-2: Climate Science (2+1+0)	**3**	**3**	**40**	**60**
II	DSC-2: Electricity and Magnetism (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Physics-2 (0+0+2)	**4**	**2**	**25**	**25**
	OE-3: Astronomy and Astrophysics (2+1+0)	**3**	**3**	**40**	**60**
	OE-4: Medical Physics (2+1+0)	**3**	**3**	**40**	**60**

Course Objective: In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its bridges the gap between the Pre-University and Post graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curriculum from first and second semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

Course Outcomes: By the end of the first and second semester, the students would have been introduced to powerful tools for tracking a wide range of topics in **Mechanics & Properties of Matter and Electricity & Magnetism**. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

Details of Course of Study: III and IV Semesters

Sem	Discipline core/ Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1+C2)	Semester End Examination Marks (C3)
III	DSC-3: Wave Motion and Optics (4+0+0)	4	4	40	60
	DSCP-3: Physics-3 (0+0+2)	4	2	25	25
	OE-5: Optical Instruments (2+1+0)	3	3	40	60
	OE-6: Sports Science (2+1+0)	3	3	40	60
IV	DSC-4: Thermal Physics & Electronics (4+0+0)	4	4	40	60
	DSCP-4: Physics-4 (0+0+2)	4	2	25	25
	OE7: Nanotechnology (2+1+0)	3	3	40	60
	OE8: Electrical Instruments (2+1+0)	3	3	40	60

Course Objective: In this course, we aim to provide a solid foundation in various aspects of physics, to show a broad spectrum of modern trends in physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its bridges the gap between the Pre-university and Post-graduate levels of physics, by providing a complete and more logical frame work of basic physics. The systematic and planned curriculum from first and second semester shall motivate and encourage the students for pursuing higher studies in physics, engage in research activities and become self-reliant.

Course Outcomes: By the end of the third and fourth semester, the students would have introduced to powerful tools for tracking a wide range of topics in **Wave Motion and Optics** and **Thermal Physics & Electronics.** Further developed their experimental skills through a series of experimental skills through a series of experimental which illustrates major themes of lecture courses.

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	12.Physics BSCCBCSPHYYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The course structure and detailed contents of the courses regarding the various components like the class room teaching (theory), laboratory (experiments), tutorials and industrial / field visits and projects can be designed and planned to achieve by the students.

PRAGRAM SPECIFIC COURSE OUTCOME:

The COURSE OUTCOME:s based curriculum framework in Physics should also allow for the flexibility and innovation in the program design of the UG education, and its syllabi development, teaching learning process and the assessment procedures of the COURSE OUTCOME:s. The process of learning is defined on the basis of final assessment of the program.

B.Sc., PHYSICS

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Modern Physics	4:0:2	6	2021-22
		DSE-IB	Quantum Computation and Quantum Information	4:0:2	6	2021-22
6	V	SEC-1	Elementary Ideas in Physics	2:0:0	2	2021-22
7	VI	DSE-2A	Relativity, Condensed Matter Physics and Electronics	4:0:2	6	2021-22
		DSE-2B	Relativity and Solid State Physics	4:0:2	6	2021-22
8	VI	SEC-2	Astronomy and Astrophysics	2:0:0	2	2021-22

V **SEMESTER**

DSE 1A: MODERN PHYSICS

COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre university and Post

graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curricula from fifth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOMEs:

By the end of the fifth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in Modern Physics. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

DSE 2A: QUANTUM COMPUTATION AND QUANTUM INFORMATION

COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that its bridges the gap between the Pre university and Post graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curricula from fifth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOMEs:

By the end of the fifth semester, the students would have been introduced to powerful tools for tracking a wide range of topics in Quantum Computation and quantum information. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture courses.

SEC-1: ELEMENTARY IDEAS IN PHYSICS COURSE

OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre university and Post graduate levels of Physics, by providing a completive and more logical frame work of basic Physics. The systematic and planned curricula from fifth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOME:

By the end of the fifth semester, the students would have been introduced to powerful tool for tracking a wide range of topics in Elementary ideas in Physics.

VI SEMESTER

DSE 1B: RELATIVITY, CONDENSED MATTER PHYSICS AND ELECTRONICS

COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre university and Post

graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curricula from fifth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOME:

By the end of the sixth semester, the students would have been introduced to powerful tool for tracking a wide range of topics in Special theory of relativity, free electron theory of metal, Band theory of solids, semiconductor devices, superconductivity and liquid Crystals. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture Courses.

DSE 2B: RELATIVITY AND SOLID STATE PHYSICS [For PEM students only]

COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre university and Post graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curricula from sixth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOME:

By the end of the sixth semester, the students would have been introduced to powerful tool for tracking a wide range of topics in special theory of relativity, free electron theory of metal, Band theory of solids, superconductivity, liquid Crystals, Interatomic forces, magnetism and x-ray crystallography. Further developed their experimental skills through a series of experiment which illustrates major themes of the lecture Courses.

SEC-2: ASTRONOMY AND ASTROPHYSICS

COURSE OBJECTIVES:

In this course, we aim to provide a solid foundation in various aspects of Physics, to show a broad spectrum of modern trends in Physics, to develop experimental and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the Pre university and Post graduate levels of Physics, by providing a complete and more logical frame work of basic Physics. The systematic and planned curricula from sixth semester shall motivate and encourage the students for pursuing higher studies in Physics, engage in research activities and become self-reliant.

COURSE OUTCOME:

By the end of the fifth semester, the students would have been introduced to powerful tool for tracking a wide range of topics in Astronomy and Astrophysics.

Bachelor of Science (Basic/Hons.) Degree in Sericulture
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Paper (L+T+ P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Fundamentals of Sericulture (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: Fundamentals of Sericulture (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Science of Sericulture(3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Mulberry Biology andCultivation (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Mulberry Biology andCultivation (0+0+2)	**4**	**2**	**25**	**25**
	OE-2: Mulberry Crop Production Technology(3+0+0)	**3**	**3**	**40**	**60**

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

- Acquire competency in the discipline with sound knowledge and skill to secureB.Sc. (Basic) or B.Sc. (Hons) degree in Sericulture.
- Know the different components and chain link of sericulture industry.
- Understand concepts of sericulture industry and demonstrate interdisciplinary skills acquired in mulberry plant cultivation, silkworm rearing, diagnosis of diseases and pest of mulberry and silkworm and their prevention and its relevance in Seri-farmer's livelihood.
- Demonstrating the Laboratory and field skills in mulberry cultivation and silk worm rearing with an emphasis on technological aspects.
- Competent to transfer the knowledge and technical skills to the Seri-farmers.
- Critically analyze the environmental issues and apply in management of mulberry garden and silkworm rearing at field.

- Demonstrate comprehensive innovations and skills in improvement of mulberry and silkworm varieties for betterment of sericulture industry and human welfare.
- Apply knowledge and skills of seri biotechnology for development new mulberryvariety and silkworm breeds suitable for varied agro-climatic zones.
- Apply tools and techniques of biostatics for critical analysis and interpretation ofdata accrueded.
- Use bioinformatics tools and techniques for the analysis and interpretation of biomolecular data for better understating mulberry and silk worm.
- Aptly demonstrate communication skills, scientific writing, data collection and interpretation abilities in all the fields of seri biotechnology.
- Thorough knowledge and application of good laboratory and good manufacturing practices in sericulture and biotech industries.
- Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up small-scale enterprises.

I SEMESTER

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

- Acquire sound knowledge on different components of sericulture industry,
- Gain skill with hands on training on mulberry cultivation and carry forward to field,
- Gain skill with hands on training on silk worm egg production and supportgrain age activity,
- Acquire knowledge and develop skill in silkworm rearing and support silk worm farming.
- With the knowledge and skill acquired students may not only acts as resource personnel to sericulture industry but also emerged as potential entrepreneur.

Program Outcomes (POs):

- Students would gain brief background on different components of Sericulture.
- They will have awareness on the origin, growth and status of sericulture industryacross the globe.

II SEMESTER

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

- Program outcomes that the course addresses: Students would know all aboutmulberry plant and cultivars in the field.
- They would gain knowledge and acquire skill in cultivation of mulberry plantsin the garden.

Open Elective Course (OE):

OE-2: MULBERRY CROP PRODUCTION TECHNOLOGY (THEORY):

3 Credits **42 Hrs.**

SEMESTER 3

Title of the Courses

Course 5: DSC-3T, SER-103T, Silkworm Biology and Rearing Technology

Course 6: OE-3T, Silkworm Rearing Technology

Course 5 : DSC-3T, SRC 103T **Silkworm Biology and Rearing Technology**		**Course 6:** OE- 3T **Silkworm Rearing Technology**	
Number of Theory Credits	**Number of lecture hours/semester**	**Number of Theory Credits**	**Number of lecture Hours / semester**
4	**56**	**3**	**42**

Semester 4

Title of the Courses

Course 7: DSC-4T, SER-104T, Mulberry and Silkworm Crop Protection
Course 8: OE-4, Textile Technology

Course 7: DSC-4T, SER-104T, Mulberry and Silkworm Crop Protection		**Course 8: OE-4, Textile Technology**	
Number of Theory Credits	**Number of lecture hours/semester**	**Number of Theory Credits**	**Number of lecture hours/semester**
4	**56**	**3**	**42**

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	**B.Sc.**	**BSCCBCSYCM**	**13.Sericulture** **BSCCBCSSERYCM**

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To impart advanced and in-depth knowledge in the area of agriculture, animal husbandry and industry in general and sericulture in particular.
- To train the students to become progressive and innovative.
- To prepare the students for industry ready with basic and translational research skills with technical excellence.

PRAGRAM SPECIFIC COURSE OUTCOME:

- In depth knowledge gained during the course of three years helps the students to quickly acclimatize to the work environment when they join as trainees or positions in public and private sector.
- Helps the students to face competitive exams in confidence for the masters as well as in civil service exams.
- Gain enough knowledge to propose research ideas in their higher studies.
- Develop practical skills along with their theory components, which helps in various positions selected in both academic institutions and R & D programs of industries.
- To develop entrepreneurial skills, with effective communication and interactive skills.

B.Sc., SERICULTURE

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Mulberry & Silkworm breeding and Silkworm Seed Technology	4:0:2	6	2021-22
		DSE-IB	Agronomy and Entomology	4:0:2	6	2021-22
6	V	SEC-1	Sericulture Technology	2:0:0	2	2021-22
7	VI	DSE-2A	Silk Technology, Vanya Sericulture and Extension	4:0:2	6	2021-22
		DSE-2B	Entrepreneurship development in sericulture	4:0:2	6	2021-22
8	VI	SEC-2	Silk Technology	2:0:0	2	2021-22

V SEMESTER

DSE-IA: Mulberry & Silkworm Breeding and Seed Technology

COURSE OBJECTIVES:

1) To gain the knowledge of germplasm bank, need of the present situations to protect, preserve and use the genetic resources.
2) To familiarize with the basic principles and recent approaches in mulberry and silkworm genetics and breeding.
3) To study the silkworm seed organization and to practice the silkworm egg preparations.

COURSE OUTCOME:

1) Gain the knowledge on the importance of plant and animal species preservation and utilization in general and mulberry and silkworm in particular.
2) They acquaint with the concept of evolution of new mulberry varieties and silkworm races for increased productivity.
3) They familiarize with the disease-free silkworm egg production practically, as it is the back bone of sericulture industry.

DSE-IB: Agronomy and Entomology

COURSE OBJECTIVES:

1) To impart the knowledge of principles of crop production. The factors affecting it and its management.
2) To impart the knowledge of services from insects to man, the factors affecting it and its management.
3) To understand the IPM system.

COURSE OUTCOME:

1) Students will understand the importance of crop production holistically.

2) Students will underhand the importance of insects and its protection.

3) Study of IPM will help students to develop the concern for environment in building the nation.

SEC-2: Sericulture Technology

COURSE OBJECTIVES:

1) To gain the knowledge of whole sericulture industry superficially for non-sericulture students of BSc.
2) Deals with the components of sericulture industry.
3) To ignite the passion for the field in the young minds.

COURSE OUTCOME:

1) Helps the students to understand the subject in brief with scientific approach and helps

to develop the interest in the subject.

2) Students will understand the components of sericulture from the view point of future prospective for research.

3) They develop the capacity to think behind the subject for the well being of the industry and the famers involved in building the nation's economy.

VI SEMESTER

DSE-2A: Silk Technology, Vanya Sericulture and Extension

COURSE OBJECTIVES:

1) To introduce the concept of cocoon as raw material & its significance in reeling technology and

to acquaint with the technologies of silk reeling & importance of reeling. devices as well as to understand the significance of raw silk production & processing of yarn.

2) To study non-mulberry sericulture as one of the occupations of millions of tribal people of north eastern India and its importance in protection of and development of forest resources.
3) To gain the knowledge of extension services.

COURSE OUTCOME:

1) Students will expose to the hands-on training of silk reeling will help them to take up silk reeling as a profession if they wish.
2) Study of non-mulberry sericulture will motivate the students to protect and preserve the natural resources of our country for the wellbeing of the countryman.
3) Students will understand the importance of communication, leadership qualities and extension of education.

DSE-2B: Entrepreneurship Development in Sericulture

COURSE OBJECTIVES:

1) To import entrepreneurship thinking in young minds.
2) To understand the extension services in improving the qualities of famers.
3) To understand the support from the Govt./NGO's and its adaptations in improving the industry and the lifestyle of the farmers.

COURSE OUTCOME:

1) Students will develop the capabilities of self-development and motivation to become self-employed.
2) Gain the knowledge of marketing strategies and extension services.
3) Get the thorough knowledge of existing schemes and how well they can adopt if they become entrepreneurs.

SEC-4: SILK TECHNOLOGY

COURSE OBJECTIVES:

1) To gain the knowledge of non-sericulture students of BSc. to the subject.
2) To get the insight about the silk production technology
3) To understand the eco-friendly nature of the industry to ignite their entrepreneurial skills.

COURSE OUTCOME:

1) The non-sericulture students will get the in-depth knowledge of silk reeling technology.
2) Understand the pros and cons of the production of quality and quantity of silk thread and its importance in the Indian tradition and culture.
3) Students will gain the knowledge of the byproducts of sericulture industry in each and every component and their utilization for the betterment of the society. Also gain the knowledge of alternate resources available for the development of the industry.

Bachelor of Science (Basic/Hons.) Degree in StatisticsChoice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Descriptive Statistics (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-1: DescriptiveStatistics (0+0+2)	**4**	**2**	**25**	**25**
	OE-1: Statistical Methodsits applications(3+0+0)	**3**	**3**	**40**	**60**
	OE-2: Business Statistics(3+0+0)	**3**	**3**	**40**	**60**
II	DSC-2: Probability and Distributions-I (4+0+0)	**4**	**4**	**40**	**60**
	DSCP-2: Probability andDistributions-I (0+0+2)	**4**	**2**	**25**	**25**
	OE-3: Applied Statistics(3+0+0)	**3**	**3**	**40**	**60**
	OE-4: Bio-Statistics (3+0+0)	**3**	**3**	**40**	**60**

Programme objectives:

- Graduates will demonstrate competence in respective domain as they apply skills to conduct scientific research and contribute to quality education.
- Graduates will be recognized as experts in educational and researchinstitutes as well as industries inidentifying and so lving global challenges.
- Graduates will become leading researchers and professors who create and disseminate new knowledgei n scientific and allied fields.

Programme outcome: The student graduating with the Statistics shouldbe able to

- **Discipline Knowledge** :Use knowledge of science and apply to relevant areas.
- **Problemanalysis:**Identify, formulate and analyze complex scientific problems using first principles of respective discipline.

- **Problem solving**: Execute a solution process using first principles of science tosolve problems related to respective discipline.
- **Conduct investigations**: Conduct investigations of issues using research methods and research-based discipline knowledge including design of experiments, data collection, interpretation and analysis to arrive atvalid conclusions.
- **Modern tool usage:** Identify, select and usemodern scientific, Software/programming languages tool or technique for modeling, prediction, data analysis and solving problems in the areas of their discipline
- **Environment and Society:** Evaluate the impact of scientific solutions on society and environment and designs ustainable solutions.
- **Ethics:**Demonstrate professional ethics, responsibilities and normsin respective profession.
- **Individual and teamwork:** Work effectively as an individual as a team member and as a leader in a multi disciplinary team.
- **Communication:**Communicate effectively with the stakeholders with emphasis on communicating with scientific community, comprehend scientific reports, write research papers and projects proposals and reports, deliver effective presentations, and give and receive clear instructions.
- **Project Management and Finance:**Apply the knowledge of scientific and technological principles to one's own work to manage projects in multi disciplinary settings.
- **Lifelong Learning:** Identify knowledge gaps and engage in lifelong learning in the context of changing trend sin respective discipline.

Course Outcomes: At the end of the semesters courses the students hould be able to:

- Acquire knowledge of introductory statistics, its scopeand importance invarious are as such as Medical, Engineering, Agricultural and Social Sciences etc.
- Learn various types of data, their organization and descriptive statistics such as presentation sin tabular form graphs and summary measures such as measures of centraltendency and dispersion etc.
- Learn cor relation, curve fitting, regression analysis, regression diagnostics, partial and multiple cor relations.
- Learn different of type sof data reflecting independence and association between two or more attributes.
- Conceptualize the probabilities of events including frequent is tandaxio maticapproach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' The orem and able solve problems on the setopics.
- Learn concept of discrete and continuous random variables and their probability distribution sincluding expectation and moments.
- Learn Standard univariated is crete and continuous distributions and their applications disciplines of science. .
- Learn basics of R-programming and able to write and execute R codes in descriptive statistics, probability models and fitting of suitable distributions to the given dataset,

applications of normal and other standard distributions.

Open Elective Course (OE):

OE-1: STATISTICAL METHODS ITS APPLICATIONS(THEORY): 3 Credits42 Hrs.

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

- Acquire knowledge of statistical methods.
- Identify types of data and visualization, analysis and interpretation.
- Learn elementary probability and probability models.
- Learn to apply test procedures for given data set.

OE-2: BUSINESS STATISTICS (THEORY): 3 Credits 42 Hrs.

Course Objectives:

- Provide an introduction to basics of statistics with in a financial context.
- To enable students to use statistical techniques for analysis and interpretation of business data.

Course Outcome: On completion of this course, the students will be able to;

- Frame and formulate management decision problems.
- Understand the basic concepts under lying quantitative analysis.
- Use sound judgment in the applications of quantitative methods to management decisions.

Open Elective Course (OE):

OE-3: APPLIED STATISTICS (THEORY): 3 Credits 42 Hrs.

Course Objectives:

- To enable the students to use statistical tools infinance, industries, population studies and health sciences.
- To acquire knowledge about sampling methods for surveys.

Course Outcome: On completion of this course, the students will be able to;

- Understand the Price and Quantity Index numbers and their different measures, understand the applicability of cost-of-living Index number.
- Know the components and Need for Time series, understand the different methods of studying trend and Seasonal Index.
- Study the concept of vital statistics, sources of data, different measures of Fertility and Mortality,Understand theGrowth rates-GRR andNRR and their inter pretations.
- Know the concept to Population, Sample, Sampling unit, sampling design, sampling frame, sampling scheme, need for sampling, apply the different sampling methods for designing and selecting a sample from a population, explain sampling and non-sampling errors.
- Describe the philosophy of statistical quality control tools as well as their usefulness inindustry and hence develop quality control tools in agiven situation.

OE-4: BIO-STATISTICS (THEORY): 3 Credits 42 Hrs.

Course Objectives:

- To enable the students to identify the variables of biological studies and explorethe 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 Outcome: On completion of this course, the students will be able to;

- After studying the course, the student will be able to apply statistical too lsandtechniques in data analysis of biological sciences.

Statistics (Core courses)
Semesters- III and IV

Semester	DSC	Core Courses	Credits
III	A3/B3	Probability distributions-II	4
		Practicals based on DSC A3/B3	2
IV	A4/B4	Statistical Inference-I	4
		Practicals based on DSC A4/B4	2

Open Electives for III and IV Semesters

Sl.NO.	Titles of **Open Electives**
OE-5	Introduction to Statistics with R
OE-6	Elements of Statistical Data Analysis
OE-7	Population Studies

Semesters- III and IV

Semester	DSC	Core Courses	Credits
III	A3/B3	Probability distributions-II	4
		Practicals based on DSC A3/B3	2
IV	A4/B4	Statistical Inference-I	4
		Practicals based on DSC A4/B4	2

Open Electives for III and IV Semesters

Sl.NO.	Titles of **Open Electives**
OE-5	Introduction to Statistics with R
OE-6	Elements of Statistical Data Analysis
OE-7	Population Studies

Syllabus for III and IV Semesters B.Sc. with Statistics as Major/Minor
B.Sc. III Semester

Course Title: **Probability Distributions-II**	
Total Contact Hours: 56	Course Credit : 04
Formative Assessment Marks: 40	Duration of ESA: 2 hours
Model Syllabus Authors: Statistics BOS Members ,YCM	Summative Assessment Marks: 60

Number of Theory Credits	**Number of lecture hours/semester**	**Number of practicalCredits**	**Number of practical hours/semester**
04	56	02	52

Course Objectives:

1) To introduce the concept and various properties of joint distribution of bivariate random vector, marginal distribution, conditional expectations and correlation coefficient.
2) To introduce the various techniques of functions of random vector and their distributions
3) To introduce Weak law of large numbers(WLLN) and Central limit theorem (CLT)
4) To make students exercise the fundamentals of simulation techniques in R environment.

Course Outcomes: At the end of this course students are able to:

1) Understand the concept of joint distribution of bivariate random vector, able to findmarginal, conditional expectations and correlation coefficient.
2) Understand in detail functions of random vector and their distributions
3) Able to find approximate distribution of statistic when is sample size is large
4) Generate random variables from various distributions using R-code.

B.Sc. IV Semester

Course Title: A4/B4 -**Statistical Inference-I**	
Total Contact Hours: 56	Course Credit :04
Formative Assessment Marks: 40	Duration of ESA: 02 hours
Model Syllabus Authors: Statistics BOS Members,YCM	Summative Assessment Marks: 60

Number of TheoryCredits	**Number of lecture hours/semester**	**Number of practicalCredits**	**Number of practical hours/semester**
04	56	02	52

Course Objectives:

1) To introduce the estimation techniques and its theoretical properties
2) To introduce basic element of testing of statistical hypotheses.
3) To introduce how to construct confidence intervals and tests of hypotheses.

Course Outcomes: At the end of this course students are able to:

1. Obtain estimators and examine the properties of good estimators
2. Construct good test procedures and find size of errors and power of tests.
3. Employ suitable test procedure and construct Confidence interval for small as well as large sample sizes, respectively for a given data set.

Pedagogy:

1. The course is taught using traditional chalk and talk method using problem solving throughexamples and exercises.
2. Students are encouraged to use resources available on open sources.

Bachelor of Science (Basic/ Hons.), Bachelor of Arts (Basic/ Hons.) etc. with Statistics as Major with practicals and any subject as Major/Minor

Summary of Discipline Specific Courses (DSC)			
Semester	**CourseCode**	**Title of the Paper**	**Credits**
		Practicals based on DSC A2	2
III	DSC A3	Calculus and Probability Distributions	4
		Practicals based on DSC A3	2
IV	DSC A4	Statistical Inference-I	4
		Practicals based on DSC A4	2

Course Title: **Calculus and Probability Distributions**	
Total Contact Hours: 56	Course Credits:04
Formative Assessment Marks: 40	Duration of ESA/Exam: 2 hours
Model Syllabus Authors: State level NEP-model curriculum setting committee members-Statistics	Summative Assessment Marks: 60

Number of Theory Credits	**Number of lecture hours/semester**	**Number of practical Credits**	**Number of practical hours/semester**
4	**56**	**2**	**52**

Course Objectives

To enable the students to

1. Know the concept of continuity, differentiability, integration of one and more variables.
2. Define and describe properties of Joint, Marginal and conditional distributions of variablesand some key concepts of probability theory.
3. Understand different discrete, continuous and sampling distributions, properties and their applications.
4. Generate random variables from various distributions using R-code.

Course outcomes

After completion of this course the students will be able to

1. Judge continuity of a function, find integrations and solve problems of differentiability.
2. Solve problems of various analytical environments using different distributions and their properties.
3. Find sampling distributions of functions of random variables and explore their applications.

B.Sc. IV Semester

Course Title: A4/B4 -**Statistical Inference-I**	
Total Contact Hours: 56	Course Credit :04
Formative Assessment Marks: 40	Duration of ESA: 02 hours
Model Syllabus Authors: Statistics BOS Members, YCM	Summative Assessment Marks: 60

Number of TheoryCredits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
4	**56**	**2**	**52**

Formative Assessment: Total 40 marks	
Assessment Occasion/ type	**Weightage in Marks**
Internal Test 1	15
Internal Test 2	15
Assignment/Seminar (7 marks) +Attendance(3marks)	10
Total	40

Course Objectives:

1) To introduce the estimation techniques and its theoretical properties
2) To introduce basic element of testing of statistical hypotheses.
3) To introduce how to construct confidence intervals and tests of hypotheses.

Course Outcomes: At the end of this course students are able to:

1. Obtain estimators and examine the properties of good estimators
2. Construct good test procedures and find size of errors and power of tests.
3. Employ suitable test procedure and construct Confidence interval for small as well as largesample sizes, respectively for a given data set.

Pedagogy:

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.

Course Title: **A4/B4 Statistical Inference-I Practical 3/Lab 3**	
Total Contact Hours: 52	Course Credit :02
Formative Assessment Marks: 25	Duration of ESA: 2 hours
Model Syllabus Authors: Statistics BoS Members ,UoM	Summative Assessment Marks: **25(20+5(Practical record)**

OPEN ELECTIVE PAPERS(OE)

OE-5. Introduction to Statistics with R

Time: 3hrs /week **Max.Marks:40+60**

Course Objectives

Co-1: This soft core course is intended to introduce basic of Statistics with R language to students whodo not study Statistics as part of their program.

Co-2: Introduce R codes to analyse data using standard statistical methods.

Course Outcomes (COs)

Upon the completion of this course students should be able to:

CO1. Install, Code and Use R Programming Language in R Studio IDE to perform basic taskson Vectors, Matrices and Data frames.

CO2. Describe key terminologies, concepts and techniques employed in Statistical Analysis.

Pedagogy:

1. The course is taught using PPT, hands-on practice, and problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.

OE-6: Elements of Statistical Data Analysis (OE)
Time: 3hrs /week Max.Marks:40+60

Course Objectives

1.To enable the students to use MS Excel/ R software for cleaning and presenting the data.
2. To enable the students to construct diagrams and graphs using MS Excel/ R software.
3. To enable the students to analyze univariate, bivariate and multivariate data using MS Excel/ R software .

Course Outcomes (CO)

Upon successful completion of this course the student will be able to
CO1. Use MS Excel/ R software for cleaning and presentation of data.
CO2. Present the data in the form of diagrams and graphs.
CO3. Analyze univariate, bivariate and multivariate data.

OE-7: **Population Studies**

Time: 3hrs /week Max.Marks:40+60

Course Objectives

Course Objectives :

1. This soft core course is intended to introduce to students who do not study Statistics as part of their program.
2. To enable the students to identify appropriate sources of data, perform basic demographic analysis using various techniques and ensure their comparability across populations.
3. To acquire knowledge about the construction of life table and its applications in demographic analysis.

Course Outcomes (CO)

Upon successful completion of this course the student will be able to
CO1. Study the concepts of Vital Statistics, sources of data, different measures of Fertility, Mortality and migration.
CO2. Understand the Growth rates- GRR and NRR and their interpretations.

Pedagogy

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.

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	14.Statistics BSCCBCSSTAYCM

PROGRAM SPECIFIC COURSE OBJECTIVES:

1. To prepare graduates who are not only statistically sound but also capable of using their appropriate statistical skills in interdisciplinary areas such as finance, health, agriculture, government, business, industry, telecommunication, and bio-statistics. As a result, they can pursue their future career either in the core field or in the applied field of Statistics.
2. To familiarize students with computational techniques and software used in the statistical arena.
3. To prepare students for undertaking further study.
4. To teach students to construct practical statistical models for several processes in the real-world.
5. To prepare the students to enrich with ability to examine basic statistical issues in a more logical and methodical manner. It is expected that the students will strengthen themselves both computationally and analytically.
6. Communication Skills and Team Work: The students are expected to develop effective and confident Communication skill after completion of the course. They will have an ability to work in a team as well as in isolation.
7. Moral and Ethical Awareness: After completion of the course, the students are expected to develop ethical and social responsibility as well. As a result, the students will be able to identify ethical issues, avoid unethical behaviour such as fabrication, falsification or misrepresentation and misinterpretation of data.
8. Scientific Reasoning: The students will be able to analyze, interpret and draw appropriate conclusions from both quantitative and qualitative data and critically evaluate ideas, evidence and experiences with an unbiased and consistent approach.

PRAGRAM SPECIFIC COURSE OUTCOME:

1. Self-directed Learning: The students are expected to be familiar with data collection, compilation, analysis and interpretation and writing of project reports independently.
2. 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.
3. Recognize the importance of statistical modelling and computing, and the role of

approximation and mathematical approaches to analyze the real problems using various statistical tools.

4. 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.
5. The students are expected to be familiar ICT skills
6. The students are prepared for personal skills such as the ability to work both independently and in a group.

B.Sc., STATISTICS

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Sampling Techniques and Design of Experiments	4:0:2	6	2021-22
		DSE-IB	Financial Statistics	4:0:2	6	2021-22
6	V	SEC-2	Data Analysis	2:0:0	2	2021-22
7	VI	DSE-2A	Statistical Quality Control, Reliability and Operations Research	4:0:2	6	2021-22
		DSE-2B	Actuarial Statistics and clinical trials	4:0:2	6	2021-22
8	VI	SEC-4	Data Science and R language-2	2:0:0	2	2021-22

V SEMESTER

DSE-IA: Sampling Techniques and Design of Experiments

COURSE OBJECTIVES:

1. To estimate population parameters from a sample
2. To find out the degree of reliability of the estimate.
3. To analyse when more than two samples are to be tested at a time on the basis of equality of several means
4. Identifying relationships between cause and effect.
5. Providing an understanding of interactions among contributory factors.
6. Minimizing experimental error.

COURSE OUTCOME:

Having successfully completed this module, students will be able to:

1. Apply various types of sampling methods, such as simple random sample, stratified random sample and systematic sample for some real life problems

2. Knowledge of drawing a sample using with/without replacement.
3. Compute sample size using proportional allocation, optimum allocation, systematic sample procedures.
4. To make generalisation about the population/universe from the studies based on samples drawn from it.
5. Knowledge of applying of Designs of experiments such as CRD, RBD, LSD and factorial experiments.
6. Understand theoretical knowledge of estimation of missing values, efficiency.
7. Knowledge of estimation of parameters, like unbiasedness of sample mean, sample variance, mean sum of squares due to error, treatment, total, block etc.
8. Knowledge of factors, levels, blocking.
9. Knowledge of analysing data on Agriculture, Biology, Statistics, Marketing, etc.

DSE-IB: Financial Statistics

COURSE OBJECTIVES:

1. Provides an introduction to financial mathematics and basic statistics within a financial context.
2. It will assist students to gain an appreciation of what statistical methods can achieve, as well as skills in analysing and interpreting business data and statistical analysis.
3. To prepare the students on data science as an analytical and decision making tool, in a variety of business contexts, with a major emphasis on interpretation and application.

COURSE OUTCOME: Students who successfully complete this unit will be able to:

1. Identify and apply commonly used techniques for data collection and analysis.
2. Apply fundamental concepts of probability and probability distributions to problems in business decision-making.
3. Apply statistical inference methods to conduct and explain the results of hypothesis testing.
4. Apply simple regression analysis to explain the relationship between variables to draw inferences about relationships.

SEC-2: Title of the Course: Statistical computing using R-1

COURSE OBJECTIVES: As the name suggests, this course on Statistical Computing uses R software for implementation and students are trained on several practical problems in this course to equip them to think independently and for analysis of statistical data. After finishing this course, one can write R codes for statistical methods and implement R codes for the various methods learnt in the B.Sc. Program.

COURSE OUTCOME: A person successfully completing the Course will acquire practical knowledge of solving problems and proof techniques in several topics in Statistical Computing. Writing R codes, visualization and running R packages are part of the Course. .

VI SEMESTER

DSE-2A: Statistical Quality Control (SQC), Reliability and Operations

COURSE OBJECTIVES:

1. To introduce the role of statistics in all manufacturing firms.
2. To provide knowledge to the students about statistical quality control.
3. To introduce seven basic quality tools for quality improvement.
4. To introduce control chart as a tool for studying the variability of a system for managers to determine how to improve a process/system.
5. To introduce the students to different OR models and their importance.
6. Formulate and solve LPP, Assignment problems, Transportation problems. Inventory problems and game theory.
7. To introduce the tools of product control in manufacturing system.

COURSE OUTCOME: On successful completion of this course the students will be able to

1. Describe the various charts in SQC
2. Interpretation of these charts in real life situations.
3. Understand the concept of product control
4. Understand single and double sampling inspection plans, OC and ASN functions,
5. Will be able to Formulate and solve LPP, Assignment problems, Transportation problems.
6. Understand the concepts in inventory and build basic inventory models indifferent conditions
7. To understand and solve problems on game theory
8. To understand reliability and basic concepts and applications

DSE-2B: Actuarial Statistics and clinical trials

COURSE OBJECTIVES:

This course is framed to equip the students with concepts of actuarial science and different premium models.

COURSE OUTCOME:

After opting for this course, the students will be equipped with knowledge about

1. Modelling of individual and aggregate losses.
2. Fitting of distributions to claims data, deductibles and retention limits, proportional and excess-of-loss reinsurance.
3. Risk models: models for individual claims and their sums.
4. Finding distribution of aggregate claims, compound distributions and their applications.
5. Applications of credibility theory.
6. Finding of survival function, curate future lifetime, force of mortality.
7. Handling problems on joint life and last survivor status and multiple decrement model.
8. Mean and variance of various continuous and discrete payments for assurance and

annuity contracts.

9. Calculation of various payments from life tables using principle of equivalence, net premiums, prospective and retrospective provisions/reserves.
10. Real illustrations for the concepts mentioned above through laboratory assignments.

SEC-4 A: Statistical computing using R-2

COURSE OBJECTIVES:

As the name suggests, this course on Statistical Computing uses R software for implementation and students are trained on several practical problems in this course to equip them to think independently and for analysis of statistical data. After finishing this course, one can write R codes for statistical methods and implement R codes for the various methods learnt in the B.Sc. Program.

COURSE OUTCOME:

A person successfully completing the Course will acquire practical knowledge of solving problems and proof techniques in several topics in Statistical Computing. Writing R codes, visualization and running R packages are part of the Course.

SEC-4 B: Econometrics

COURSE OBJECTIVES:

Students are trained to Learn how to apply linear regression models in practice, identify situation where linear regression is appropriate, build and fit linear regression models on several practical problems on different regression models and estimation and analysis

COURSE OUTCOME:

After the completion of the course, students will be able to think independently to build different regression models, fit linear regression models on several practical problems, interpret estimates and diagnostic statistics.

Bachelor of Science (Basic/Hons.) Degree in ZoologyChoice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper(L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	DSC-1: Cytology, Genetics &Infectious Diseases (4+0+0)	4	4	40	60
	DSCP-1: Cytology, Genetics & Infectious Diseases (0+0+2)	4	2	25	25
	OE-1: Economic Zoology (3+0+0)	3	3	40	60
II	DSC-2: and Biochemistry Physiology (4+0+0)	4	4	40	60
	DSCP-2: and Biochemistry Physiology (0+0+2)	4	2	25	25
	OE-2: Parasitology (3+0+0)	3	3	40	60

I SEMESTER

Learning/Course outcome:

Cell biology: After studying this portion of syllabus students are able to learn and understand the fundamentals of Cell biology like;

- Cell organelles, Cytoskeleton, Cellular transport, Cell-extracellular matrix interaction, Cell division, and Protein trafficking etc.,
- Students will be able to understand the structures and basic components of Prokaryotic and Eukaryotic cells, especially Macromolecules, Membranes, andOrganelles
- Students will understand how these cellular components are used to generate andutilize energy in cells
- Be able to know the basic elements of intercellular signal transduction pathways, including nuclear receptors and cell surface receptors.
- To demonstrate the knowledge of common and advanced laboratory practices in cell and molecular biology.
- Cells house the biological machinery that makes the proteins, chemicals, andsignals responsible for everything that happens inside our bodies.
- The learner will understand the importance of cell as a structural/functional unit of life.
- The dynamism of bio membranes indicates the dynamism of life. Its working mechanism and precision are responsible for our performance in life.
- To acquire knowledge of principles and working mechanisms of simple and compound Microscopes.
- Be able to understand the mechanism of Mitosis and Meiosis.
- To gain knowledge about slide preparation to observe Giant chromosome, Epithelial, Nerve cell, Muscle cells and Blood cells.

Open Elective Course (OE):

OE-1: ECONOMIC ZOOLOGY (THEORY): 2 Credits 42 Hrs.

Course outcome: At the end of the course the student will be able to:

- Gain knowledge to define the concepts of the applied subjects like Fisheries, Aquaculture, Sericulture, Apiculture, Vermiculture, Lac culture, Dairy, Poultry etc.,
- Gain knowledge about Silkworms rearing and their products.
- Gain knowledge in Bee keeping equipment and Apiary management.
- Acquaint knowledge on dairy animal management, the breeds and diseases ofcattle and learn the testing of egg and milk quality.
- Acquaint knowledge about the culture techniques of fish and poultry.
- The student will be able to identify, freshwater, marine water fishes.
- To understand the physiology and reproductive mechanisms of important fishes.

- Attained knowledge about important cultivable fin fishes, shell fishes andimportance of value added fishery products.
- Be able to gain knowledge to explain the tools and techniques used in aquaculture, agriculture, apiculture and sericulture practices.
- Students will be able to categorize economically important fish species.
- Be able to describe the economic importance of honeybee and silk worm.
- Acquaint the knowledge about basic procedure and methodology of Vermi culture.
- Learn various concepts of lac cultivation.
- Students can start their own business i.e. self-employments.
- Get employment in different applied sectors.

II SEMESTER

Learning/Course outcome:

Biochemistry: Study of biochemistry help student to understand the chemical structure of carbohydrates, proteins and lipids and also mechanism of their metabolism. This course lays the foundation for other advanced courses like physiology, molecular biology and immunology. The student at the completion of the course will learn;

- The importance of chemical foundation in living organisms to attain the knowledgeof macromolecule such as carbohydrates, protein and fat, their types andsignificance.
- Correlate how the large biomolecules such as proteins, carbohydrates, lipids, nucleic acids are made from the simple precursors.
- Interpret the structure-function relationships of the proteins, carbohydrates, lipids, and nucleic acids.
- Be able to familiar with the enzymes (biocatalysts), and their salient attributes including unique conformation and amazing catalytic properties.
- To recognize how the catabolic breakdown of the substances is associated with release of free energy; whereas, free energy is utilized during synthesis of biomolecules i.e., anabolic pathways.
- Comprehended the energy source, chemical bonds and the principles of thermo dynamic understood the importance of acid base balance.

Physiology: This course is designed to impart knowledge of functioning of circulatory, respiratory, digestive, muscular and excretory system. After successfully completing this programme;

- Students will be able to aware the molecular and cellular basis of physiological functions in animals.
- The course will aid to understand the basics of excretory system like structure of nephron, glomerular filtration, reabsorption and tubular secretion, homeostatic regulation of water and electrolyte.

- ❖ To learn and understand the fundamentals of Respiratory system & chemicalregulation of respiration.
- ❖ Be able to illustrate the physiological adaptations, development, reproduction and behaviour of different forms of life.
- ❖ Students will be able to understand about the composition of food and mechanismof digestion, absorption and assimilation.
- ❖ To described the mechanism of circulation and composition of blood.
- ❖ Students will acquire knowledge of neuromuscular coordination and the mechanism of Osmoregulation in animals and endocrine system and their function.

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

- ❖ 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 throughenzyme kinetics.

Open Elective Course (OE):

OE-2: PARASITOLOGY (THEORY): 2 Credits 42 Hrs.

Course outcome:

Parasitology: Parasitology is the scientific discipline concerned with the study of the biology of parasites and parasitic diseases, including the distribution, biochemistry, physiology, molecular biology, ecology, evolution and clinical aspects of parasites, and the host response to these agents. This course will be able to know the students to;

- ➢ Identify, describe and contrast unicellular parasites and parasitic worms.
- ➢ Helps to understand the specific human and non-human parasitic diseases.
- ➢ Be able to prepare and observe live parasitic specimens and test students' own seropositivity for a particular parasitic infection.
- ➢ It is estimated that at least half of all known species are parasitic, so understanding the life cycle and interaction of these organisms with their hosts is often key to understanding the dynamics of ecosystems generally.
- ➢ By analyzing microorganisms up close, microbiologists play a crucial role in combating disease, creating chemical products for agriculture, and even helping to keep our planet earth healthy.

Programme Structure for Bachelor of Science (Basic/Hons.)
Zoology as Core subject: III to IV semesters

Theory - 04Hours/Week (04 Credits); Practical - 04Hours/Week (02 Credits)
SYLLABUS: DSC-3: B.Sc.,(Hons)Zoology- III Semester
Zoology: Paper - III: Molecular Biology, Bioinstrumentation & **Techniques in Biology**

Course Title/Code: **Molecular Biology, Bioinstrumentation** & **Techniques in Biology**	Course Credits: **4**
Course Code: **DSCC5ZOOT3**	L-T-P per week: 4-0-0
Total Contact Hours: **56**	Duration of ESA: 3 Homs
Formative Assessment Marks: 40	Summative Assessment Marks:60

DSCC500P3: Core Practical Course
Zoology; III - Semester B.Sc., Hons,
Paper - III: Molecular Biology, Bioinstrumentation & **Techniques in Biology**

Credits: 2 (L-T-P per week: 0-0-4) **Marks: 50**
Total contact hours: 56 **Formative assessments: 25**
Exam Duration: 3hrs **Summative assessment: 25**

Course Title: **Molecular Biology, Bioinstrumentation and Techniques in Biology**	Course Credits: 2
Course Code: DSCC5ZOOP3	L-T-P per week 0-0-4
Total Contact Hours: **56**	Duration of ESA: 3 Hours
Formative Assessment Marks: **25**	Summative Assessment Marks:25

Pattern of Assessment	**C_1 - Test**	**C_2**	**Record with Attendance**	**Total**
	10 Marks	05 Marks (Assignment)	10 Marks	25 Marks

Semester IV- Zoology
Semester: IV Semester, B. Sc., (Hons) Zoology Core Course IV Content

Course Title: **Core Course Content: Gene Technology Immunology and Computational Biology**	Course Code: **DSCC5ZOOT4**
Course Type: **Discipline Core Theory, L-T-P: 4-0-0**	Course Credits: **4**
Total Contact Hours: **56**	Duration of ESA: **Hrs,**
Formative Assessment **Marks: 40**	Summative Assessment **Marks:60**

DSCC500P4: Core Practical Course
Zoology; IV - Semester B.Sc., Hons,
Zoology: Paper - IV: Gene Technology Immunology and Computational Biology
Credits: 2 (L-T-P per week: 0-0-4) **Marks: 50**
Total contact hours: 56 **Formative assessments: 25**
Exam Duration: 3hrs **Summative assessment: 25**

Course Lab Content

Course Title: Gene Technology, Immunology and	Course Credits: 02

Computational Biology	
Course Type: **Minor Discipline Core Practical, L-T-P: 0-0-4**	Corse Code:DSCC5ZOOP4l
Total Contact Hours: **56**	Duration of ESA: 3 **Hours**
Formative Assessment Marks: **25**	Summative Assessment Marks: **25**

Pattern of Assessment	**C_1 - Test**	**C_2**	**Record with Attendance**	**Total**
	10 Marks	05 Marks (Assignment)	10 Marks	25 Marks

OPEN ELECTIVE COURSE (OE)
Zoology: III- Semester
OE-3: ENDOCRINOLOGY: (03 Hours/week; 03 credits)

Course Title: **ENDOCRINOLOGY** Course Code: OEC5ZOOT3	Course Credits:3
Total Contact Hours: 42	Duration of ESA: 3 Hours
Formative Assessment Marks: **40**	Summative Assessment Marks:60

OPEN ELECTIVE COURSE (OE)
Zoology: IV- Semester
OE-4: Animal Behavior: (03 Hours/week; 03 credits)

Course Title: **Animal Behavior** Course Code: **OEC5ZOOT4**	Course Credits: 03
Total Contact Hours: **42**	Duration of ESA: 3 Hours
Formative Assessment Marks: **40**	Summative Assessment **Marks:60**

V & VI semester

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	15.Zoology BSCCBCSZOOYCM

PRAGRAM SPECIFIC COURSE OBJECTIVES: and COURSE OUTCOME:

- Understand the basic concepts of Cell biology, Developmental biology, Biochemistry, Taxonomy and ecology.
- Analyse the relationships among animals, plants and microbes which will enable the students to think of applications related to the interdisciplinary fields.
- Perform procedures as per laboratory standards in the areas of Biochemistry, Bioinformatics, Taxonomy, Economic Zoology and Ecology.
- Understand the applications of biological sciences in Biotechnology viz., Apiculture, Aquaculture, Agriculture and Medicine.

B.Sc., Zoology

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	DSE-IA	Developmental Biology and Endocrinology	4:0:2	6	2021-22
		DSE-IB	Medical Diagnostics	4:0:2	6	2021-22
6	V	SEC-1	Applied Zoology	2:0:0	2	2021-22
7	VI	DSE-2A	Environmental biology, Zoogeography and applied Biology	4:0:2	6	2021-22
		DSE-2B	Animal Biotechnology	4:0:2	6	2021-22
8	VI	SEC-2	Vectors and disease	2:0:0	2	2021-22

V SEMESTER

DSE1A: Developmental Biology and Endocrinology

COURSE OBJECTIVES:

1. Students will study the mendelian principles and classical genetically aspects and some part of cytology
2. The aim of the course is to provide students with a deeper insight into the evolutionary processes –
3. both selective and random - which can explain the genetic composition of populations, form, behaviour and distribution of organisms.
4. To teach students the basic methods of analysing the evolutionary relationships between the organisms.
5. Study of organic evolution and adaptations
6. Study of speciation
7. The above points are observed in the practical class along with the hands of experience

COURSE OUTCOME:

1. Solve problems in Mendelian genetics, including multiple alleles and X-linkage along with the Laws of Segregation and Independent Assortment
2. Describe the structure and replication of the genetic material and basic aspects of the flow of genetic information from DNA to proteins.
3. Apply knowledge about transcription, translation and the genetic code to demonstrate an understanding of the flow of genetic information from DNA to proteins students

can describe some of the processes involved in the regulation of gene expression

4. Explain fundamental genetic concepts. Describe the phases of mitosis and meiotic in detail and explain the connection between chromosomal behavior in meiosis.
5. Apply the principles of Mendelian inheritance and their extensions (one- and two-locus traits with two or more alleles, gene interactions, sex linkage and linkage) by analyzing inheritance patterns from crosses
6. Describe the origins and genetic consequences of mutations and chromosomal abnormalities
7. Analyze allele and genotype frequencies within populations from the Hardy-Weinberg
8. Analyze basic processes in population genetics, mutation, migration, natural selection, sexual selection and genetic drift and describe how they affect the genetic diversity within a species
9. Discuss methods for detecting and analyzing variation at gene, genome and phenotypic levels within and between individuals, populations and species. 12 Describe the relationship between molecular and phenotypic evolution.

V SEMESTER

DSE1B: Medical Diagnostics

COURSE OBJECTIVES:

1. To acquire basic knowledge of pathogenesis, diagnosis and management of common medical conditions in the patients.
2. Provide actionable knowledge about disease diagnosis, prognosis, and treatment to policy makers.
3. To study the First aid and its principles in the present era

COURSE OUTCOME:

1. Upon successful completion of this course students would familiarize the various dimensions of Medical lab technology and career opportunities available in these fields.
2. They can develop practical understanding among the students associated with Medical lab through classroom discussion/ participation and projects.
3. The can also develop transferrable skills among the students for managing Laboratory works efficiently so that they could be ready to join the Laboratory functions in any organization.
4. It provides brief insight about personal grooming and its stages, meaning and importance of knowledge of Laboratory base works and other key dimensions of laboratory management in Hospitals.
5. This would help students enhance their practical skills and would enable them work in a Hospital setup.

V SEMESTER

SEC2: Applied Zoology

COURSE OBJECTIVES:

1. The applied Biology Programme is designed to equip the students with the practical uses of biological knowledge and to inculcate in the students an entrepreneurial and problem-solving ability.
2. Study about the sericulture, apiculture, fisheries and also some of the aspects of the applied branches in Zoology

COURSE OUTCOME:

1. After successfully completing this course, the students will be able to understand the culture techniques Honey bee and fish and their products.
2. They also understand the Bee keeping equipments and apiary management.
3. They also learn various types of aquarium fishes and its maintenance as well as fish transportation.
4. Students are able to understand the concept of the applications in the field of applied biology
5. Students have lot of scope to adopt the applications which has been thought from the present paper.

VI SEMESTER

DSE 2A: Environmental biology, Zoogeography and applied Biology

COURSE OBJECTIVES:

1. Creating the awareness about environmental problems among people.
2. Imparting basic knowledge about the environment and its allied problems.
3. Developing an attitude of concern for the environment.
4. Students will study how to assess the pollutants in water samples.
5. Students are able understand the local varieties of the edible fishes.
6. Zoogeography aims to explain the structure, function and history of the geo graphical ranges of animals. The absence or presence of a species in a given place has ecological as well as historical causes.
7. The Applied Biology program is designed to equip the students with the practical uses of biological knowledge and to inculcate in the students an entrepreneurial and problem- solving ability.

COURSE OUTCOME:

1. After completing this course, the students will be able to: Acquire an in-depth knowledge on the diversity and relationships in animal world. Develop a holistic appreciation on the phylogeny and adaptations in animals.
2. Enable the students to understand the evolution of universe and life. Understanding on the process and theories in evolutionary biology.
3. Develop an interest in the debates and discussion taking place in the field of evolutionary biology by visiting the lake available in the around localities .

4. The students will also be able to know the evolutionary and functional basis of animal ecology. Develop an understanding of how animals interact with each other and their natural environment. Studies engage in field-based research activities to understand well the theoretical aspects, taught besides learning techniques for gathering data in the field.
5. Analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice.
6. Solve the environmental problems involving interaction of humans and natural systems at local or global level. The course is an introduction to wildlife management and gives an account of the tools used by wildlife managers. Topics covered are to equip students with adequate knowledge of various biodiversity monitoring methodologies, conservation and management issues of vertebrate pests, wildlife conflict and over abundant species, wildlife health and diseases

VI SEMESTER

DSE2B: Animal Biotechnology

COURSE OBJECTIVES:

1. Identification and characterization of animal breeds.
2. Developing DNA - based diagnostics and genetically engineered vaccines for animals.
3. Studying animal genomics and its varied applications.
4. Developing embryo - transfer technology, cloning, transgenic animals.
5. DNA forensics, molecular diagnostics, cloning, wildlife conservation, stem cell research and bio - processing technologies are other import areas of animal biotechnology.

COURSE OUTCOME:

1. After successfully completing this course, the students will be able to develop an understanding of the fundamental molecular tools and their applications of DNA modification and cloning.
2. They can also develop future course of their career development in higher education and research with a sound base.
3. They can apply their knowledge with problem solving approach to recommend strategies of
4. Genetic engineering for possible applications in Biotechnology and allied industry.

VI SEMESTER

SEC4: Vectors and Diseases

COURSE OBJECTIVES:

1. Create a framework for networking to improve surveillance and monitoring of emerging vector-borne zoonotic diseases of viral origin.
2. Provide training for public health experts and improve national laboratories capacities to increase the communicable disease control.
3. Strengthen integrated surveillance (animal health, human health, entomological and environmental data).
4. Provide tools for awareness, risk assessment and monitoring of the emerging viruses

of interest

COURSE OUTCOME:

1. After successfully completing this course, the students will be able to develop awareness about the causative agents and control measures of many commonly occurring diseases.
2. They can understand the favourable breeding conditions for the vectors and devise strategies to manage the vectors population below threshold levels, public health importance.

Sl No.	Program	Program Code	No of Program specific disciplines with code
1	B.Sc.	BSCCBCSYCM	**AECC** **Language disciplines: Compulsory (One):** 1(a)English, BSCCBCSENGYCM

ENGLISH LANGUAGE- PROGRAMME SPECIFIC COURSE OBJECTIVES:

- To enable the learner to communicate effectively and appropriately in real life situations;
- To impact the use of English effectively for various purposes across the curriculum;
- To develop interest in the appreciation of Literature;

To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing.

B.Sc. (Language Course): Ability Enhancement Compulsory Course (AECC): English

Sl No	Sem	Course	Title of the Paper	Hrs/Week L:T:P	Credits	Introduction Year
5	V	SEC-1	Introduction to Phonetics – I	2:0:0	2	2021-22
6	VI	SEC-1	Introduction to Phonetics – II	2:0:0	2	2021-22

ENGLISH LANGUAGE- PROGRAMME SPECIFIC COURSE OBJECTIVES:

- To enable the learner to communicate effectively and appropriately in real life situations;
- To impact the use of English effectively for various purposes across the curriculum;
- To develop interest in the appreciation of Literature;
- To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing.

V SEMESTER: B.Sc/BBA/BCA

SEC-1: Introduction to Phonetics – I

COURSE OBJECTIVES:

- To introduce the students to acquire Phonetic Skills required for oral communication.
- To enable students to acquire the required skills in speech mechanism and introduce the students to word accent and speech rhythm.

VI SEMESTER: B.Sc/BBA/BCA

SEC-1: Introduction to Phonetics – II

COURSE OBJECTIVES:

- To introduce the students to acquire Phonetic Skills required for oral communication.
- To enable students to acquire the required skills in speech mechanism and introduce the students to word accent and speech rhythm.

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Bachelor of Computer Applications (BCA) (Basic/Hons.)DegreeProgramme
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options
under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	CA C-1: Fundamentals of Computers (3+0+0)	**3**	**3**	**40**	**60**
	CA CP-1: Information Technology (0+0+2)	**4**	**2**	**25**	**25**
	CA C-2: Programming in C (3+0+0)	**3**	**3**	**40**	**60**
	CA CP-2: C Programming (0+0+2)	**4**	**2**	**25**	**25**
	CA C-3: Accountancy (3+0+0)	**3**	**3**	**40**	**60**
II	CA C-4: Data Structures using C(3+0+0)	**3**	**3**	**40**	**60**
	CA CP-3: Data Structure (0+0+2)	**4**	**2**	**25**	**25**
	CA C-5: Object Oriented Conceptsusing JAVA (3+0+0)	**3**	**3**	**40**	**60**
	CA CP-4: JAVA (0+0+2)	**4**	**2**	**25**	**25**
	CA C-6: Discrete MathematicalStructures (3+0+0)	**3**	**3**	**40**	**60**

Objectives:

- 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.
- It helps students analyze the requirements for system development and exposes students to business software and information systems.
- This course provides students with options to specialize in legacy application software, system software or mobile applications.
- To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves.

- To provide opportunity for the study of modern methods of information processing and its applications.
- To develop among students, the programming techniques and the problem-solving skills through programming.
- To prepare students who wish to go on to further studies in computer scienceand related subjects.
- To acquaint students to Work effectively with a range of current, standard,Office Productivity software applications.

Programme outcome:

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

- **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.
- **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.
- **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 skillsin applying various design strategies for solving complex problems.
- **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.
- **Application Systems Knowledge**: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
- **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.
- **Communication:** Must have a reasonably good communication knowledge bothin oral and writing.
- **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
- **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.
- **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
- **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.
- Apply standard Software Engineering practices and strategies in real -time software project development.

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

I SEMESTER

Course Outcomes:

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, micro controllers.
- Operating systems, functions of operating systems, classification of operatingsystems, kernel, shell, basics of Unix, shell programming, booting.
- Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in.
- Internet basics, features, applications, services, internet service providers,domain name system, browsing, email, searching.
- Web Programming basics, introduction of HTML and CSS programming.
- Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, micro controllers.
- Confidently operate Desktop Computers to carry out computational tasks.
- Understand working of Hardware and Software and the importance of operatingsystems.
- 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.
- Study and understand Accounting, systems of Book, Branches of accounting advantage and limitations.
- Know the concept of accounting, financial accounting process and Journalization.
- Maintenance different account book and reconciliations.
- Preparations of different bills, and trial balance.
- Understand the basic concepts of Mathematical reasoning, set and functions.

II SEMESTER

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

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphsare 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, records, 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.
- 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.
- Implement Object Oriented programming concept using basic syntaxes of control Structures.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
- Demonstrates how to achieve reusability using inheritance.
- Demonstrate understanding and use of interfaces, packages, different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common user interface components to design GUI in Java using Applet & AWT along with response to events.

CA C-6: DISCRETE MATHEMATICAL STRUCTURES(THEORY):

3 Credits **42 Hrs.**

Course Outcomes: 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 and principle of inclusion and exclusions.
- Understand the concepts of various types of relations, partial ordering and equivalence relations.
- Apply the concepts of generating functions to solve the recurrence relations.
- Familiarize the fundamental concepts of graph theory and shortest pathalgorithm.

III &IV semester

Curriculum for BCA

Semester	Core Courses	Hour / Week		DS Elective Courses	Hours/ Week
		Theory	Lab		
III	Database Management Systems	3			
	C# and .NET Technologies	3			
	Computer Networks	3			
	DBMS Lab		4		
	C# and .NET Technologies Lab		4		
IV	Python Programming	3			
	Multimedia Animation	3			
	Operating System Concepts	3			
	Multimedia Animation Lab		4		
	Python Programming Lab		4		

Open Source Tools
(Skill Enhancement Course: SEC for BCA Course)

Semester: III

Course Title: **Open Source Tools**	Course Credits: 2 (1L+0T+2P)
Semester: III	Duration of SEE: 01 Hour
Total Contact Hours: 13 hours of theory and 26-28 hours of practicals	SEE: 30 Marks IA: 20 Marks

Course Outcomes (COs):

- Recognize the benefits and features of Open Source Technology and to interpret, contrast and compare open source products among themselves
- Use appropriate open source tools based on the nature of the problem
- Write code and compile different open-source software.

Model Syllabus for BCA (Basic and Honors), Semesters III and IV

Semester: III

Course Title: Database Management Systems	Course code: CAC07
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database usingDBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-worldproblem.
- Convert an ER diagram to a database schema and deduce it to the desired normalform.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Explain the transaction processing and concurrency control techniques.

Course Title: DBMS Lab	Course code: CAC07P
Total Contact Hours: 52	Hours/week : 04
Formative Assessment Marks: 25	Course Credits: 02
Exam Marks: 25	Duration of Exam: 03 Hours

Course Outcomes (COs):

Student would be able to create tables, execute queries

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table

Course Title: C# and .Net Technologies	Course code: CAC08
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Describe Object Oriented Programming concepts like Inheritance and Polymorphismin C# programming language.
- Interpret and Develop Interfaces for real-time applications.
- Build custom collections and generics in C#.

Course Title: Computer Networks	Course code: CAC09
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the transmission technique of digital data between two or more computersand a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks inreal world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.

Semester: IV

Course Title: Python Programming	Course code: CAC10
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving file handling.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop the emerging applications of relevant fields using Python.

Course Title: Multimedia Animation	Course code: CAC11
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Write a well-designed, interactive Web site with respect to current standards and practices.
- Demonstrate in-depth knowledge of an industry-standard multimedia development tool and its associated scripting language.
- Determine the appropriate use of interactive versus standalone Web applications.

Course Title: Operating System Concepts	Course code: CAC12
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the fundamentals of the operating system.
- Comprehend multithreaded programming, process management, process synchronization, memory management and storage management.
- Compare the performance of Scheduling Algorithms
- Identify the features of I/O and File handling methods.

V & VI semester

Sl. No	Program	Program Code	No of Program specific disciplines with code
2	B.C.A	BCACBCSYCM	**One** - Computer applications

COMPUTER SCIENCE COURSE STRUCTURE UNDER CBCS FOR BCA PROGRAMME 2020-21

Discipline Specific Courses:

Sl.No	**Core**		**Elective**		**Ability Enhancement Course**		**Total Credits**		**Total Credits**
	DSC		**DSE**		**SEC**		**AECC**		
	Course	**Credits L:T:P**	**Course**	**Credits L:T:P**	**Course**	**Credits L:T:P**	**Course**	**Credits L:T:P**	
	DSC-12	6= 4:0:2							
V			DSE-1 DSE-2 DSE-3	6= 4:0:2 6= 4:0:2 6= 4:0:2	SEC-1 SEC-2	2 2:0:0 2 2:0:0			22
VI			DSE-4 DSE-5 DSE-6	6= 4:0:2 6= 4:0:2 6= 4:0:2	SEC-3 SEC-4	2 2:0:0 2 2:0:0			22

List of Electives for both Vth and VIth Semesters:

(Select three of the following electives in **Vth** semester and two of the following electives in **VIth** semester, without repetition.)

Computer Graphics and animation (L:T:P::4:0)
Software Engineering (L:T:P::4:2:0)
NET Programming (L:T:P::4:2:0)
Software Testing (L:T:P::4:1:1)
Web Technology (L:T:P::4:0:2)
Digital Image Processing (L:T:P::4:0:2)
Network Security (L::P::4:2:0)
Cloud Computing and Big Data Analytics (L:T:P::4:1:1)

Skill Oriented Course

SEC-1: DTP (Page Maker and CorelDraw)	(L:T:P:1:0:1)
SEC-2: Cyber Security	(L:T:P:1:0:1)
SEC-3: Accounting Software (Tally)	(L:T:P:1:0:1)
SEC-4: Android Programming	(L:T:P:1:0:1)

V and VI SEMESTER

COMPUTER GRAPHICS AND ANIMATION

COURSE OBJECTIVES: Students will try to learn:

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- To learn the basic principles of 3- dimensional computer graphics.
- Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
- To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles and applications.

COURSE OUTCOME: Students will able to:

- To list the basic concepts used in computer graphics.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its related technologies.
- To understand a typical graphics pipeline 6. To design an application with the principles of virtual reality.

SOFTWARE ENGINEERING

COURSE OBJECTIVES: Students will try to learn:

- Knowledge of basic SW engineering methods and practices, and their appropriate application.
- Describe software engineering layered technology and Process frame work.
- A general understanding of software process models such as the waterfall and evolutionary models.

- Understanding of software requirements and the SRS documents.
- Understanding of the role of project management including planning, scheduling, risk management, etc.
- Describe data models, object models, context models and behavioural models.
- Understanding of different software architectural styles.
- Understanding of software testing approaches such as unit testing and integration testing.
- Describe software measurement and software risks.
- Understanding on quality control and how to ensure good quality software.

COURSE OUTCOME: Students will able to:

- Select and implement different software development process models.
- Extract and analyze software requirements specifications for different projects.
- Develop some basic level of software architecture/design.
- Apply standard coding practices.
- Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
- Identify and implement of the software metrics.
- Apply different testing and debugging techniques and analyzing their effectiveness

NET PROGRAMMING

COURSE OBJECTIVES: Students will try to learn:

- Microsoft framework architecture
- Development of console application
- Building windows application
- OOPs using C#.NET
- Learn data access mechanism provided .net
- Create and consume libraries
- Create a web application using .net
- Developing the website & application
- Application security
- Dot Net IDE Component Framework.
- Programming concepts in .Net Framework.

COURSE OUTCOME: Students will able to:

- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.
- Performing Database operations for Windows Form and web applications.

SOFTWARE TESTING

COURSE OBJECTIVES: Students will try to learn:

- Basic software debugging methods.
- White box testing methods and techniques.
- Black Box testing methods and techniques.

- Designing test plans.
- Different testing tools (familiar with open source tools)
- Quality Assurance models.

COURSE OUTCOME: Students will able to:

- Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
- Implement various test processes for quality improvement
- Design test planning.
- Manage the test process
- Apply the software testing techniques in commercial environment
- Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.

WEB TECHNOLOGY

COURSE OBJECTIVES: Students will try to learn:

- The best technologies for solving web client/server problems
- To analyze and design real time web applications
- To use Java script for dynamic effects and to validate form input entry
- To Analyze to Use appropriate client-side or Server-side applications

COURSE OUTCOME: At the end of the course students are able to:

- Choose, understand, and analyze any suitable real time web application.
- Integrate java and server side scripting languages to develop web applications.
- To develop and deploy real time web applications in web servers and in the cloud.
- Extend this knowledge to .Net platforms.

DIGITAL IMAGE PROCESSING

COURSE OBJECTIVES: Students will try to learn:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

COURSE OUTCOME: At the end of the course students are able to:

- Review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques.
- Interpret Image compression standards.
- Interpret image segmentation and representation techniques.

NETWORK SECURITY

COURSE OBJECTIVES: Students will try to learn:

- To know about various encryption techniques.
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on Network security
- To be able to secure a message over insecure channel by various means
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data
- To understand various protocols for network security to protect against the threats in the networks.

COURSE OUTCOME: At the end of the course students are able to:

- Classify the symmetric encryption techniques
- Illustrate various Public key cryptographic techniques
- Evaluate the authentication and hash algorithms.
- Discuss authentication applications
- Summarize the intrusion detection and its solutions to overcome the attacks.
- Basic concepts of system level security

CLOUD COMPUTING AND BIG DATA ANALYTICS

COURSE OBJECTIVES: Students will try to learn:

- To study the basic technologies that forms the foundations of Big Data.
- To study the programming aspects of cloud computing with a view to rapid prototyping of complex applications.
- To understand the specialized aspects of big data including big data application, and big data analytics.
- To study different types Case studies on the current research and applications of the Hadoop and big data in industry

COURSE OUTCOME: At the end of the course students are able to:

- Student must be Able to understand the building blocks of Big Data
- Student must be able to articulate the programming aspects of cloud computing (map Reduce etc)
- Student must be able to understand the specialized aspects of big data with the help of different big data applications
- Student must be able to represent the analytical aspects of Big Data
- Student must be know the recent research trends related to Hadoop File System, Map Reduce and Google File System etc

Bachelor of Business Administration (BBA) (Basic/Hons.)DegreeProgramme
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options
under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Open Elective Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	BBA C-1: Management Principles& Practice (4+0+0)	**4**	**4**	**40**	**60**
	BBA C-2: Fundamentals ofBusiness Accounting (4+0+0)	**4**	**4**	**40**	**60**
	BBA C-3: Marketing Management(4+0+0)	**4**	**4**	**40**	**60**
	OE-1: Business Organization(3+0+0)	**3**	**3**	**40**	**60**
	OE-2: Office Organization and Management (3+0+0)	**3**	**3**	**40**	**60**
II	BBA C-4: Financial Accounting andReporting (4+0+0)	**4**	**4**	**40**	**60**
	BBA C-5: Human ResourceManagement (4+0+0)	**4**	**4**	**40**	**60**
	BBA C-6A: Business EnvironmentOR BBA C-6A: Business Mathematics(4+0+0)	**4**	**4**	**40**	**60**
	OE-3: People Management(3+0+0)	**3**	**3**	**40**	**60**
	OE-4: Retail Management (3+0+0)	**3**	**3**	**40**	**60**

Objectives:

- To develop the skills required for the application of business concepts and techniques learned in the classroom at the workplace.
- To provide competent and technical skills personnel to the industry in the area

of Marketing, Finance, Human Resource, Data Analytics, Retailing and Logistics and Supply Chain Management. To enhance the employability skills of the management students.

- To enhance the capability of the students, improve their decision-making skills.
- To encourage entrepreneurship among students pursuing education in the field of Business Administration.
- To empower students for pursuing professional courses like MBA, Chartered Accountancy, Company Secretary, etc.,
- To ensure holistic development of Business administration students.

I SEMESTER

BBA C-1: MANAGEMENT PRINCIPLES & PRACTICE (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate;

- The ability to understand concepts of business management, principles andfunction of management.
- The ability to explain the process of planning and decision making.
- The ability to create organization structures based on authority, task andresponsibilities.
- 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 controltechniques.

BBA C-2: FUNDAMENTALS OF BUSINESS ACCOUNTING (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate;

- 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.

BBA C-3: MARKETING MANAGEMENT (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate;

- Understand the concepts and functions of marketing.
- Analyse marketing environment impacting the business.
- Segment the market and understand the consumer behavior.
- Describe the 4 p's of marketing and also strategize marketing mix.
- Describe 7 p's of service marketing mix.

Open Elective Course (OE):

OE-1: BUSINESS ORGANIZATION (THEORY): 3 Credits 45 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate:

- An understanding of the nature, objectives and social responsibilities ofbusiness.
- 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.

OE-2: OFFICE ORGANIZATION AND MANAGEMENT (THEORY):3 Credits 45 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate;

- An understanding of basic knowledge of office organisation and management.
- Demonstrate skills in effective office organization.
- Ability to maintain office records.
- Ability to maintain digital record.
- Understanding of different types of organisation structures and responsibilitiesas future office managers.

II SEMESTER

BBA C-4: FINANCIAL ACCOUNTING AND REPORTING (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion of the course, the students willdemonstrate;

- The ability to prepare final accounts of partnership firms.
- The ability to understand the process of public issue of shares and accounting forthe 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.

BBA C-5: HUMAN RESOURCE MANAGEMENT (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion of the course, the students will be able to demonstrate;

- 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.

BBA C-6A: BUSINESS ENVIRONMENT (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion Student will demonstrate;

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.

BBA C-6B: BUSINESS MATHEMATICS (THEORY): 4 Credits 56 Hrs.

Course Outcomes: On successful completion Student will demonstrate;

- The Understanding of the basic concepts of business maths and apply them to create solve and interpret application problems in business.
- Ability to solve problems on various types of equation.
- Ability to solve problems on Matrices and execute the laws of indices, law of logarithm and evaluate them.
- Ability to apply the concept of simple interest and compound interest billsdiscounted etc. and apply them in day-to-day life.
- Ability to solve problems on Arithmetic progression, Geometric progression and construct logical application of these concepts.

Open Elective Course (OE):

OE-3: PEOPLE MANAGEMENT (THEORY): 3 Credits 45 Hrs.

Course outcome: On successful completion of the course, student will demonstrate:

- Ability to examine the difference between People Management with Human Resource Management.
- Ability to explain the need for and importance of People Management.
- Ability to explain role of manager in different stages of performance management process.
- Ability to list modern methods of performance and task assessment.
- Ability to analyse the factors influencing the work life balance of a working individual.

OE-4: RETAIL MANAGEMENT (THEORY): 3 Credits 45 Hrs.

Course Outcomes: On successful completion Student will demonstrate;

- An understanding of the types and forms of Retail business.
- Ability to examine Consumer Behaviour in various environment.
- Ability to analyse various Retail operations and evaluate them.
- Ability to analyse various marketing mix elements in retail operations.
- An understanding of Information Technology in retail business.

SYLLABUS FOR BBA DEGREE AS PER NEP – 2020 REGULATIONS IMPLEMENTED FROM THE ACADEMIC YEAR 2021-22

BBA PROGRAM

Proposed Scheme of Teaching & Evaluation for BBA (Basic/Hons) with Business Administration as Core subject

Semester III								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week (L + T +**	**SEE**	**CIE**	**Total Marks**	**Credits**

				P)				
16	Lang.1.1	Language – I	AECC	3+1+0	60	40	100	3
17	Lang.1.2	Language – II	AECC	3+1+0	60	40	100	3
18	BBA.3.1	Cost Accounting	DSC	3+2+0	60	40	100	4
19	BBA.3.2	Organizational Behavior	DSC	3+2+0	60	40	100	4
20	BBA.3.3	Statistics for Business Decisions	DSC	3+2+0	60	40	100	4
21	BBA.3.4	Artificial Intelligence/Critical thinking& Problem Solving	SEC	1+0+2	25	25	50	2
22	BBA.3.5	Social Media Marketing/ Rural Marketing	OEC	3+0+0	60	40	100	3
Sub – Total (C)					385	265	650	23

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
23	Lang.1.1	Language – I	AECC	3+1+0	60	40	100	3
24	Lang.1.2	Language – II	AECC	3+1+0	60	40	100	3
25	BBA.4.1	Management Accounting	DSC	3+2+0	60	40	100	4
26	BBA.4.2	Business Analytics / Financial Markets & Services	DSC	3+2+0	60	40	100	4
27	BBA.4.3	Financial Management	DSC	3+2+0	60	40	100	4
28	BBA.4.4	Constitution of India	AECC	2+0+0	30	20	50	2

29	BBA.4.5	Sports/NCC/NSS/YOGA	SEC-VB	1+0+2	25	25	50	2
40	BBA.4.6	Business Leadership Skills/Personal Wealth Management	OEC	3+0+0	60	40	100	3
Sub –Total (D)					415	285	700	25

Curriculum as per
National Educational Policy (NEP 2020)

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
16	Lang.1.1	Language – I	AECC	3+1+0	70	30	100	3
17	Lang.1.2	Language – II	AECC	3+1+0	70	30	100	3
18	BBA.3.1	Cost Accounting	DSC	3+0+2	70	30	100	4
19	BBA.3.2	Organizational Behavior	DSC	4+0+0	70	30	100	4
20	BBA.3.3	Statistics for Business Decisions	DSC	3+0+2	70	30	100	4
21	BBA.3.4	Artificial Intelligence	SEC	1+0+2	50	50	100	2
22	BBA.3.5	Social Media Marketing/ Rural Marketing	OEC	3+0+0	50	50	100	3
Sub –Total (C)					450	250	700	23

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
23	Lang.1.1	Language – I	AECC	3+1+0	70	30	100	3
24	Lang.1.2	Language – II	AECC	3+1+0	70	30	100	3
25	BBA.4.1	Management Accounting	DSC	3+0+2	70	30	100	4
26	BBA.4.2	Business Analytics / Financial	DSC	4+0+0	70	30	100	4

		Markets & Services						
27	**BBA.4.3**	**Financial Management**	**DSC**	**3+0+2**	**70**	**30**	**100**	**4**
28	**BBA.4.4**	**Constitution of India**	**AECC**	**2+0+0**	**50**	**50**	**100**	**2**
29	**BBA.4.5**	**Sports/NCC/NSS/others (if any)**	**SEC-VB**	**1+0+2**	**-**	**100**	**100**	**2**
30	**BBA.4.6**	**Business Leadership Skills/Personal Wealth Management**	**OEC**	**3+0+0**	**50**	**50**	**100**	**3**
Sub –Total (D)					**450**	**350**	**800**	**25**

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

Name of the Program: BBACourse Code: BBA 3.1 Name of the Course: COST 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. • Understand the elements of costing and preparation of cost sheet. • The ability to prepare material requisitions and management of store. • The ability to compare and contrast labour cost techniques. • Ability to differentiate kinds of overhead costing. • Ability to reconcile the cost.		

Name of the Program: BBACourse Code: BBA 3.2 Name of the Course: ORGANIZATIONAL BEHAVIOR		
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: • To recall role of OB in business organization. • Able to understand group dynamics in an organization.		

- Able to understand the change management.
- Able to construct the process of organizational development.
- Ability to understand the kinds of Interventions in OB.

Name of the Program: BBACourse Code: BBA 3.3 **Name of the Course: Statistics for Business Decisions**		
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 willdemonstrate • To understand the requirements of statistical framework • To construct and visualize the data. • To determine the data adequacy for analysis. • To Review the data by using various tools. • To understand and analyze the impact of probability.		

Name of the Program: BBACourse Code: BBA 3.5 **Name of the Course: Social Media Marketing (OEC)**		
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**
3 Credits	**3 Hrs**	**42 Hrs**
Pedagogy: Classrooms lecture, tutorials, and Problem Solving.		
Course Outcomes: On successful completion of the course, the Students willdemonstrate: • Define social media marketing goal setting for successful online campaigns. • Analyze the effective social media marketing strategies for various types of industries and businesses. • Design social media content and create strategies to optimize the content's reachto the target audience. • Appraise the reach and track progress in achieving social media objectives witha variety of measurement tools and metrics. • Design a suitable social media campaign for the business goals.		

Name of the Program: BBACourse Code: BBA 3.5 **Name of the Course: Rural Marketing (OEC)**		
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**
3 Credits	**3 Hrs**	**42 Hrs**
Pedagogy: Classrooms lecture, tutorials, and Problem Solving.		

Course Outcomes: On successful completion of the course, the Students willdemonstrate

- Describe the importance and application of various concepts of rural marketing.
- demonstrate the appropriate selection of the segmentation, targeting and positioning strategies along with the environmental factors that influence rural consumers' buying behavior.
- Design a Pricing Strategy that suits the characteristics of rural products and the stage in the product life cycle.
- Formulate the appropriate marketing communication and rural distribution channel plans to promote and deliver the rural products.
- Appraise the recent trends in Rural marketing and the application of digital technology in rural marketing.

Name of the Program: BBACourse Code: BBA 4.1
Name of the Course: MANAGEMENT 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 willdemonstrate:

- Able to understand the concept of Management Accounting.
- To Understand and recall ratios and apply the same on given case.
- To construct cash flow statement.
- Should be able to apply Marginal cost rations to make business decisions.
- Student should be able to analyze business problems through applicatio ns.

Name of the Program: BBACourse Code: BBA 4.2
Name of the Course: Business Analytics

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 willdemonstrate

- Able to understand Data Types and storage of Data.
- To understand types of analytics and data models.
- To demonstrate visualization of data.
- To recall the data mining and processing of data.
- Able to understand concepts of different analytics model.

Name of the Program: BBA
Course Code: BBA 4.2
Name of the Course: Financial Markets & Services

3 Credits	3 Hrs	42 Hrs
Pedagogy: Classrooms lecture, tutorials, and Problem Solving.		
Course Outcomes: On successful completion of the course, the Students willDemonstrate ◎ To make students understand the significance of leadership skills for effective people management ◎ To increase the comprehension of leadership through various leadership theories ◎ To make students understand different leadership styles, types, patterns and functions ◎ To introduce various leadership approaches for effective management of people ◎ To make students aware of recent trends in the area of business leadership		

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 willdemonstrate • To able to recall concepts of financial system. • Able to differentiate the roles of financial institutions. • Able understand concept of financial services. • To understand the trading process of Instruments. • Able to Summarize the concept of stock market.		

Name of the Program: BBA **Course Code:** BBA 4.3 **Name of the Course: FINANCIAL MANAGEMENT**		
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**
4 Credits	**4 Hrs**	**56 Hrs**
Course Outcomes: On successful completion of the course, the Students will demonstrate. • To identify the goals of financial management. • To appraise the concepts of time value of money. • To understand the different models of dividend policy. • Able to analyze the business problem related to investments. • Able to appraise the working capital requirements in an organization.		

Name of the Program: BBA **Course Code:** BBA 4.6 **Name of the Course: Business Leadership Skills (OEC)**		
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**

Name of the Program: BBA Course Code: BBA 4.6 Name of the Course: Personal Wealth Management	
No. of Hours per Week	
3 Hrs	

Pedagogy: Classrooms lecture, tutorials, and Problem Solving.

Course Outcomes: On successful completion of the course, the Students willdemonstrate

- Demonstrate an understanding of the importance of Wealth Management and Financial Planning in personal life
- Identify the Real Estate Investment Routes and understand the tax planning that minimises tax burden
- Select and Apply the Asset Allocation strategies to balance between Risk and Return
- Anlayse the Retirement Planning Benefits and retirement strategie s to provide regular income for life.
- Understand the basic principles and importance various insurance polices

V & VI semester

3	B.B.A	BBABCSYCM	**One** - Business Administration BBACBCSMANYCM Electives : **1. Marketing Management** 2. **Human Resource Management** 3. **Financial management**

PRAGRAM SPECIFIC COURSE OBJECTIVES: AND COURSE OUTCOME:

Elective: Marketing Management:

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To help students to understand the concepts of marketing and its 4 P's. How the 4 P's: product, price, place and promotion decisions affect the success of any business.
- To help students to understand the working of rural marketing institutions and to familiarize with the special problems related to sales in rural markets, consumer behavior and consumer satisfaction in rural region.
- The purpose of this program is to expose the students different issues concerned with Advertising and Sales.
- Provides understanding the management of retail business and supply chain. Provides an insight into customer relationship management and effective retail space management.
- Students learn the tools and techniques necessary to effectively manage the sales function of an organization.

Elective: Marketing Management: PRAGRAM SPECIFIC COURSE OUTCOME:

- Student learns the nature, scope and importance of marketing.
- It helps to understand basic concepts of marketing.
- It develops the basic and essential skills of students related to marketing.
- Improves the ability of the students and creates employability opportunities in marketing which are essential for industries.
- Students get insights into all functional areas of retailing.
- students also get an insight on consumer behavior and social responsibility of marketing towards business.
- Students will able to Categorize issues in rural markets and Analyze marketing environment, consumer behavior, distribution channels, marketing strategies, etc

- Students will be able to describe different types of advertisement, discuss the ethics in advertisement.
- Students will be able to implement the key issues in supply chain management effectively.

Elective: Human Resource Management:

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- The objective of this course is to acquaint the students with the basics of Resource management, its scope and functions
- Understand theoretical foundations of key areas of HRD, importance of HRD, its scope and how it helps in imp roving the Quality of Work Life of employees in an organization.
- They also get an insight into what if training, development, career development, employee empowerment and related concepts.
- The course helps in understanding performance management techniques, various motivation
- theories and importance of job evaluation in assessing the relative worth of the job.
- The course helps to give insight with regard to wage and salary administration, v a rious incentive plans, benefits and services, discipline and Industrial relations for a strong & effective workforce through right policies & practices.
- Students are exposed to Recruitment and Selection Process though Practice work.
- Students get to understand important legal provisions governing the industrial.

Elective: Human Resource Management
PRAGRAM SPECIFIC COURSE OUTCOME:

- Students apply motivational theories in their life.
- Students understand the employee contributions and participations in solving any disputes.
- Students will be able to understand the importance of human resources and their effective management in organizations.
- They get an insight into what are human resource planning, job analysis and design, recruitment sources and selection methods, different tests used in selection and the process of interview.
- Enables students to develop integrated view on role of HRD in modern business.
- They develop insight into various HRD programs, to help keep employees empowered.
- They understand the importance of Workers participation in Management, in the form of works committees, Joint Management Councils, worker directors, Co-partnership.
- The students would be able to understand how employees can be managed effectively

sing motivation techniques.

- They would be able to design jobs and carryout job evaluations.
- Helps in Designing and Executing effective Incentive programs and employee management techniques. Students will be able to analyze core and legal issues, policies and practices surrounding employee relations, and the strength of trade union movement in India.

Elective: Financial management

PRAGRAM SPECIFIC COURSE OBJECTIVES:

- To acquaint the students with the fundamental aspects of financial management in the business.
- To acquaint the students with the fundamental aspects and the importance of Working Capital Management in business.
- To expose the students with an overview of banks and other financial services companies.
- To acquaint the students with the basics of security Analysis and portfolio management
- Students got knowledge about the interpretation and analysis of financial statements effectively
- Students able to understand long-term and short term financing
- To make Students read and studied about dividend policies
- Students are acquainted with current financial practices
- Students are well **acquainted with Financial Markets**

Elective: Financial management

PRAGRAM SPECIFIC COURSE OUTCOME:

- Empowers the students with knowledge of financial planning, procurement, investment and distribution of finance in companies.
- Students will learn about the capital structures which is most appropriate for the company and they will be able to calculate cost of various sources of capital.
- They also get an insight into meaning, importance of Capital Budgeting and also learn its techniques.
- Students will be able to determine working capital requirement, optimum inventory level. Enables them to prepare cash budget and estimate the various kinds of leverages.
- Students will be able to evaluate credit policies of the company.
- Students learn about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance.
- Students are acquainted with current financial practices and also acquainted with Financial Markets knowledge.

- Students will be able to; explore different avenues of investment, equipped with the knowledge of security analysis, apply the concept if portfolio management for better investment.

- Students will have the knowledge o f analysing market efficiency.

COURSE STRUCTURE- BBA

Sl No.	Subject	COURSES	Credits	L:T:P Pattern	Work
	V SEMESTER				
	Financial management		5		
	Management accounting		5		
	Office Administration and Mgt.		4		
	Quantitative Technique		4		
	Taxation – I		5		
	Elective – I-HRM		5		
	Elective – I-FM		5		
	Elective – I-MM		5		
	VI SEMESTER				
	Financial Management – II		5		
	Principles and Practice of Auditing		4		
	Marketing Management		4		
	Taxation – II		5		
	Elective – II-HRM		5		
	Elective – II-FM		5		
	Elective –II-MM		5		
	Entrepreneurship Development		4		

V SEMESTER

Course Title: Financial Management – I **Course Code:**

COURSE OBJECTIVES:

To acquaint the students with the fundamental aspects of financial management in the business.

COURSE OUTCOME:

Empowers the students with knowledge of financial planning, procurement, investment and distribution of finance in companies. Students will learn about the capital structures which is most appropriate for the company and they will be able to calculate cost of various sources of capital. They also get an insight into meaning, importance of Capital Budgeting and also learn its techniques.

Course Title: Management Accounting **Course Code:**

COURSE OBJECTIVES:

This course provides the students an understanding of the application of accounting techniques for management decision making.

COURSE OUTCOME:

Students will have knowledge of components of costs that constitute business analysis. Students will be able develop an attitude to focus on financial statement users, their information needs, and how financial statement analysis addresses those needs. Students will acquire the basic knowledge required for application of tools for decision making.

Course Title: Office Administration and Management **Course Code: BBE030**

COURSE OBJECTIVES:

This course enables the students to know about the office administration and management which is the part of information management.

COURSE OUTCOME:

Describe the changing work environment and the skills needed by the administrative assistant to function in such an environment.

Course Title: Quantitative Technique **Course Code: BBE040**

COURSE OBJECTIVES:

This course enables the students to gain basic understanding of quantitative techniques and its applicability to business.

COURSE OUTCOME:

They will develop knowledge to apply basic financial mathematical techniques and Develop problem solving skills. Students enable to demonstrate their competence and confidence in using

descriptive statistics and statistical process control.

COURSE OBJECTIVES:

Course Title: TAXATION – I Course Code: BBE050

This course enables the students to know the basics of Income Tax and its Implications.

COURSE OUTCOME:

Students will be able to define the procedure of direct tax assessment, file IT return on individual basis, compute total income and define tax complicacies, differentiate between direct and indirect tax assessment and they will understand the various deductions to be made from gross total income..

Course Title: Elective 1-MM- Marketing Research Course Code: BBE150

COURSE OBJECTIVES:

To introduce students to the research methods in business marketing and also provides experience in designing questionnaire and statistical analysis.

COURSE OUTCOME:

Enables students to understand the role of business research in decision making. Learn different kinds of research design, primary scales of measurement, sampling techniques and methods for analysis of data. Students will be able to carry out a simple sample survey, analyze the results and present the findings

Course Title: Elective 1- HRM- Principles And Practice of Human Resource Management Course Code: BBE120

COURSE OBJECTIVES:

The objective of this course is to acquaint the students with the basics of Human Resource management, its scope and functions

COURSE OUTCOME:

Students will be able to understand the importance of human resources and their effective management in organizations. They get an insight into what is human resource planning, job analysis and design, recruitment sources and selection methods, different tests used in selection and the process of interview

Course Title: Elective 1- FM- INDIAN CAPITAL MARKET Course Code: BBE150

COURSE OBJECTIVES:

This course aims at acquainting the students with the working of financial markets in India.

COURSE OUTCOME:

Students learn about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance, Students are acquainted with current financial practices and also acquainted with Financial Markets knowledge.

VI SEMESTER

Course Title: Financial Management II Course Code: BBF

COURSE OBJECTIVES:

To acquaint the students with the fundamental aspects and the importance of Working Capital Management in business.

COURSE OUTCOME:

Students will be able to determine working capital requirement, optimum inventory level. Enables them to prepare cash budget and estimate the various kinds of leverages. Students will be able to evaluate credit policies of the company.

Course Title: Principles and Practice of Auditing Course Code: BBF010

COURSE OBJECTIVES:

This course provides the students an understanding of the application of Verification techniques for finding the integrity of accounting transactions

COURSE OUTCOME:

Helps to understand the auditing environment in the corporate entities and students will understand roles and responsibilities of auditor

Course Title: Marketing Management Course Code: BBF020

COURSE OBJECTIVES:

The objective of this course is to help students to understand the concepts of marketing and its 4 P's. How the 4 P's:product, price, place and promotion decisions affect the success of any business COURSE OUTCOME: On successful completion of the course, students will be able to: have an in depth understanding of the marketing concepts, and how strategies with regard to the 4 P's have to be effectively designed and managed. The students also get an insight on consumer behavior and social responsibility of marketing towards business.

Course Title: Taxation – II Course Code: BBF040

COURSE OBJECTIVES:

The course provides basic ideas about Tax law concerning Business organizations.

COURSE OUTCOME:

Enables students to define the procedure of direct tax assessment. They will understand the concept of recovery and refund of tax. Students will define tax complicacies and structure and aware about IT authorities and their powers and appeal & revision, tax penalties, offences and prosecutions.

Course Title: Elective II- HRM- Industrial Relations Course Code: BBF120

COURSE OBJECTIVES:

The course helps to give insight with regard to wage and salary administration, various incentive plans, benefits and services, discipline and Industrial relations for a strong & effective workforce through right policies & practices

COURSE OUTCOME:

Helps in Designing and Executing effective Incentive programs and employee management techniques. Students will be able to analyze core and legal issues, policies and practices surrounding employee relations, and the strength of trade union movement in India

Course Title: Elective II- MM-Advertisement and Sales Management Course Code: BBF130

COURSE OBJECTIVES:

The purpose of this course is of expose the students different issues concerned with Advertising and Sales.

COURSE OUTCOME:

Students will be able to describe different types of advertisement, discuss the ethics in advertisement, identify and make decisions regarding the most feasible advertising appeal and media mix, describe different types of sales persons and explain the steps involved in sales force management.

Course Title: Elective II- FM-Security Analysis and Portfolio Management Course Code: BBF230

COURSE OBJECTIVES:

The objective of this course is to acquaint the students with the basics of security Analysis and portfolio management

COURSE OUTCOME:

Students will be able to; explore different avenues of investment, equipped with the knowledge of security analysis, apply the concept if portfolio management for better investment and students will have the knowledge of analysing market efficiency Analysis and portfolio management.

Course Title: Entrepreneurship Development Course Code: BBF220

COURSE OBJECTIVES:

This course will enable students to develop an understanding of entrepreneurship and small business management. The course would give an insight about the importance of small business for economic development, the support available to small business from Government. Develops entrepreneurial skill and motivates them to become entrepreneurs.

COURSE OUTCOME:

The students should be able to develop an understanding about entrepreneurship and small business and appreciate their role in an economy, particularly in the FSM economy. Develop and demonstrate competence in basic business and marketing planning and in identifying opportunities and challenges of small business entrepreneurs.

Bachelor of Science (Basic/Hons.)/Integrated M.Sc. (Five Years)Degree in Molecular Biology

Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020

(2021-22 Batch Onwards)

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	MBDSC-1: General Botany (4+0+0)	4	4	40	60
	MBDSCP-1: General Botany (0+0+2)	4	2	25	25
	MBDSC-2: General Zoology (4+0+0)	4	4	40	60
	MBDSCP-2: General Zoology (0+0+2)	4	2	25	25
II	MBDSC-3: Cell Biology and Plant Physiology-I (4+0+0)	4	4	40	60
	MBDSCP-3: Cell Biology and Plant Physiology-I (0+0+2)	4	2	25	25
	MBDSC-4: Inorganic & Physical Chemistry (4+0+0)	4	4	40	60
	MBDSCP-4: Inorganic & Physical Chemistry (0+0+2)	4	2	25	25

Programme opportunities:

- Students with B.Sc. Molecular Biology shall be eligible for 2 years M.Sc. in Molecular biology and Biochemistry, Biotechnology, Environmental Science.
- Students with B.Sc. Honors in Molecular Biology shall be eligible for One year M.Sc. in Molecular Biology
- Students with B.Sc. Molecular Biology shall be eligible for B.Ed.

- Students with B.Sc. Honors/ Integrated M.Sc. (Five years) Molecular biology shall be eligible for B.Ed. and also shall be eligible for PUC teaching and coursesinvolved with interdisciplinary subjects in Biology at graduate and Masters level after meeting the minimum standards through KSET/NET/Ph. D. degree as per the rules and regulations laid by UGC from time to time.
- Students with B.Sc. degree/ B.Sc. Honors/ Integrated M.Sc. (Five Years) Molecular biology in Molecular Biology shall be eligible to take up all competitive examinations at state/national level.

I SEMESTER

MBDSC-1: GENERAL BOTANY (THEORY): 4 Credits 56 Hrs.

Course outcome:

- Students understand the basis for classifying fungi and plants.
- They gain knowledge on the types and importance of classification.
- Students know external morphology of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms.
- They acquire the knowledge of cellular diversity of fungi and plants starting from unicellular to highly complex angiosperm plants.
- They gain insight into the varied types of reproductive cycles of fungi and plants.
- Knowledge gained on the economic importance of different fungi and plants help them in future for research and other applications in agriculture, medicine and industry.
- Students understand the course of evolution in plants.

MBDSCP-1: GENERAL BOTANY (PRACTICALS): 2 Credits 56 Hrs.

Course outcome:

- Students understand the use of binocular microscope for understanding biology.
- They get practical knowledge of the aspects studied in theory.
- Students see and appreciate the beauty of phytoplanktons and other algae.
- They will see and understand better the microscopic and macroscopic stages ofsome of the fungi of kingdom mycota and oomycota.
- They gain insight into the views of internal structure and external morphology of different groups of plants such as bryophytes, pteridophytes and gymno sperms.
- Students get the skill of her barium preparation.

MBDSC-2: GENERAL ZOOLOGY (THEORY): 4 Credits 56 Hrs

Course outcome:

- Students will understand the basis for classifying animals.
- They will gain knowledge on the types and importance of classification.
- Students will know external morphology of different phyla of animals starting from Protozoa to Chor data.
- They will acquire the knowledge of different types of tissues animals with special emphasis to humans. This gives a clear dimension to the students regarding their role in different organs.

- They will gain insight into the varied types of reproductive behavior of different groups of animals. This knowledge forms a basis for further research.
- Over view of human system also gives a foundation to understand a course on Animal Physiology in the fourth semester.
- Knowledge gained on the economic importance of different animals help them in future for research and other applications in agriculture, medicine and industry.

MBDSC-2; GENERAL ZOOLOGY (PRACTICALS): 2 Credits 54 Hrs.

Course outcome:

- Students get practical knowledge of the aspects studied in theory.
- Students see and appreciate the beauty of zoo planktons and other aquatic animals.
- They will see and understand better animal diversity.
- They gain better insight of osteology.
- Students get the skill of plastination.

II SEMESTER

MBDSC -3: CELL BIOLOGY AND PLANT PHYSIOLOGY (THEORY): 4 Credits 56 Hrs.

Course outcome:

- Students will understand the structure and functions of cell organelles.
- They will acquire knowledge of mechanisms of cell membrane transport.
- They will get the knowledge on the role of ligands and receptors for cell signaling.
- This will enable them to understand the internal features of the cell and cell mobility.
- They will understand the stages of cell division, cell cycle.
- They will gain knowledge on principle and applications of microscopy.
- Students will understand the plant water relation, solute transport, different bio- physico-chemical phenomenon.
- Students will understand the mechanism of crop stress tolerance to various abiotic stresses.
- Students will be able to integrate and apply their knowledge of plant physiology for analytical thinking and solving practical problems experienced in agricultural systems.

MBDSCP-3: CELL BIOLOGY AND PLANT PHYSIOLOGY (PRACTICALS):
2 Credit 56 Hrs;

Course outcome:

- Students will practical knowledge of the theoretical aspects studied.
- They will acquire cell biology practical skills such as haematology, cell viability, microtomy and DNA isolation.
- Skills on estimation of amino acid related to stress in plants is also imparted.

MBDSC-4: INORGANIC AND PHYSICAL CHEMISTRY (THEORY) 04 Credits56 Hrs.

Course outcome:

- Students will understand the behavior of gases and their laws, atomic structure and

chemical bonding.

- Important techniques like chromatography and X-ray crystallography are discussed which helps students in academia and research.
- They will understand bioinorganic chemistry, chemistry of biologically important elements which bridges the gap between chemistry and biology for better relationship between both.
- Students will understand the phenomenon of photochemistry.
- Students will learn about the electro chemical cell and its conductance in detail.
- Basic understanding of chemical kinetics and catalysis of reactions help students tobetter understand in higher semester paper enzymology

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks(C1 + C2)	Semester End Examination Marks (C3)
I	AECC: (L2–1): English (3+0+0)	**4**	**3**	**40**	**60**
II	AECC: (L2–2): English (3+0+0)	**4**	**3**	**40**	**60**

I SEMESTER

Course Objectives:

- To introduce basic grammar through ample practice exercises for effectivelanguage learning.
- To teach to use vocabulary appropriately and grammatical structures correctly.
- To adopt strategies for developing effective reading and listening skills whileengaging students in using correct pronunciation.
- To instill confidence and develop competence in students in order tocommunicate in grammatically correct English.
- Develop the skill to translate texts from one language to another.

Programme outcome:

- Students will be able to enrich their vocabulary and enhance their comprehension skills.

- They will acquire grammatical competence and communicative skill which in turn willimprove their command over English.
- Students will acquire greater fluency in English which is an important dimensionof language learning.

II SEMESTER

Course Objectives:

- To adopt strategies for developing effective reading and listening skills whileengaging students in using correct pronunciation.
- To introduce basic grammar through ample practice exercises for effectivelanguage learning.
- To teach the students to use vocabulary appropriately and grammaticalstructures correctly.
- To instil confidence and develop competence in students in order to communicatein grammatically correct English.

Programme outcome:

- Students will be able to enrich their vocabulary and enhance their comprehension skills.
- They will acquire grammatical competence and communicative skill which in turn willimprove their command over English.
- Students will acquire greater fluency in English which is an important dimensionof language learning.

Ability Enhancement Compulsory Course (AECC)-Languages for B.Sc. (Basic/Hons.), B.C.A. (Basic/Hons.), B.B.A. (Basic/Hons.)andB.Sc. (Basic/Hons.)/Integrated Master (Five years) Degree in Molecular Biology Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	Discipline Core/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	AECC: (L1–1): Kannada (3+0+0)	**4**	**3**	**40**	**60**
II	AECC: (L1–2): Kannada (3+0+0)	**4**	**3**	**40**	**60**

ºÉÆ¸À gÁ¶ÖçÃAiÀÄ ²PÀët ¤Ãw 2020gÀ C£ÀÄ¸ÁgÀPÀ£ÀßqÀ ¨sÁµÁ ¥ÀoÀåPÀæªÀÄ 2021-2020 £ÉÃ ±ÉÊPÀëtÂPÀ
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©.J¹ì.¸É«Ä¸ÀÖgï-1

Course Title	©.J¹ì.-**PÀ£ÀßqÀ ¨sÁµÁ ¥ÀoÀå**
«ªÀgÀUÀ¼ÀÄ	**¨ÉÆÃzÀ£ÁCªÀ¢ü**
WÀlPÀ-1 PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄr-aAvÀ£É	13/14
WÀlPÀ-2 ¨sÀÆ«Ä	13/14
WÀlPÀ-3 ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄð	13/14
WÀlPÀ-4 ¸ÀAQÃtð	13/14

WÀlPÀ -1 PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄr-aAvÀ£É:
PÀ£ÀßqÀ £ÁqÀÄgÀÆ¥ÀÄUÉÆAqÀzÀÝjAzÀ ¥ÁægÀA©ü¹ CzÀgÀ ²æÃªÀÄÄAwPÉ, ªÉÊ²µÀÖöåvÉ, CzÀgÀ ¯ÉÆÃPÀzÀè¶Ö, PÀ¯Á ¥ÀæPÁgÀUÀ¼À°è£À ¸ÀªÀÄÈzÀÞvÉ, gÁdQÃAiÀÄ ¸ÁªÀiÁfPÀ aAvÀ£ÉUÀ¼À ¸ÉÆéÃ¥ÀdÕvÉ, CzÀgÀ ¨sËUÉÆÃ½PÀ ¸ËAzÀAiÀÄð, ««zsÀ PÉëÃvÀæUÀ¼À°è£À ¸ÁzsÀPÀgÀÄ, ªÀÄºÀvÀézÀZÀ¼ÀÄªÀ½UÀ¼ÀÄ, ¨sÁgÀvÀ ªÀÄvÀÄÛ «±ÀéPÉÌ PÀ£ÀßqÀzÀ PÉÆqÀÄUÉUÀ¼ÀÄ EªÀÅUÀ¼À°è PÉ®ªÀ£ÀÄß DAiÀÄÄÝ ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸ÀÄªÀ ªÀÄÆ®PÀ «zÁåyðUÀ¼À°è £ÁqÀÄ - £ÀÄr PÀÄjvÀ C©üªÀiÁ£ÀªÀ£ÀÄß

eÁUÀÈvÀUÉÆ½¸ÀÄªÀÅzÀÄ F WÀlPÀzÀ GzÉÝÃ±ÀªÁVgÀÄvÀÛzÉ

WÀlPÀ -2 ¨sÀÆ«Ä:

¨sÀÆ«ÄAiÀÄÄ ªÀÄ£ÀÄµÀågÀ ªÀÄÆ®gÀAUÀªÁVzÉ. ¨sÀÆ«ÄAiÀÄÄ £ÀªÀÄä ªÀÄÆ®zÉÃªÀvÉAiÀÄÆ ºËzÀÄ. DzÀÝjAzÀ¯ ÉÃ ¨sÀÆ«ÄvÁ¬Ä J£ÀÄßªÀÅzÀÄ DgÁzsÀ£ÉAiÀÄ £É¯É ªÀiÁvÀæªÀ®è, CzÀÄ £ÀªÀÄä C¹ÛvÀézÀ ¸ÀAUÀwAiÀÄÆ DVzÉ. ¨sÀÆ«Ä¬Ä®èzÉ, ¨sÀÆ«ÄAiÀÄ fÃªÀ ¸ÀA¥À£ÀÆä®UÀ½®èzÉ ªÀÄ£ÀÄµÀågÀ C¹ÛvÀéªÉÃ EgÀ¯ ÁgÀzÀÄ. ¨sÀÆ«ÄAiÀÄ M¼ÀUÀÄ, ºÉÆgÀUÀÄ F J®èªÀÅ £ÀªÀÄä ¸ÀªÀ®vÀÆÛ ºËzÀÄ. dªÁ¨ÁÝjAiÀÄÆ ºËzÀÄ. EwÛÃa£À PÁ®WÀlÖzÀ°è ¨sÀÆ«ÄAiÀÄ£ÀÄß ªÀÄ£ÀÄµÀågÀÄ ±ÉÆÃµÀuÉ ªÀiÁqÀÄvÁÛ §A¢zÀÄÝ ªÀÄ£ÀÄPÀÄ®zÀ

C¹ÛvÀéªÉÃ DvÀAPÀªÀ£ÀÄß JzÀÄj¸ÀÄwÛzÉ. F ¨sÁUÀzÀ°è ¨sÀÆ«ÄAiÀÄ ªÉÊeÁÕ¤PÀ «ªÀgÀuÉ¬ÄAzÀ »rzÀÄ, DgÀA¨sÀ¢AzÀ E°èAiÀÄvÀ£ÀPÀ ªÀÄ£ÀÄµÀågÀÄ ¨sÀÆ«ÄAiÀÄ£ÀÄß £ÉÆÃqÀÄvÁÛ §A¢gÀÄªÀ zÀÈ¶ÖPÉÆÃ£ÀUÀ¼À£ÀÄß ¥ÀoÀåªÁV EqÀ§ºÀÄzÀÄ. DgÁzsÀ£É¬ÄAzÀ »rzÀÄ E®èzÀ C¢üPÁgÀªÀ£ÀÄß ¨sÀÆ«ÄAiÀÄ ªÉÄÃ¯ É ZÀ¯ Á¬Ä¸ÀÄªÀÅzÀgÀ vÀ£ÀPÀ ¥ÀoÀå ªÀ¸ÀÄÛUÀ¼À£ÀÄß Dj¹PÉÆ¼ÀÄîªÀÅzÀÄ. d®¸ÀA¥À£ÀÆä®UÀ½AzÀ »rzÀÄ, C¢gÀÄUÀ¼ÀÄ, PÀÈ¶ F J®èªÀ£ÀÆß M¼ÀUÉÆ¼ÀÄîªÀÅzÀÄ, ¨sÀÆ«ÄAiÀÄ ªÉÄÃ°£À ªÀÄ£ÀÄµÀågÀ CwPÀæªÀÄt¢AzÁUÀÄªÀ zÀÄµÀÖjuÁªÀÄUÀ½UÉ MvÀÄÛPÉÆqÀÄªÀÅzÀÄ ¸ÀªÀÄPÁ°Ã£À, DvÀAPÀUÀ¼À »£Éß¯ ÉAiÀÄ°è C¥ÉÃPÀëtÂÃAiÀÄ. ¸Á»vÀåzÀ ªÀÄvÀÄÛ ¸Á»vÉåÃvÀgÀ DPÀgÀUÀ½AzÀ®Æ ¥ÀoÀåUÀ¼À£ÀÄß Dj¹PÉÆAqÀÄ ¨sÀÆ«ÄAiÀÄ ªÀÄºÀvÀéªÀ£ÀÄß «zÁåyðUÀ½UÉ ªÀÄ£ÀªÀjPÉ ªÀiÁrPÉÆqÀÄªÀÅzÀÄ F ¨sÁUÀzÀ GzÉÝÃ±ÀªÁVgÀÄvÀÛzÉ.

WÀlPÀ -3 ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄð:

DzsÀÄ¤PÀ ¨sÁgÀwÃAiÀÄ ¸ÀªÀiÁdªÀÅJzÀÄj¸ÀÄwÛgÀÄªÀ ªÀÄÄRå ¸ÀªÁ®ÄUÀ¼À°è MAzÀÄ ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄðzÀ PÉÆgÀvÉ, ¸ÁA¥ÀæzÁ¬ÄPÀ, «¢üªÁ¢ §zÀÄQ£À zÀÈ¶ÖPÉÆÃ£ÀªÀÅ ¨sÁgÀwÃAiÀÄgÀ£ÀÄß ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄð¢Az CAvÀgÀzÀ°è EnÖzÉ. CxÀªÁ ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄð ªÀÄvÀÄÛ ªÀÄÆqsÀ£ÀA©PÉUÀ¼À £ÀqÀÄ«£À ¸ÀAWÀµÀðªÀÅ ¨sÁgÀwÃAiÀÄgÀ ®PÀëtªÉÃ DV ©nÖzÉ. «eÁÕ¤UÀ¼ÀÄ, ¥ÀæUÀw ¥ÀgÀ aAvÀPÀgÀÄ ¨sÁgÀvÀzÀ ¥ÀæUÀwUÉ ªÀiÁgÀPÀªÁVgÀÄªÀ ¸ÀAUÀwUÀ¼À°è EzÀÆ MAzÀÄ JAzÀÄ ¥Àæw¥Á¢¸ÀÄvÁÛgÉ. F »£Éß¯ ÉAiÀÄ°è «zÁåyðUÀ¼À°è ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄðªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ wÃgÀ CUÀvÀåªÁVzÉ. £ÀA©PÉUÀÆ, ªÀÄÆqsÀ£ÀA©PÉUÀÆ EgÀÄªÀ ªÀåvÁå¸ÀªÀ£ÀÄß w½¸ÀÄªÀÅzÀgÀ eÉÆvÉUÉ ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃzsÀªÀÄðªÀÅ DgÉÆÃUÀåPÀgÀªÁzÀ ªÀÄvÀÄÛ ¸ÀªÀiÁ£À ¥ÁvÀ½AiÀÄ §zÀÄQ£À PÀæªÀÄUÀ¼À£ÀÄß gÀÆ¦¸À§®èzÀÄ J£ÀÄßªÀÅzÀ£ÀÄß w½¸ÀÄªÀÅzÀÄ. ¸ÁªÀiÁfPÀ, zsÁ«ÄðPÀ ªÀÄvÀÄÛ ¸ÁA¸ÀÌøwPÀ ¯ ÉÆÃPÀUÀ¼À°è£À vÀgÀvÀªÀÄUÀ¼À£ÀÄß ¤ªÁj¸ÀÄªÀ°è ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃ¨sÁªÀzÀ ¥ÁvÀæªÀ£ÀÄß ZÀað¸ÀÄªÀAvÀºÀ, ¸ÀzÀÈqsÀ ¸ÀªÀiÁdªÀ£ÀÄßgÀÆ¦¸ÀÄªÀ°è ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃ¨sÁªÀzÀ dªÁ¨ÁÝjAiÀÄ£ÀÄß JwÛ»rAiÀÄÄªÀ ¥ÀoÀåUÀ¼À£ÀÄß Dj¹PÉÆAqÀÄ «zÁåyðUÀ¼À°è ªÉÊeÁÕ¤PÀ ªÀÄ£ÉÆÃ¨sÁªÀzÀ CUÀvÀå ªÀÄvÀÄÛ ªÀÄºÀvÀé PÀÄjvÀÄ CjªÀÅ ªÀÄÄr¸ÀÄªÀ GzÉÝÃ±À F ¨sÁUÀzÁÝVzÉ.

WÀlPÀ -4 ¸ÀAQÃtð:

«eÁÕ£ÀzÀ eÉÆvÉUÉ §zÀÄQ£À E¤ßvÀgÀ D¯ ÉÆÃZÀ£Á £É¯ ÉUÀ¼À£ÀÆß «zÁåyðUÀ½UÉ vÀ®Ä¦zÀ D±ÀAiÀÄ¢AzÀ ¸ÀAQÃtð J£ÀÄßªÀ ¨sÁUÀªÀ£ÀÄß ¥ÀoÀåzÀ°è C¼ÀªÀr¸À¯ ÁVzÉ. ¸Á»vÀå ªÀÄvÀÄÛ ¸ÁªÀiÁfPÀ ¸ÀA¸ÀÌøw ºÁUÀÆ ªÉÊeÁÕ¤PÀvÉAiÀÄ ««zsÀ DAiÀiÁªÀÄUÀ¼À£ÀÄß ¥Àæ¸ÁÛ¦¸ÀÄªÀ

¸À®ÄªÁV F §UÉAiÀÄ N¢¤AzÀ ¸Á»vÀåPÉÌ EgÀÄªÀ C£Àå ²¸ÀÄÛUÀ¼À eÉÆvÉV£À MqÀ£Ál ªÀÄvÀÄÛ C£À£ÀåvÉ «zÁåyðUÀ½UÉ ®©ü¸ÀÄvÀÛzÉ.
«eÁÕ£À ªÀÄvÀÄÛ ¸Á»vÀå ¸ÀA§AzsÀUÀ¼ÀÄ PÀ£ÀßqÀ
¨sÁµÉAiÀÄ°è «eÁÕ£À §gÉºÀUÀ¼À EwºÁ¸ÀE§âgÀÄ
§gÀºÀUÁgÀgÀ JgÀqÀÄ ¯ÉÃR£ÀUÀ¼ÀÄ
¸ÁªÀiÁfPÀ ªÀÄvÀÄÛ ªÀiÁ£À«ÃAiÀÄ ªÀiË®åUÀ¼À ªÀÄºÀvÀéªÀ£ÀÄß ¸ÁgÀÄªÀ PÀ£ÀßqÀzÀ GvÀÛªÀÄ §gÀºÀUÀ¼ÀÄ-F jÃw E¤ßvÀgÀ ¥ÀoÀåUÀ¼ÀÄ

WÀlPÀ– 1:PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄraAvÀ£É

¥ÀzÀ« ¥ÀoÀåUÀ¼À°è PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄr aAvÀ£ÉUÀ¼ÀÄ ªÀÄvÀÄÛ PÀ£ÀßqÀ ¨sÁµÁ ¸ÀA¸ÀÌøwUÉ EgÀÄªÀ §ºÀÄªÀÄÄT DAiÀiÁªÀÄUÀ¼À£ÀÄß ¥ÀjUÀtÂ¹ WÀlPÀ-1 C£ÀÄß gÀÆ¦¸À¯ ÁVzÉ. gÁµÀÖæPÀ« PÀÄªÉA¥ÀÅ CªÀgÀ PÀ£ÀßqÀ rArªÀÄ- ªÀÄÄ£ÀÄßr ¯ ÉÃR£À. qÁ.ºÁ.ªÀiÁ.£ÁAiÀÄPÀgÀªÀgÀ‘ PÀ£ÀßqÀ PÀlÄÖªÀ PÉ®¸À’¯ ÉÃR£À ªÀÄvÀÄÛ ºÀÄ¬Ä¼ÀUÉÆÃ¼À£ÁgÁAiÀÄtgÁAiÀÄgÀ‘ GzÀAiÀÄªÁUÀ°£ÀªÀÄä ZÉ®ÄªÀPÀ£ÀßqÀ£ÁqÀÄ’ - PÀªÀ£ÀªÀ£ÀÄß CzsÀåAiÀÄ£ÀPÉÌ EqÀ¯ ÁVzÉ. EzÀjAzÀ PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄrAiÀÄ §UÉÎ ºÉaÑ£À C©üªÀiÁ£À ªÀÄÆqÀÄªÀÅzÀ®èzÉÃ PÀ£ÀßqÀzÀ »jªÉÄ-UÀjªÉÄAiÀÄ£ÀÄß ¥ÀjZÀ¬Ä¸À¯ ÁUÀÄvÀÛzÉ.

WÀlPÀ– 2:DzsÀÄ¤PÀvÉ

PÀ¼ÉzÀ ±ÀvÀªÀiÁ£À¢AzÀ dUÀvÀÄÛ DzsÀÄ¤PÀvÉAiÀÄ eÉÆvÉUÉ ªÀÄÄSÁªÀÄÄTAiÀÄ£ÀÄß £ÀqÉ¸ÀÄvÀÛ¯ ÉÃ §A¢zÉ. DzsÀÄ¤PÀvÉAiÀÄÄ DPÀµÀðuÉAiÀÄÆ ºËzÀÄ. §zÀ¯ ÁªÀuÉAiÀÄ ¥ÀæQæAiÉÄAiÀÄÆ ºËzÀÄ.
¸ÀªÁ®Æ ºËzÀÄ, zÀÄgÀAvÀªÀÇ ºËzÀÄ. ªÀÄÄRåªÁV ªÀÄÆgÀ£ÉAiÀÄ dUÀwÛ£À gÁµÀÖæUÀ¼À «µÀAiÀÄzÀ°è EzÀÄ E£ÀÆß ºÉZÀÄÑ
¸ÀAQÃtðªÁVzÉ. DzsÀÄ¤PÀvÉAiÀÄÄ ¸ÁªÀiÁfPÀ vÁgÀvÀªÀÄåUÀ¼À£ÀÄß ¤ªÁj¹PÉÆ¼Àî®Ä EgÀÄªÀ ¥ÀjºÁgÀ ªÀiÁUÀðJAzÉÃ ¨sÁ«¸À¯ ÁVvÀÄÛ.PÁ®PÀæªÉÄÃt DzsÀÄ¤PÀ «zÀåªÀiÁ£ÀUÀ¼ÀÄ ±ÉæÃtÂPÀgÀtªÀ£ÀÄß E£ÀÆß §®¥Àr¸ÀÄwÛªÉ J£ÀÄßªÀ ¸ÀvÀå FUÀ §AiÀÄ¯ ÁUÀÄwÛzÉ. DzsÀÄ¤PÀvÉAiÀÄ ¥ÀgÀ ªÀÄvÀÄÛ «gÉÆÃzsÀzÀ DA±ÀUÀ½gÀÄªÀ
¥ÀoÀåUÀ¼À£ÀÄß ¸ÀAAiÉÆÃf¹zÀgÉ «zÁåyðUÀ½UÉ DzsÀÄ¤PÀvÉAiÀÄ ¸ÀàµÀÖavÀæt ¹UÀÄvÀÛzÉ.

WÀlPÀ - 3: PÀÄlÄA§

¸ÀªÀiÁdzÀ ªÀÄÆ® WÀlPÀ PÀÄlÄA§, ¸ÀªÀiÁdzÀ J®è ¸ÀA¸ÉÜUÀ¼ÀÆ(zÁA¥ÀvÀå, ¸ÉßÃºÀ, ¥Àæ¨sÀÄvÀé ªÀiË®å ªÀåªÀ¸ÉÜ EvÁå¢) ºÀÄlÄÖªÀÅzÉÃF ªÀÄÆ® WÀlPÀ¢AzÀ PÀÄlÄA§zÀ DzsÁgÀ ¸ÀÛA¨sÀªÁV UÀAqÀ- ºÉAqÀwAiÀÄgÀ£ÀÄß UÀÄgÀÄw¸À¯ ÁUÀÄwÛzÉ J£ÀÄßªÀÅzÀÄ ¤dªÁzÀgÀÆ, C°è UÀAqÁ½PÉAiÀÄ ªÀåªÀ¸ÉÜAiÀÄ°è CzÀÄ ±ÉæÃtÂÃPÀÈvÀ
¸À«ÄÃPÀgÀtªÁUÀÄvÀÛzÉ. UÀAqÀÄ PÉÃAzÀæzÀ°èzÀÝgÉ‘ºÉtÄÚ

CAa£À°ègÀÄªÀ ¹Üw EzÀPÉÆÌAzÀÄ «µÀªÀÄvÉAiÀÄ£ÀÄß vÀgÀÄvÀÛzÉ. EzÀgÀ eÉÆvÉ eÉÆvÉUÉÃ ºÉtÄÚ PÀÄlÄA§zÀ PÀtÄ ÚJ£ÀÄßªÀ zsÉÆÃgÀuÉAiÀÄÆ CµÉÖÃ ¥Àæ§®ªÁV ZÁ°ÛAiÀÄ°èzÉ. ªÀÄPÀÌ¼À ªÉÄÃ°£À ªÉÆzÀ® ªÀÄvÀÄÛ UÁqsÀªÁzÀ ¥Àæ¨sÁªÀ PÀÄlÄA§zÉÝÃDVgÀÄvÀÛzÉ. vÁ¼Éä ¦æÃw, vÁåUÀ, ±ÀæªÀÄ, ¸À»µÀÄÚvÉ, MUÀÎlÄÖ EvÁå¢ UÀÄtUÀ¼À£Éß®è £ÁªÀÅ PÀ°AiÀÄÄªÀÅzÀÄ PÀÄlÄA§ ªÀåªÀ¸ÉÜ¬ÄAzÀ¯ ÉÃ, ¸ÀªÀiÁdzÀ ªÀÄÆ® WÀlPÀ PÀÄlÄA§ JA§ zsÉåÃAiÀÄzÉÆA¢UÉ ²ªÀgÁªÀÄ PÁgÀAvÀgÀ ¨ÉlÖzÀfÃªÀ PÁzÀA§jAiÀÄ DAiÀÄÝ ¨sÁUÀ 'PÀtÂªÉAiÀÄ ªÀÄÄzÀÄPÀ PÀ«vÉ' ºÁUÀÆ ¨Á£ÀÄ ªÀÄÄµÁÛPï gÀªÀgÀ '§qÀªÀgÀ ªÀÄUÀ¼ÀÄ ºÉtÚ®è' ¥ÀoÀåªÀ£ÀÄß EqÀ¯ÁVzÉ. F ¨sÁUÀzÀ°è PËlÄA©PÀ ¥Àj¸ÀgÀzÀ avÀæt, ¸ÉßÃºÀ ºÁUÀÆ PÀÄlÄA§zÀ DzsÁgÀ ¸ÀÜA¨sÀªÁV PÀÄlÄA§zÀ AiÀÄdªÀiÁ£À£À£ÀÄß UÀÄgÀÄw¸À¯ ÁUÀÄvÀÛzÉ. §qÀ ºÉtÄÚªÀÄUÀ¼À ªÀÄzÀÄªÉ ¸ÀAzÀ¨sÀðzÀ°è JzÀÄgÁUÀ §ºÀÄzÁzÀ ¸ÀªÀÄ¸ÉåUÀ¼À M¼À£ÉÆÃlzÀ avÀæt«zÉ. PÀtÂªÉAiÀÄ ªÀÄÄzÀÄPÀ PÀ«vÉAiÀÄ°è «±ÀéPÀÄlÄA©AiÀÄPÀµÀÖzÀ°è F ¨sÁªÀzÀ £É¯ É EzÀgÀµÉÖÃ ¸Áé©üPÀªÁVzÉÊªÀªÀ£ÀÄß awæ¹zÁÝgÉ. PÀÄlÄA§ ªÀåªÀ¸ÉÜAiÀÄ ¢PÀÄÌ-zÉ¸ÉUÀ¼À£ÀÄß M¼ÀUÉÆ¼ÀÄîªÀ ¥ÀoÀåUÀ¼À£ÀÄß ¸Á»vÀå ªÀÄvÀÄÛ ¸Á»vÉåÃvÀgÀ ªÀÄÆ®UÀ½AzÀ ¸ÀAUÀæ»¹ ¥ÀoÀåUÀ¼À£ÀÄß gÀÆ¦¸À§ºÀÄzÀÄ.

WÀlPÀ- 4: ¸ÀAQÃtð

«zÁåyðUÀ¼À°è ªÀiÁ£À«ÃAiÀÄvÉAiÀÄ ªÀåªÀºÁjPÀ zÀÈ¶ÖPÉÆÃ£ÀªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ. ªÀåªÀºÁgÀzÀ°è ªÀiË¯ ÁåzsÁjvÀ UÀÄtUÀ¼À£ÀÄß D¼ÀªÀr¹PÉÆ¼ÀÄîªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄªÀÅzÀÄ. ªÀåªÀºÁgÀ ªÀÄvÀÄÛ ¸Àé¸ÀÜ §zÀÄQ£À ¤d CxÀðªÀ£ÀÄß w½¸ÀÄªÀÅzÀÄ. «zÁåyðUÀ¼À°è ªÀiÁ£À«ÃAiÀÄvÉ ªÀåªÀºÁjPÀ zÀÈ¶ÖPÉÆÃ£À ºÁUÀÆ ªÀåªÀºÁgÀzÀ°è ªÀiË¯ ÁåzsÁjvÀ UÀÄtUÀ¼À£ÀÄß C¼ÀªÀr¹PÉÆ¼ÀÄîªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄªÀ ¤nÖ£À°è ªÀ¸ÀÄzÉÃAzÀæCªÀgÀ ¤±ÁªÁVßUÀ¼À ¤vÀå¸ÀvÀåUÀ¼À, ¸ÉÆÃªÀÄ±ÉÃRgÀEªÀiÁæ¥ÀÅgÀ CªÀgÀ UÀAqÀ-ºÉAqÀw dUÀ¼À ºÁUÀÆ r.«.fAiÀÄªÀgÀ ¨Á½UÉÆAzÀÄ £ÀA©PÉ-¯ ÉÃR£ÀªÀ£ÀÄß CzsÀåAiÀÄ£ÀPÉÌ EqÀ¯ÁVzÉ.

WÀlPÀ -1 PÀ£ÀßqÀ £ÁqÀÄ-£ÀÄr-aAvÀ£É: PÀ£ÀßqÀ £ÁqÀÄ gÀÆ¥ÀÄUÉÆAqÀzÀÝjAzÀ ¥ÁægÀA©ü¹ CzÀgÀ ²æÃªÀÄAwPÉ,ªÉÊ²µÀÖöåvÉ, CzÀgÀ ¯ÉÆÃPÀzÀÈ¶Ö, PÀ¯Á ¥ÀæPÁgÀUÀ¼À°è£À ¸ÀªÀÄÈzÀÞvÉ, gÁdQÃAiÀÄ ¸ÁªÀiÁfPÀ aAvÀ£ÉUÀ¼À ¸ÉÆéÃ¥ÀdÕvÉ, CzÀgÀ ¨sËUÉÆÃ½PÀ ¸ËAzÀAiÀÄð, ««zsÀ PÉëÃvÀæUÀ¼À°è£À ¸ÁzsÀPÀgÀÄ, ªÀÄºÀvÀézÀ ZÀ¼ÀÄªÀ½UÀ¼ÀÄ, ¨sÁgÀvÀ ªÀÄvÀÄÛ «±ÀéPÉÌ PÀ£ÀßqÀzÀ PÉÆqÀÄUÉUÀ¼ÀÄ EªÀÅUÀ¼À°è PÉ®ªÀ£ÀÄß DAiÀÄÄÝ ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸ÀÄªÀÅzÀÄ. PÀ£ÀßqÀ £ÁqÀÄ - £ÀÄrAiÀÄ §UÉUÉ «zÁåyðUÀ¼À°è C©üªÀiÁ£À ªÀÄvÀÄÛ UËgÀªÀ£ÀÄß ºÉaÑ¸ÀÄªÀ GzÉÝÃ±À F ¥ÀoÀåUÀ½VgÀÄvÀÛzÉ.

WÀlPÀ -2 DPÁ±À: DPÁ±ÀªÀÅ «±ÁévÀäPÀ vÀvÀéUÀ¼À°è MAzÀÄ
ªÀiÁvÀæªÀ®èzÉ, ªÀiÁ£ÀªÀ ¸ÀAPÀÄ®ªÀ£ÀÄß ¥ÉÆgÉAiÀÄÄªÀ
±ÀQÛUÀ¼À°è MAzÁVzÉ. DPÁ±ÀªÀ£ÀÄß ¥ÀAZÀ¨sÀÆvÀUÀ¼À°è MAzÁV ¥ÀgÀUÀtÂ¸ÀÄªÀÅzÀÄ EzÉÃ PÁgÀtPÉÌ «±ÁévÀäPÀ vÀvÀéUÀ¼ÀÄ vÀªÀÄäC£ÀAvÀ ±ÀQÛUÀ¼À PÁgÀtPÁÌV ªÀiÁvÀæªÀ®èzÉ ªÀÄ£ÀÄµÀågÀ CºÀAPÁgÀPÉÌ PÁgÀt«®è J£ÀÄßªÀ ¸ÀvÀåªÀ£ÀÄß w½¸ÀÄªÀ PÁgÀtPÁÌVAiÀÄÆ ªÀÄÄRå. «¸ÁÛgÀ, O£ÀßvÀå, ¤¸ÁéxÀðvÉ,
PÉÆlÄÖzÀtÂAiÀÄzÀOzÁAiÀÄð, vÉgÉzÀ ªÀÄ£À¸ÀÄì, G£ÀßwÃPÀgÀtzÀ°èAiÉÄÃ £ÉlÖ zÀÈ¶Ö EAvÀºÀ C£ÉÃPÀ PÁgÀtUÀ½UÁV DPÁ±ÀªÀÅ £ÀªÀÄä ªÀiÁzÀjUÀ¼À° MAzÁVzÉ. NeÉÆÃ£ï ¥ÀzÀgÀPÉÌ MzÀVgÀÄªÀ DvÀAPÀªÀÇ ¸ÉÃjzÀAvÉ DPÁ±ÀªÀ£ÀÄß PÀÄjvÀ ªÉÊeÁÕ¤PÀ £É¯ÉUÀ¼À£ÀÆß ¥ÀoÀåªÀÅ M¼ÀUÉÆAqÀgÉ CzÀPÉÆÌAzÀÄ ¸ÀªÀÄUÀævÉ ¹UÀÄvÀÛzÉ. £ÀPÀëvÀæ ªÀiÁ°PÉUÀ¼ÀÄ,
zsÀÆªÀÄPÉÃvÀÄUÀ¼ÀÄ, ªÀÄ¼É, ªÉÆÃqÀ, UÀÄqÀÄUÀÄ ¹r®Ä EAxÀ
¥ÁæxÀ«ÄPÀ ¸ÀAUÀwUÀ½AzÀ »rzÀÄ CzÀgÀ ªÀtð£ÁvÀäPÀ «ªÀgÀUÀ½gÀÄªÀ ¥ÀoÀåUÀ¼À£ÀÄß Dj¹PÉÆ¼Àî§ºÀÄzÀÄ.

WÀlPÀ -3 vÁgÀÄtå:vÁgÀÄtåªÀÅ ªÀÄ£ÀÄµÀå §zÀÄQ£À Cw DPÀµÀðPÀ, ¤uÁðAiÀÄPÀ PÁ¯ ÁªÀ¢üAiÀiÁVzÉ. F CªÀ¢üAiÀÄ°è£À vÀ®ètUÀ¼ÀÄ, DPÀµÀðuÉUÀ¼ÀÄ, D«ÄµÀUÀ¼ÀÄ ªÀÄÄAvÁzÀªÀÅ Cw «²µÀÖªÁVzÀÄÝ CªÀ£À ªÀåQÛvÀé ªÀiÁUÀÄ«PÉUÉ vÀ¼ÀºÀ¢AiÀiÁVgÀÄvÀÛzÉ. ºÀÄqÀÄUÁnPÉ ªÀÄvÀÄÛ dªÁ¨ÁÝjUÀ¼À £ÀqÀÄ«£À zÀéAzÀéUÀ¼À£ÀÄß ªÀÄvÀÄÛ F CªÀ¢üAiÀÄ°è£À M½vÀÄ-PÉqÀPÀÄUÀ¼À£ÀÄß ¸Á»vÀå ¨sÁUÀUÀ¼À ªÀÄÄSÉÃ£À w½¹PÉÆqÀÄªÀÅzÀÄ. fÃªÀ£ÀzÀ ªÀÄºÀvÀézÀWÀlÖªÁzÀ F CªÀ¢üAiÀÄ°èCªÀ£À ªÀÄ£À¸ÀÄì ªÀiÁUÀÄªÀvÀÛ ZÀ°¸ÀÄwÛzÀÄÝ PÀ£À¸ÀÄUÁjPÉ, DzÀ±ÀðUÀ¼ÀÄ, ¨sÀæªÉÄUÀ¼ÀÄ, ºÉÆ¸ÀvÀ£ÀzÀ, ºÀÄqÀÄPÁl, ¦æÃw ¥ÀætAiÀÄUÀ¼À ¸É¼ÉvÀ, ¥Àæw¨sÉ ªÀÄÄAvÁzÀªÀÅUÀ¼À §UÉÎ CjªÀ£ÀÄß ªÀÄÆr¸ÀÄªÀ°è ¸Á»vÀåzÀ £ÉgÀªÀ£ÀÄß w½¹PÉÆqÀÄªÀÅzÀÄ.

WÀlPÀ -4 ¸ÀAQÃtð: vÁAwæPÀ «µÀAiÀÄUÀ¼À£ÀÄß PÀ£ÀßqÀzÀ°è gÀÆ¦¸À¨ÉÃPÁzÀ CUÀvÀåvÉUÀ¼À£ÀÄß w½¹PÉÆqÀÄªÀÅzÀÄ EA¢£À vÀAvÀæeÁÕ£À AiÀÄÄUÀzÀ°è CzÀPÉÌ CUÀvÀåªÁzÀ PÀ£ÀßqÀªÀ£ÀÄß gÀÆ¦¸ÀÄªÀ vÀgÀ¨ÉÃw ¤ÃqÀÄªÀÅzÀÄ. UÀtPÀ PÉëÃvÀæzÀ°è PÀ£ÀßqÀªÀ£ÀÄß ¥ÀjuÁªÀÄPÁjAiÀiÁV §¼À¸ÀÄªÀÅzÀPÉÌ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸ÀÄªÀÅzÀÄ, UÀtPÀPÉëÃvÀæPÉÌ ¸ÀA§A¢ü¹zÀ vÁAwæPÀ «µÀAiÀÄUÀ¼À£ÀÄß GzÁºÀgÀuÉ E-ªÉÄÃ¯ï, PÀ£ÀßqÀCAvÀeÁð® vÁtUÀ¼ÀÄ, PÀ£ÀßqÀ vÀAvÁæA±ÀUÀ¼ÀÄ, PÀ£ÀßqÀ «Q¦rAiÀiÁ ªÀÄÄAvÁzÀ ¥Àj¨sÁµÉAiÀÄ£ÀÄß PÀ£ÀßqÀzÀ°è w½¸ÀÄªÀÅzÀÄ.

ಮೂರನೆಯ ಚತುರ್ಮಾಸ ಬಿ.ಎಸ್ಸಿ 5 ವರ್ಷದ ಸಂಯೋಜಿತ ಅಣುಜೀವಶಾಸ್ತ್ರ

ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ (ಎನ್.ಇ.ಪಿ – 2022–23)

ವಿಜ್ಞಾನ ಗಂಗೋತ್ರಿ – 3

ಘಟಕ : 1 ಮಾನವೀಯತೆ

1. ಅ. ಚಂದ್ರಹಾಸನ ಪ್ರಸಂಗ – ಲಕ್ಷ್ಮೀಶ
   ಆ. ನನ್ನ ನಾಯಿ – ಪು.ತಿ. ನರಸಿಂಹಾಚಾರ್
2. ತಾಯ್ತನ – ಎಚ್. ನಾಗವೇಣಿ

ಘಟಕ : 2 ಪ್ರವಾಸ

1. ಜೋಗದ ಗುಂಡಿ – ಮೂಗೂರು ಮಲ್ಲಪ್ಪ
2. ಮಹಾನ್ ಗೋಡೆ – ಶೂದ್ರ ಶ್ರೀನಿವಾಸ್
3. ಅನಾಫಿಲ್ಲಮ್ ಮತ್ತು ಕದಂಬ – ಬಿ.ಜಿ.ಎಲ್ ಸ್ವಾಮಿ

ಘಟಕ : 3 ವಿಚಾರಕ್ರಾಂತಿ

1. ಬೆಂಜಮಿನ್ ಮೋಲಾಯಿಸ್ ಹಾಡು – ಡಾ. ಚೆನ್ನಣ್ಣ ವಾಲೀಕಾರ
2. ಮೈಮೇಲೆ ದೆವ್ವ ಬರುವುದೇ? – ಡಾ.ಸಿ.ಆರ್. ಚಂದ್ರಶೇಖರ್
3. ಮಿಂಚಿನ ಅಕ್ಷರ ಮಾಲೆ – ಮೊಗಳ್ಳಿ ಗಣೇಶ್

ಘಟಕ : 4 ಸಂಕೀರ್ಣ

1. ಗಂಡಾಗಿ ಹುಟ್ಟಬೇಕಿತ್ತು – ಶ್ರೀದೇವಿ ಕೆರೆಮನೆ
2. ಹೃದಯ ದುರ್ಬಲವಾಗುತ್ತಿದೆಯೇ? – ಡಾ.ಆರ್.ಕೆ. ಸರೋಜ
3. ಕುಸಿಯುತ್ತಿರುವ ಸಾಂಸ್ಕೃತಿಕ ನೆಲೆಗಳು – ರಂಜಾನ್ ದರ್ಗಾ

ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ ಬಿ.ಎಸ್ಸಿ 5 ವರ್ಷದ ಸಂಯೋಜಿತ ಅಣುಜೀವಶಾಸ್ತ್ರ
ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ (ಎನ್.ಇ.ಪಿ – 2022–23)
ವಿಜ್ಞಾನ ಗಂಗೋತ್ರಿ – 4

ಘಟಕ : 1 ದಮನಿತ ಲೋಕ

1. ಅ. ಅಲ್ಲೇ ಕುಂತವರೆ – ಸಿದ್ದಲಿಂಗಯ್ಯ
   ಆ. ಹಡದಿ ಹಾಸುವವರು – ವೀರಣ್ಣ ಮಡಿವಾಳರ
2. ಚೋಮನ ದುಡಿ (ಕಾದಂಬರಿಯ ಆಯ್ದ ಭಾಗ) – ಕೆ.ಶಿವರಾಮಕಾರಂತ

ಘಟಕ : 2 ಸಹಿಷ್ಣುತೆ

1. ಅ. ಭಿನ್ನ ಭೇದವ ಮಾಡ ಬ್ಯಾಡಿರೋ – ಅಜ್ಞಾತ ತತ್ವಪದಕಾರ
   ಆ. ಕುಲ ಕುಲ ಕುಲವೆಂದು – ಕನಕದಾಸ
2. ಒಂದು ಅಪೂರ್ವ ಸಂಸಾರ – ಕರಿಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಘಟಕ : 3 ಶ್ರೀಸಾಮಾನ್ಯದ ಬದುಕು

1. ಅ. ಅಮ್ಮನ ಸೀರೆ – ಬಾನು ಮುಷ್ತಾಕ್
   ಆ. ನಮ್ಮೂರ ಮಳ್ಳೇ ಮನೆ ಸೀತೆ – ಎಚ್.ಆರ್. ಸುಜಾತ
2. ಮಾರಿಕೊಂಡವರು – ದೇವನೂರ ಮಹಾದೇವ

ಘಟಕ : 4 ಸಂಕೀರ್ಣ

1. ಅ. ನಂ ರೂಪ್ಲಿ – ಬಿ.ಟಿ. ಲಲಿತಾ ನಾಯಕ್
   ಆ. ವಕ್ರೀಭವನ – ಲಲಿತಾ ಸಿದ್ದಬಸವಯ್ಯ
2. ಹಬ್ಬ ಮತ್ತು ರಥೋತ್ಸವ – ಗೊರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್

ಮೂರನೆಯಯ ಚತುರ್ಮಾಸ ಬಿ.ಬಿ.ಎ 2022–23ನೇ ಸಾಲಿನ ಕನ್ನಡಭಾಷಾ ಪಠ್ಯಕ್ರಮ

ನಿರ್ವಹಣಾ ಗಂಗೋತ್ರಿ –03 ಎನ್.ಇ.ಪಿ ಪಠ್ಯಕ್ರಮ

ಘಟಕ : 1 ಸಮಾಜ

1. ಪುರಂದರದಾಸರ ಕೀರ್ತನೆಗಳು – ಪುರಂದರದಾಸರು
2. ಧಣಿಗಳ ಬೆಳ್ಳಿಲೋಟ – ಎಚ್. ನಾಗವೇಣಿ
3. ಔದಾರ್ಯಕ್ಕೆ ಕೊನೆಯುಂಟೆ – ತ.ಸು. ಶಾಮರಾವ್

ಘಟಕ : 2 ವೈಚಾರಿಕತೆ

1. ಅ) ಬ್ಯಾಡ ಬ್ಯಾಡಪ್ಪ ನಮಗಿದು ಸರಿಯಿಲ್ಲ – ಜನಪದ ಮಹಾಭಾರತ
   ಆ) ಅತಿಹಿತದಲಿ ನೀವಿಯಹುದು – ಕನಕದಾಸರು
2. ದೇವರ ಹೆಣ – ಕುಂ. ವೀರಭದ್ರಪ್ಪ

ಘಟಕ : 3 ಜೀವನ ಮತ್ತು ಕಲೆ

1. ಅ. ನುಡಿಬೇಕು ಮೌನವೂ ಬೇಕು – ರತ್ನಾಕರವರ್ಣಿ
   ಆ. ಕಳವಳವ ನೀಗಿ ಬಿಡು – ಡಿ.ವಿ. ಗುಂಡಪ್ಪ
2. ಡಾ. ರಾಜ್‌ಕುಮಾರ್ : ನಾಡಿನ ನುಡಿ – ದೊಡ್ಡಹುಲ್ಲೂರು ರುಕ್ಕೋಜಿ

ಘಟಕ : 4 ಸಂಕೀರ್ಣ

1. ಅ. ಪರಹಿಂಸೆಯಂ ಮಾಡಿ ಮಾನವಂ ಬಾಳ್ದಪನೆ – ಲಕ್ಷ್ಮೀಶ
   ಆ. ಮನೆವೆಳಸಿದವೊಲು ನಡೆಯದಿರು – ನಂಜುಂಡ ಕವಿ
2. ವ್ಯಥಾ ಇತಿಹಾಸವನು ಕೆಣಕದಿರು – ಡಾ. ರಾಗೌ

ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ ಬಿ.ಬಿ.ಎ 2022–23ನೇ ಸಾಲಿನ ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ

ನಿರ್ವಹಣಾ ಗಂಗೋತ್ರಿ – 4 ಎಸ್.ಇ.ಪಿ. ಪಠ್ಯಕ್ರಮ

ಘಟಕ : 1 ಯುದ್ಧ

1. ಇವರ ಯುದ್ಧವೆಂಬುದತಿ ಕ್ರೂರಗ್ರಹ ಯುದ್ಧದಂತೆ – ಪಂಪ
2. 'ಶ್ಮಶಾನ ಕುರುಕ್ಷೇತ್ರಂ' ನಾಟಕದಿಂದ ಆಯ್ದಭಾಗ – ಕುವೆಂಪು
3. ನಾಗೇಶ ಹೆಗ್ಗಡೆ ಅವರ ಕೃತಿಯಿಂದ ಆಯ್ದ ಲೇಖನ – ನಾಗೇಶ ಹೆಗ್ಗಡೆ

ಘಟಕ : 2 ರಾಷ್ಟ್ರೀಯತೆ

1. ಅ. ಕನ್ನಡಮೆನ್ನಿಪ್ಪಾ ನಾಡು ಬೆಲ್ಲಾಯ್ತು – ಆಂಡಯ್ಯ
   ಆ. ಕಿತ್ತೂರ ಚೆನ್ನಮ್ಮ – ಜನಪದ ಕವಿ
2. ಸೆರೆಯಿಂದ ಹೊರಗೆ – ಬಸವರಾಜ ಕಟ್ಟಿಮನಿ

ಘಟಕ : 3 ಶಾಂತಿ

1. ಅ) ಶ್ರೀಕೃಷ್ಣ ರಾಯಭಾರ ಪ್ರಸಂಗ – ಕುಮಾರವ್ಯಾಸ
   ಆ) ಗೋಲ್ಗೊಥಾ – ಎನ್. ಗೋವಿಂದ ಪೈ
2. ವಚನಭಾರತದಿಂದ ಆಯ್ದಭಾಗ – ಎ.ಆರ್. ಕೃಷ್ಣಶಾಸ್ತ್ರೀ

ಘಟಕ : 4 ಸಂಕೀರ್ಣ

1. ಅ) ಶಾಸನ ಸಂಸ್ಕೃತಿ – ಶಾಸನ ಪದ್ಯಗಳು
   ಆ) ಕನ್ನಡ ನಾಡು–ನುಡಿ – ಶ್ರೀವಿಜಯ
2. ಅಗ್ನಿರೆಕ್ಕೆಗಳು – ಎ.ಪಿ.ಜೆ. ಅಬ್ದುಲ್‌ಕಲಾಂ

ಮೂರನೆಯ ಚತುರ್ಮಾಸ ಬಿ.ಸಿ.ಎ 2022–23ನೇ ಸಾಲಿನ ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ

ಗಣಕ ಗಂಗೋತ್ರಿ – 3 ಎನ್.ಇ.ಪಿ ಪಠ್ಯಕ್ರಮ

ಘಟಕ – 1 ದೈನಂದಿನ ಲಯ

1. ಅ. ಜನಪದ ತ್ರಿಪದಿಗಳು – ಅಜ್ಞಾತ ಕವಿ
   ಆ. ರಾಮನ್ ಸತ್ತ ಸುದ್ದಿ – ಕೆ.ಎಸ್. ನಿಸಾರ್ ಅಹಮದ್
2. ತಟ್ಟೆಯ ಕೊನೆ ಅಗುಳು – ಸುನಂದಾ ಕಡಮೆ

ಘಟಕ – 2 ಸೌಹಾರ್ದ

1. ಅ. ಎಲುಬಿನ ಹಂದರದೊಳಗೆ – ಮೂಡ್ನಾಕೂಡು ಚಿನ್ನಸ್ವಾಮಿ
   ಆ. ಹೊಸ ಗಾಳಿ ಬಂತಣ್ಣ – ಎಚ್.ಎಲ್. ಪುಷ್ಪ
2. ಕಾಗೆ – ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ

ಘಟಕ – 3 ಸ್ವಾತಂತ್ಯ

1. ನಲವತ್ತೇಳರ ಸ್ವಾತಂತ್ರ್ಯ – ಸಿದ್ದಲಿಂಗಯ್ಯ
2. ಮಾಡಿ ಮಡಿದವರು (ಕಾದಂಬರಿಯ ಆಯ್ದ ಭಾಗ) – ಬಸವರಾಜ ಕಟ್ಟಿಮನಿ
3. ಗಿರಿಜವ್ವನ ರೊಟ್ಟಿ – ಅ.ನ.ಕೃ

ಘಟಕ – 4 ಸಂಕೀರ್ಣ

1. ಅ. ಸಾರಥಿಯಾಗು ನಡೆ – ಕುಮಾರವ್ಯಾಸ
   ಆ. ಸೋಮೇಶ್ವರ ಶತಕ – ಸೋಮೇಶ್ವರ
2. ನಿಷಿದ್ಧ ಗಡಿಗಳ ದಾಟಿದ ಡಾ. ರುಕ್ಮಾಬಾಯಿ – ಡಾ.ಎಚ್.ಎಸ್. ಅನುಪಮ

ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ ಬಿ.ಸಿ.ಎ 2022–23ನೇ ಸಾಲಿನ ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ

ಗಣಕ ಗಂಗೋತ್ರಿ – 4 ಎನ್.ಇ.ಪಿ ಪಠ್ಯಕ್ರಮ

ಘಟಕ – 1 ನಾಗರಿಕತೆ

1 ಅ. ಇಟ್ಟಿಗೆಯ ಪುಟ್ಟಣ್ಣ – ಚಂದ್ರಶೇಖರ ಕಂಬಾರ

ಆ. ಒಂದು ಸರೀ ಕಡ್ಡಿಗಾಗಿ – ಜಯಂತಕಾಯ್ಕಿಣಿ

2. ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಗರಿಕತೆ – ಭಾನುಮುಸ್ತಾಕ್

ಘಟಕ – 2 ಅಭಿವೃದ್ಧಿ

1. ಅ. ಮುಂಬೈ ಜಾತಕ – ಜಿ. ಎಸ್. ಶಿವರುದ್ರಪ್ಪ

ಆ. ಪರದೆ ಸರಿದಂತೆ – ಡಿ. ಬಿ. ರಜಿಯಾ

2. ಡಾಂಬರು ಬಂದುದು – ದೇವನೂರು ಮಹಾದೇವ

ಘಟಕ – 3 ಕರುಣೆ

1. ಅ. ಉಪಕಾರಿಯಾದವಂ ತನ್ನ ನೋವಂ ನೋಳ್ಪನೆ

(ಜೈಮಿನಿ ಭಾರತ ಕಾವ್ಯದ ಆಯ್ದಭಾಗ) – ಲಕ್ಷ್ಮೀಶ

ಆ. ಗೋವಿನ ಹಾಡು – ಚನ್ನಪಟ್ಟಣ ವಾಸುದೇವರಾಯ

2. ಕೊನೆಯ ಗಿರಾಕಿ – ನಿರಂಜನ

ಘಟಕ – 4 ಸಂಕೀರ್ಣ

1. ಅ. ಬಾಹುಬಲಿಯ ವೈರಾಗ್ಯಂ – ಪಂಪ

ಆ. ಎರಡು ಗಿಳಿಗಳ ಕಥೆ (ಪಂಚತಂತ್ರ) – ದುರ್ಗಸಿಂಹ

2. ಚಾಪ್ಲಿನ್ (ಆಯ್ದಭಾಗ) – ಕುಂ. ವೀರಭದ್ರಪ್ಪ

ಯುವರಾಜ ಕಾಲೇಜು

ಹೊಸ ಶಿಕ್ಷಣ ನೀತಿ (NEP-201-22)

ಕನ್ನಡ ಭಾಷಾ ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ

ಕನ್ನಡ ಭಾಷಾ ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ (ಬಿ.ಎಸ್ಸಿ. 5 ವರ್ಷದ ಸಂಯೋಜಿತ ಅಣುಜೀವಶಾಸ್ತ್ರ ಬಿ.ಬಿ.ಎ ಮತ್ತು ಬಿ.ಸಿ.ಎ)

(1,2,3 ಮತ್ತು 4ನೇ ಚತುರ್ಮಾಸದ ಎಲ್ಲಾ ಪದವಿ ಕೋರ್ಸ್‌ಗಳಿಗೆ ಅನ್ವಯ)

ಅವಧಿ: 2 ಗಂಟೆ **ಗರಿಷ್ಠ ಅಂಕಗಳು: 60**

1) ಅ) ಒಂದು ಭಾಗದ ಭಾವವನ್ನು ಸಂದರ್ಭ ಸಹಿತ ವಿವರಿಸಿ ಎರಡು ಕವನದ ಖಂಡಿಕೆಗಳನ್ನು ಕೊಡಬೇಕು. 04

ಆ) ಆರು ಪದಗಳಿಗೆ ಅರ್ಥ ಬರೆಯಿರಿ ಹತ್ತು ಪದಗಳನ್ನು ಕೊಡಲಾಗುತ್ತದೆ. (½ x6)=3

ಇ) ಎರಡು ವಿಷಯಗಳನ್ನು ಕುರಿತು ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ ಮೂರು ವಿಷಯಗಳನ್ನು ಕೊಡಲಾಗುತ್ತದೆ. (1½ x2)=3

2) ಅ) ನಾಲ್ಕು ವಾಕ್ಯಗಳ ಸಂದರ್ಭ ಸ್ವಾರಸ್ಯವನ್ನು ವಿವರಿಸಿ ಆರು ವಾಕ್ಯಗಳನ್ನು ಕೊಡಲಾಗುತ್ತದೆ. (2½ x4)=10

3) ಅ) ಒಂದು ಪ್ರಶ್ನೆಗೆ ಸಂಕ್ಷಿಪ್ತವಾಗಿ ಉತ್ತರಿಸಿ. ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ. (1 ಮತ್ತು 2ನೇ ಘಟಕದಿಂದ) 05

ಆ) ಒಂದು ಪ್ರಶ್ನೆಗೆ ಸಂಕ್ಷಿಪ್ತವಾಗಿ ಉತ್ತರಿಸಿ. ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ. (3 ಮತ್ತು 4ನೇ ಘಟಕದಿಂದ) 05

4) ಅ) ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿ. ಐದು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೊಡಲಾಗುತ್ತದೆ. (1x5)=5

ಆ) ಬಿಟ್ಟಿರುವ ಸ್ಥಳಗಳನ್ನು ಭರ್ತಿಮಾಡಿ. (1x5)=5

5) ಅ) ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ. ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ. 10
(1 ಮತ್ತು 2ನೇ ಘಟಕದ ಲೇಖನ ಮತ್ತು ಸಣ್ಣಕಥೆ ಮತ್ತು ಕಾದಂಬರಿ ಭಾಗದಿಂದ ಆಯ್ಕೆ ಮಾಡಿಕೊಳ್ಳಲಾಗುತ್ತದೆ.)

ಆ) ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ. ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ. 10
(3 ಮತ್ತು 4ನೇ ಘಟಕದ ಲೇಖನ, ಸಣ್ಣಕಥೆ ಮತ್ತು ಕಾದಂಬರಿ ಭಾಗದಿಂದ ಆಯ್ಕೆ ಮಾಡಿಕೊಳ್ಳಲಾಗುತ್ತದೆ.)

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	AECC: (L1–1): Sanskrit (3+0+0)	**4**	**3**	**40**	**60**
II	AECC: (L1–2): Sanskrit (3+0+0)	**4**	**3**	**40**	**60**

I Semester Sanskrit

Learning Objectives:

- It gives introduction to Sanskrit poetry.
- It inspires to read the Raghuvamsham Mahakavyam.
- It helps to build the foundation for Sanskrit vocabulary.
- It supports the formation of sentences in Sanskrit.
- It assists in comprehension skills.

Learning Outcomes:

- The student gets motivated to compose poems.
- The student imbibes the noble qualities.
- The student develops conviction inscriptures.
- The student learns Sanskrit speaking skills.
- The student will be confident in learning new texts of Sanskrit.

II Semester Sanskrit

Learning Objectives:

- It gives introduction to Sanskrit prose.
- It inspires to read the complete BharataSangraha.
- It helps to gain the knowledge about various forms of nouns.
- It supports the formation of sentences in Sanskrit.

- ❖ It assists in translation skills.

Learning Outcomes:

- ➢ The student gets motivated to make out similar works in Sanskrit literature.
- ➢ The student imbibes the noble qualities depicted in Sanskritliterature.
- ➢ The student acquires grammatical skills.
- ➢ The student learns Sanskrit speaking skills.
- ➢ The student will be confident in learning new texts of Sanskrit.

NEP Syllabi For B.Sc. III Semester, Sanskrit Language

Yuvaraja's College, Mysuru. Academic Year : 2022-23

Ability Enhancement Compulsory Course – 3 Credits

B.Sc / BBA / BCA / Molecular Biology

- Title : Sanskrit Champu Kavya and Grammar [L+T+P] [3+1+0]

Unit-1

Introduction to Classical Sanskrit Literature with special reference to Champu Kavya and it's Lakshanas, Introduction to Author and Text. 15 Marks

Unit-2

Sundarakandam from Champu Ramayana of King Bhoja. 40 Marks

Unit-3

- Grammar : Selected Alankara – Upama, Roopakam, Ananvaya, Utpreksha and Shlesha. 5 Marks

Internal Assessment [Test + Assignment, Test+Seminar] 40 Marks

Total 100 Marks

Learning Objectives –

1. It gives introduction to Sanskrit Champu Kavya.
2. It inspires to read the Champu Ramayana-Sundara Kandam.
3. It helps to build the foundation for Sanskrit vocabulary.
4. It supports the formation of sentences in Sanskrit.
5. It assists in comprehension skills.

Learning Outcomes –

1. The student gets motivated to compose poems.
2. The student imbibes the noble qualities.
3. The student develops conviction in scriptures.
4. The student learns Sanskrit speaking skills.
5. The student will be confident in learning new texts of Sanskrit.

Recommended Learning Resources [Printed Text Books] –

1. Samskrita Bhashashastra Mattu Sahitya Charitre - Dr. K. Krishnamurthy, Vidwan Ranganathasharma and Vidwan H.K. Siddagangaiah. (Page 663-704).
2. Champu Ramayana Sundara kandam – Publication Prasaranga, University of Mysore-1995.
3. Kuvalayananda of Appayya Dixith.

Digital Resources : www.archieve.org https://www.wikipedia.org/

NEP Syllabi For B.Sc. IV Semester, Sanskrit Language

Yuvaraja's College, Mysuru. Academic Year : 2022-23

Ability Enhancement Compulsory Course – 3 Credits

B.Sc / BBA / BCA / Molecular Biology

- Title : Sanskrit Drama and Dramaturgy. [L+T+P] [3+1+0]

Unit-1

Introduction to Sanskrit Drama and Dramaturgy origin and development of Sanskrit Drama – Dasha-Rupakas and their Lakshanas, Important Drushya Kavyas (Dramas) and Dramatists in Sanskrit Literature. 15 Marks

Unit-2

Introduction to Author and Text, Appropriateness of title, background of given contents. Malavikagnimitram of Kalidasa. 40 Marks

Unit-3

- Chandas : Trishtup and it's varieties. 5 Marks

Internal Assessment [Test + Assignment, Test+Seminar] 40 Marks

Total 100 Marks

Learning Objectives –

1. It gives introduction to Sanskrit Drama.
2. It inspires to read the complete Malavikagnimitram of Kalidasa.
3. It helps to gain the knowledge about various forms of nouns.
4. It supports the formation of sentences in Sanskrit.
5. It assists in comprehension skills.

Learning Outcomes –

1. The student gets motivated to make out similar works in Sanskrit Drama.
2. The student imbibes the noble qualities depicted in Sanskrit literature.
3. The student acquires grammatical skills.
4. The student learns Sanskrit speaking skills.
5. The student will be confident in learning new texts of Sanskrit.

Recommended Learning Resources [Printed Text Books] –

1. Samskrita Nataka - By A. R. Krishna Shastry, Prasaranga, University of Mysore, 1988. (page 1-58)
2. Malavikagnimitra, Prasaranga, University of Mysore, 1985.
3. Vrutta-Ratnakara, By Bhatta Kedara, Motilal Banarasidas Publication, New Delhi. 1993.
4. Dasha-Rupakam of Dhananjaya.

Digital Resources : www.archieve.org https://www.wikipedia.org/

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युवराजमहाविद्यालयः, मैसूरुनगरम् ।

(A constituent Autonomous College with Potential for Excellence)

(Re-Accredited "A" Grade with CGPA 3.34 by NAAC)

Department of Sanskrit [Year-2022-23]

संस्कृतविभागः

NEP syllabus and Question paper pattern are applied. for I and II semesters of BSc, BCA, and BBA in the Academic Year 2021-22.

NEP QUESTION PAPER PATTERN

For Ability Enhancement Compulsory Course

B.Sc. / B.B.A. / B.C.A

Qn. No	Particulars		Marks	Total
	SECTION-A			
I	Objective Type Questions (Compulsory)	10 out of 10	1	10
II	Referenceto Context	2 out of 4	5	10
	SECTION-B			
III	Short Answer Questions	4 out of 7	5	20
	SECTION-C			
IV	Essay Type Answer Questions	2 out of 4	10	20
			Total	60
	Internal Assessment			
C1	Test	1	15	15
C2	Assignment	1	15	15
C3	Seminar	1	10	10
			Total	40

Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/ Paper (L+T+P)	Teaching hours/	Credits	Internal Assessment	Semester End Examination
		week		Marks (C1 + C2)	Marks (C3)
I	AECC: (L1–1): Hindi (3+0+0)	4	3	40	60
II	AECC: (L1–2): Hindi(3+0+0)	4	3	40	60

Syllabus for Ability Enhancement Compulsory Course

B.Sc. (AECC)

B.Sc. Ability Enhancement Compulsory Course

III Semester B.Sc

Title of the Subject/ Discipline: हिंदी नाटक साहित्य+ संचार माध्यम और हिंदी				
Semester	**III**	Course Code : AECC-1-HINDI (B.Sc.) Course Title/Discipline : Collection of Short Stories+ Media Writing Text - सात एकांकी- डॉ. सूर्यप्रसाद दीक्षित - अमन प्रकाशन, कानपुर	**Credits**	**3**
			Hours	**4**
Formative Assessment Marks:40		**Summative Assessment Marks:60**		**Duration of ESA:64hrs.**
LearningOutcomes	• एकांकी स्वरूप को समझने की योग्यता निर्माण होगी । • एकांकी के मंचन में रुचि निर्माण होगी । • संचार माध्यमों में हिंदी के अनुप्रयोग और महत्व को समझ पाएंगे ।			
UnitNo.	**Course Content**		Suggested Pedagogy	Hours Per week
Unit I	हिंदी आकांकी का उद्भव और विकास		• व्याख्यान • संवाद एवं बहस • सामूहिक चर्चा • समाचार पत्र में रिपोर्टिंग का अभ्यास	**16**
Unit II	प्रत्येक एकांकी का अध्ययन			**16**
Unit III	एकांकी का विश्लेषण			**16**
Unit IV	संचारमाध्यमों में हिंदी का प्रयोग एवं अनुप्रयोग			**16**
Recommended Leaning Resources				
Print Resources				
Digital Resources	https://hi.wikipedia.org/wiki/{dYm			

IV Semester B.Sc.

Title of the Subject / Discipline: हिंदी लघु उपन्यास + भाषा के विविध रूप (कार्यालयी भाषा, मीडिया की भाषा, वाणिज्य की भाषा, मशीनी भाषा)				
Semester	**IV**	**Course Code : AECC-1-HINDI (B.Sc.) Course Title/Discipline : Collection of Short Stories+ Media Writing** **Text** -मोबाईल– क्षमा शर्मा– राजकमल प्रकाशन– नई दिल्ली	**Credits**	**3**
			Hours	**4**
Formative Assessment Marks:40 Summative Assessment Marks:60			**Duration of ESA:64hrs.**	
LearningOutcomes	• उपन्यास स्वरूप को समझने की योग्यता निर्माण होगी। • उपन्यास लेखन में रुचि निर्माण होगी। भषा के विविध रूपो स परिचिय होंगे			
UnitNo.	**Course Content**		**Suggested Pedagogy**	**Hours Per week**
Unit I	हिंदी उपन्यास का उद्भव और विकास, तत्व एवं स्वरूप		• व्याख्यान • संवाद एवं बहस • सामूहिक चर्चा • समाचार पत्र में रिपोर्टिंग का अभ्यास	**16**
Unit II	मोबाईल उपन्यास का अध्ययन एवं विश्लेषण			**16**
Unit III	उपन्यास का समग्र अध्ययन			**16**
Unit IV	भाषा के विविध रूपों का परिचय			**16**

Syllabus for Ability Enhancement Compulsory Course

B.B.A. (AECC)

B.B.A. Ability Enhancement Compulsory Course

III Semester B.B.A.

Title of the Subject / Discipline : हिंदी कहानी और अनुवाद अभ्यास				
Semester	**III**	Course Code : AECC-1-HINDI (B.B.A) Course Title/Discipline : Collection of Short Stories+ Media Writing Text-प्रतिनीधि कहानियाँ- संपा. डॉ. राजेन्द्र पोवार- राजकमल प्रकाशन, नई दिल्ली	**Credits**	3
			Hours	4
Formative Assessment Marks:40		**Summative Assessment Marks:60**		**Duration of ESA:04hrs.**
Learning Outcomes	● हिंदी कहानी के स्वरूप को समझने की योग्यता निर्माण होगी। ● कहानी लेखन पठन में रुचि निर्माण होगी। ● अनुवाद करने में योग्यता प्राप्त होगी			
Unit No.	**Course Content**		Suggested Pedagogy	Hours Per week
Unit I	हिंदी कहानी का उद्भव और विकास		• व्याख्यान • संवाद एवं बहस • सामूहिक चर्चा • समाचार पत्र में रिपोर्टिंग का अभ्यास	16
Unit II	प्रत्येक कहानी का कथ्यगत अध्ययन			16
Unit III	कहानी का विश्लेषण			16
Unit IV	अनुवाद अभ्यास, अनुवाद के प्रकार, अनुवाद की परिभाषा, अनुवाद का महत्त्व , अनुवाद की आवश्यकता ।			16
Recommended Learning Resources				
Print Resources	व्यावहारिक अनुवाद – भोलानाथ तिवारी			
Digital Resources	https://hi.wikipedia.org/wiki/%E0%A4%85%E0%A4%A8%E0%A5%81%E0%A4%B5%E0%A4%BE%E0%A4%A6			

IV semester B.B.A.

Title of the Subject/ Discipline: हिंदी नाटक साहित्य+ अंतर्जाल पर पत्रिकाएँ, चिट्ठा लेखन				
Semester	IV	Course Code : AECC-1-HINDI (B.B.A) Course Title/Discipline : Collection of Short Stories+ Media Writing Text -एकांकी सप्तक – डॉ चम्पा श्रीवास्तव– प्रो. राजेन्द्र कुमार– लोकभारती प्रकाशन नई दिल्ली	Credits	3
			Hours	4
Formative Assessment Marks:40 Summative Assessment Marks:60 Duration of ESA:04hrs.				
Learning Outcomes	• नाटक स्वरूप को समझने की योग्यता निर्माण होगी। • • नाटक के मंचन में रुचि निर्माण होगी । • अंतर्जाल पर पत्रिकाएँ, चिट्ठा लेखन पर जानकारी मिलेगी ।			
Unit No.	Course Content		Suggested Pedagogy	Hours Per week
Unit I	हिंदी नाटक का उद्भव और विकास, तत्व एवं स्वरूप		• व्याख्यान • संवाद एवं बहस • सामूहिक चर्चा • समाचार पत्र में रिपोर्टिंग का अभ्यास	16
Unit II	ताजमहल का टेंडर का अध्ययन एवं विश्लेषण			16
Unit III	नाटक का समग्र अध्ययन			16
Unit IV	अंतर्जाल पर पत्रिकाएँ, चिट्ठा लेखन			16
Recommended Learning Resources				
Print Resources	इंटरनेट और हिंदी-डॉ. बसवराज बारकेर			
Digital Resources	https://hi.wikipedia.org/wiki/jdYm			

Syllabus for Ability Enhancement Compulsory Course
B.C.A. (AECC)
B.C.A, Ability Enhancement Compulsory Course

B.C.A. III semester

TitleoftheSubject/Discipline: हिंदी कविता और कंप्युटर और हिंदी				
Semester	**III**	Course Code : AECC-1-HINDI (B.C.A) Course Title/Discipline : Collection of Short Stories+ Media Writing Text -काव्य पारासर- डॉ. भोलानाथ- जवाहर पुस्तकाल- मथुरा	**Credits**	**3**
			Hours	**4**
Formative Assessment Marks:40		**Summative Assessment Marks:60**		**Duration of ESA:64hrs.**
Learning Outcomes	• हिंदी कविता के स्वरूप को समझने की योग्यता निर्माण होगी। • कविता लेखन और पठन में रुचि निर्माण होगी। • कंप्युटर के अनुप्रयोग को समझेंग			
UnitNo.	**Course Content**		Suggested Pedagogy	Hours Per week
Unit I	हिंदी कविता का का उद्भव और विकास		• व्याख्यान • संवाद एवं बहस • सामूहिक चर्चा • समाचार पत्र के रिपोर्टिंग का अभ्यास	**16**
Unit I	प्रत्येक कविता का अध्ययन			**16**
Unit III	कविता का विश्लेषण एवं काव्य सौष्ठव			**16**
Unit IV	कंप्युटर और हिंदी का प्रयोग एवं अनुप्रयोग			**16**
Recommended Leaning Resources				
Print Resources				
Digital Resources	https://hi.wikipedia.org/wiki/{dYm			

MALAYALAM LANGUAGE SYLLABUS

I Semester BA/ BSc/ BSW/BPA/BSc [FcSc]

MalayalamLanguage- Paper-1 (Part -1) Syllabus and Text Books Under NEP, W.E.F 2021-22

Credits:3(2L+1T) Max.Marks:100 Contac

hours per week:4 C1+C2=40

Exam Duration: 3 hours C3=60

Sl No	Content	Hrs
1	Unit 1 - Medieval Poetry Magdalana Mariyum Vallathol Narayana Menon	16
2	Unit 2 - Prose BharathaPariadanam By KuttikrishnaMaarar Following Essays 1. Amba 2. Karnante Arangettam 3. vyasante chiri	15
3	Unit 3 - Novel Intuppooppakkoranenendarnu By Vaikkam Muhammad Basheer	15
4	Functional Malayalam 1. Padasudhi 2. Vakya sudhi 3. Asayavipulanam	10

Total Contact Hours 56

MALAYALAM LANGUAGE SYLLABUS

II Semester BA/ BSc/ BSW/BPA/BSc [FcSc]

MalayalamLanguage- Paper-1 (Part -1) Syllabus and Text Books Under NEP, W.E.F 2021-22

Credits:3(2L+1T) Max.Marks:100 Contac

hours per week:4 C1+C2=40

Exam Duration: 3 hours C3=60

Sl No	Content	Hrs
1	Unit 1 – Poetry Vailoppilli Sreedharamenon 1. Mala Thurakkal 2. AassamPanikkaar 3. Kakka	16
2	Unit 2 Autobiography - Kanneerum Kinavum V.T Bhattahirippad 1. Kanneerum kinavum 2. valarnnuvarunna orathmavu	14
3	Unit 3 – Short Stories 1. Marappavakal KaroorNeelakandaPilla 2. Kazhcha M.T Vasudevan 3. Moonamathoral Mundur Krishnan Kutty 4. Parudeesa Nashtam Subhash Chandran	16
4	Functional Malayalam 1. Report writing 2. Interview	10

Total Contact Hours 56

TAMIL LANGUAGE SYLLABUS
First Semester B.Sc/B.Sc(FAD) /B.Sc(FCSc)
Tamil Language- Paper-1
(Part -1)
Syllabus and Text Books Under NEP, W.E.F 2021-22

Credits:3(2L+1T)	Max.Marks:100
Contact hours per week:4	C1+C2=40
Exam Duration: hours	C3=60

Course Outcomes (Cos):

1. Understand about the God, we can see like as Friend, workers etc.
2. Understand the special nature of Tamil Poets and Tamil kings of Ancient
3. Gain knowledge about ethics.
4. Understand the usage of correct Tamil letters and its pronunciation.
5. Gain creative skills.

Pedagogy:

1. Lecture Method
2. Discussion method.
3. Using board
4. Using PPT and showing videos.

TAMIL LANGUAGE SYLLABUS
Second Semester BSC /BSC (FAD)/B.Sc(FCSc) Tamil Language- Paper-II
(Part -1)
Syllabus and Text Books Under NEP, W.E.F 2021-22

Credits:3(2L+1T)	Max.Marks:100
Contact hours per week:4	C1+C2=40
Exam Duration: hours	C3=60

Course Outcomes (Cos):

1. Be well versed with the modern ethics.
2. Students would realize that where the true friendship.
3. Students can understand the good culture and family relationship through Kuravanchi literature.
4. Understand proper usage of words
5. Establish that Novels are the timepiece of a society.

Pedagogy:

1.Lecture Method
2.Board using
3.Discussion method
4.PPT& Videos using

Syllabus

(III & IV Semester)

INDIA AND INDIAN CONSTITUTION

(Revised on November 23, 2022)

INDIA AND INDIAN CONSTITUTION

Ability Enhancement Compulsory Courses (AECC)	
Course Title: INDIA AND INDIAN CONSTITUTION	
Total Contact Hours: **45**	Course Credits: 3
No. of Teaching Hours/Week:3	Duration of ESA/Exam: 2 **Hours**
Formative Assessment Marks: 40	Summative Assessment Marks: **60+40=100**

Course Objective

The purpose of the course is to help students to learn and explain the journey of India as a republic. They will, through this paper learn to contextualise the depth of India as a nation with its diverse socio-political culture, its philosophical traditions, values and Ideals. It will give them knowledge to expound the breadth of freedom struggle in various parts of India, its significance in nation building and the sacrifices made both by its leaders and followers. It will help them to demonstrate their knowledge regarding the efforts made at working towards a constitution as India's conscience cherishing the values of Justice, Liberty, Equality and Fraternity. Consequently it will enable students to contextualise the powers and functions of various offices under the Constitution. It will help them determine the role and responsibilities of citizens as enshrined in the Constitution, offering insights in to the contributions of personalities like Gandhiji, Dr B.R.Ambedkar and Jawahar Lal Nehru, Bal Gangadhar Tilak, the values tolerence, equality of treatment, scientific secularism and swarajya and the processes of policymaking keeping national wellbeing in the forefront. This paper will enable students to illustrate how vibrant our Constitution is, how farsighted were its makers and how efficient are the various institutions that are functioning under it.

Learning outcomes

Upon completion of this course students will be able to—

- Explain the philosophy and the structure of the Constitution.
- Measure the powers, functions and limitations of various offices under the Constitution.
- Demonstrate the values, ideals and the role of Constitution in a democratic India.

SEC: NSS - National Service Scheme Syllabus

University of Mysore

National Service Scheme

Syllabus

Semester: III	
Course Code: SECNSS3.1	**Course Title: Volunteerism and National Service Scheme**
Course Credits: 01	**Hours / week : 02**
Total contact hours: 32	**Evaluation : Max Marks 25**

Course Objectives:

- To understand the concept of Volunteerism
- To motivate the students to take part in voluntary community activities.
- To understand the organizational structure of National Service Scheme at different levels

Course Outcomes: At the end of this course students will be able to :

- Appreciate the spirit and purpose of Volunteerism.
- Know the organizational structure and its functions at national to Institutional level.
- Learn the skills of critical thinking and Decision making.
- Appreciate the culture of Shramadhan and its benefits through working as a team or group.

Ability Enhancement Compulsory Course (AECC)-
ENVIRONMENTAL STUDIES
Choice Based Credit System (CBCS) With Multiple Entries
And Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	DisciplineCore/Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	AECC: Environmental studies(2+0+0)	**3**	**2**	**20**	**30**
II	AECC: Environmental studies(2+0+0)	**3**	**2**	**20**	**30**

I SEMESTER

Environmental studies

Course Objectives:

- Environmental Studies (AECC) is made compulsory core module syllabus framed by UGC for all the Indian Universities as per the directions given by thehonor able Supreme court, which believed that, conservation of environment should be anational way of life and to be inculcated into the education process. The committee proposes a staggered implementation for this course. This facilitates the distribution of the teaching workload of aninstitution.
- To ensure the interdisciplinary spirit of the proposed curriculum, teaching must be carried out by the faculty who are trained at post-graduate(M.Sc.) and Ph.D. in the 'Environmental Science subject only. A candidate who is qualified with UGC- NET/K-SET in the area of Environmental Science will be well- equippedtoteach thiscurriculum.

Skill Enhancement Course (SEC)-DIGITAL FLUENCY

Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	Skill Enhancement Course (Skill Based) Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	SEC-1 (Skill Based): Digital Fluency (1+0+1)	**1 +2**	**2**	**20**	**30**
II	SEC-1 (Skill Based): Digital Fluency (1+0+1)	**1 +2**	**2**	**20**	**30**

I and II SEMESTERS
SEC-1 (SKILL BASED): DIGITAL FLUENCY (THEORY/PRACTICAL):
2 Credits **15 +30 Hrs.**

Course Outcomes: At the end of the course the student should be able to: Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course. 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 Cyber security.

- Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and team work.
- Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth.

Open Elective Papers Across the Faculty for B.Sc. (Basic/Hons.),BCA (Basic/Hons.), BBA (Basic/Hons.), and B.Sc. (Basic/Hons.)/Integrated M.Sc. (Five Years)Degree in MolecularBiology Programmes

Choice Based Credit System (CBCS) With Multiple EntriesAnd Exit Options under New Education Policy (NEP) – 2020

(2021-22 Batch Onwards)

Details of Course of Study: I and II Semesters

Sem.	Open Elective Papers (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	OE-1: Human Rights (Political Science) (3+0+0)	3	3	40	60
	OE-2: Human Resources Management (Public Administration) (3+0+0)	3	3	40	60
	OE-3: Public Personnel Administration (Public Administration) (3+0+0)	3	3	40	60
II	OE-1: Indian Polity: Issues and Concerns (Political Science) (3+0+0)	3	3	40	60
	OE-2: International Relations (Political Science) (3+0+0)	3	3	40	60
	OE-3: Management of NGO's (Public Administration) (3+0+0)	3	3	40	60
	OE-4: State Administration (Public Administration) (3+0+0)	3	3	40	60

I SEMESTER

OE-1: HUMAN RIGHTS (THEORY): 3 Credits 45 Hrs.

CourseOutcome: This course aims to introduce the students to basic concepts and practices of Human Rights in the global and local domain. This course also exposes them to certain recent issues confronting the Human Rights debates.

Learning Outcome: After completing this course student will be able to;

- Explain the basic concept of Human Rights and its variousformulations.
- Have necessary knowledge and skills for analyzing, interpreting, andapplyingthe Human Rights standards and sensitize them to theissues.
- Develop ability to critically analyse Human Rights situations aroundthem.

OE-2: HUMAN RESOURCES MANAGEMENT (THEORY): 3 Credits 45 Hrs.

Objective: To help students understand, appreciate and analyze work force at the managerial and non-managerial levels. The course also facilitates learning of various concepts, new trends and skills required for Planning, managing and development of human resources for organizational effectiveness.

Learning Outcome: At the end of the course the students shall;

- Understand the scope and importance of Human Resource Management.
- Develop ability to take appropriate decisions in Human Resource Management.
- Understand the process involved in the Recruitment, Training, ManagingDiscipline and Grievance.

OE-3: PUBLIC PERSONNEL ADMINISTRATION (THEORY): 3 Credits 45 Hrs.

Objective: This course will aim at creating awareness about the evolution and growth of the discipline. To make students learn about basic principles of Public Personnel Administration. and to give clarity of basic concepts.

Learning Outcome: At the end of the course the students shall;

- To explain the basic concepts of Public Personnel Administration.
- To know the methods of recruitment of Public Servants.
- Understand the Rights and Duties of Employee.

II SEMESTER

OE-1: INDIAN POLITY: ISSUES AND CONCERNS (THEORY): 3 Credits 45 Hrs.

Course Outcome: To make the students aware on different issues that exists in Indian polity. Through this paper student need to understand the emerging issues and their

causes to the Indian Democracy.

Learning Outcome: After completing this course student will be able to;

- Understand the reasons behind the causes of these issues and also the constitutional provisions that existed.
- Familiarize with the debates that emerged.
- Be able to suggest the measures to control such issues.

OE-2: INTERNATIONAL RELATIONS (THEORY): 3 Credits 45 Hrs.

Course Outcome: This course aims to introduce the students to basic concepts, Institutions and Issues of Global Politics. This course also exposes them to the Understanding OF Power Politics of Regional and Global level.

Learning Outcome: After completing this course student will be able to;

- Understand and reflect on basic concepts, Institutions and Issues of International Relations Global Politics.
- Develop and deepen the sense of Cosmopolitanism
- To acquire General knowledge for Competitive exam.

OE-3: MANAGEMENT OF NGO'S (THEORY): 3 Credits 45 Hrs.

Course Objectives: To acquire specific knowledge on NGO management. To understand the basic concepts and principles involved in managing NGOs. To understand the Project Management Dimensions, Planning and its implementation. To enhance skills and techniques for Resource Mobilization.

Learning Outcome: After completing this course student will be able to;

- Learn the functions of NGO management along with its legal structure.
- Understand about Project management Dimensions, Planning and its implementation.
- Acquire the Skills and techniques of project evaluation / Resource Mobilization.

OE-4: STATE ADMINISTRATION (THEORY): 3 Credits 45 Hrs.

Course Objectives: This course will aim at creating awareness about the evolution and growth of the discipline. To make students learn about basic ideas of State Administration. And to give clarity of basic concepts.

Learning Outcome: After completing this course student will be able to;

- To explain the basic concepts of state administration.
- To know the working of state administration.
- To know the role played by different authorities in state administration.

Open Elective Papers of Physical Education for B.Sc. (Basic/Hons.),BCA (Basic/Hons.), BBA (Basic/Hons.), and B.Sc. (Basic/Hons.)/Integrated M.Sc. (Five Years)Degree in Molecular Biology Programmes
Choice Based Credit System (CBCS) With Multiple EntriesAnd Exit Options under New Education Policy (NEP) – 2020
(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	Open Elective Papers (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)	Semester End Examination Marks (C3)
I	OE-1: Self Defence (1+0+2)	1 + 4	3	40	60
	OE-2: Sports Event Management (2+0+2)	2 + 2	3	40	60
	OE-3: Yoga and Fitness (1+0+2)	1 + 4	3	40	60
II	OE-4: Adventurous Sports(3+0+0)	1 + 4	3	40	60
	OE-5: Physical Fitness for	1 + 4	3	40	60
	Careers (3+0+0)				
	OE-6: Sports and Recreation(3+0+0)	1 + 4	3	40	60

1. **Program Structures for the Five Year Integrated Programs in University of Mysore and Yuvaraja's college, Karnataka**

Bachelor of Molecular Biology (Basic/Hons.)/Integrated M.Sc.with Molecular Biology as core subject prepared based on Annexure 2 for Model structures (I. Model) for the Under-Graduate Programs in Universities and Colleges in Karnataka with required modifications to suit Five Year Integrated Program

Program structure and syllabus for Second Year (III and IV semester)

III	DSC -5 (4+0+2=6) DSC -6 (4+0+2=6) Total from DSC 5 and 6 is 6+6=12 credits	OE3 (3hrs+0+0) 3 credits	L1-(3),L2-(3) (4 hrs each) 6 credits	----	SEC-2: Artificial Intelligence/ (AI) (1hr+0+2hrs) 2 credits	Physical Education-Sports (0+0+2 hrs) 1 credit	
IV	DSC -7(4+0+2) DSC -8(4+0+2) Total from DSC 6 and 7 is 6+6=12 credits	OE4 (3hrs+0+0) 3 credits	L1-(3),L2-(3) (4 hrs each) 6 credits	Constitution of India (2hrs+0+0) 2 credits	----	Physical Education -Games (0+0+2hrs) 1 credit	

Program structure with credits, hours of teaching and marks

Sem.	**Discipline Core (MBDSC) (Credits) (L+T+P)**	**Discipline Elective (DSE) / Open Elective (OEMBDSC) (Credits) (L+T+P)**	**Ability Enhancement Compulsory Courses (AECC),Languages (Credits) (L+T+P)**	Credits	**Skill Enhancement Courses (SEC)**	Hours of teaching	**Credits**	**Total Credits**
III	DSC-5	DSC	4+0+2	6	Microbiology Theory	4	4	**25**
					Microbiology Practical	4	2	
	DSC-6	DSC	4+0+2	6	Biochemistry Theory	4	4	
					Biochemistry Practical	4	2	
	OE -3	OE	3+0+0	3		3	3	
	AECCL1	AECCL1	3+0+0	3	ML1	4	3	
	AECCL2	AECCL2	3+0+0	3	ML2	4	3	
	SECSB2	SECSB2	1+0+1	2	Artificial Intelligence theory	1	1	
					Artificial Intelligence	2	1	

					Practical			
	SECVB1	SECVB1	0+0+1	1	Physical Education sports (SEC value based)	2	1	
	SECVB2	SECVB2	0+0+1	1	NCC/NSS/ R&R(S&G)/ Cultural (SEC value based)	2	1	
IV	DSC-7	DSC	4+0+2	6	Developmental and Reproductive Biology Theory	4	4	**25**
					Developmental and Reproductive Biology Practical	4	2	
	DSC-8	DSC	4+0+2	6	Plant Physiology II and Animal Physiology Theory	4	4	
					Plant Physiology II and Animal Physiology Practical	4	2	
	MBOE -4	OE	3+0+0	3	----	3	3	
	AECCL1	AECCL1	3+0+0	3	ML1	4	3	
	AECCL2	AECCL2	3+0+0	3	ML2	4	3	
	AECC2	AECC2	3+0+0	3	Constitution of India	2	2	
	SECVB1	SECVB1	0+0+1	1	Physical Education sports (SEC value based l)	2	1	
	SECVB2	SECVB2	0+0+1	1	NCC/NSS/ R&R(S&G)/ Cultural (SEC value based)	2	1	

III semester

DSC-5	4+0+2 credits	Microbiology Theory	4 hrs	4 credits
		Microbiology Practical	4 hrs	2 credits
DSC-6	4+0+2 credits	Biochemistry Theory	4 hrs	4 credits
		Biochemistry Practical	4 hrs	2 credits

Microbiology – Theory - Credits – 4 **56hrs**

Course objectives:

- To equip the students to gain knowledge about microbes in human health and the environment in many ways.
- This course paper emphasizes to acquire knowledge about microbial diversity and their interactions among themselves, and with the environment and biological systems under various conditions.
- To address the relevance of microbiology in other disciplines.
- To impart practical skills in concepts of Microbiology.

Course outcome:

- Student will understand Koch's postulates which is the basic requirement to study plant, animal and human diseases.
- Students will learn how to identify and isolate pure cultures, maintenance and preservation of different microbes.
- Students will acquire the skills to qualify for broad range of positions in academic and research institutions in different discipline to increasing need for skilled scientific manpower with an understanding of research involving microorganisms to contribute to application, advancement and impartment of knowledge in the field of microbiology and molecular biology globally.
- The laboratory training will empower them to prepare for careers in broad range fields.

Microbiology Practical - 2 Credits, 56 hrs

Course outcome:

Students will develop the skills of

1. Bacterial and fungal staining techniques
2. Knowledge of cyanobacterial practical applications
3. Preparation of various microbiological media
4. Pure culturing and Single colony isolation and preservation of cultures, growth curve plotting, disc diffusion technique which are needed for many biotech industries based on microbes

Biochemistry – Theory – 4 Credits, 56 hrs

Course objectives:

- To study the basics of biomolecules like sugars, amino acids, fatty acids, and nucleosides.
- To gain knowledge about the structures and functions of vitamins.
- To study the influence and role of structure in reactivity of biomolecules.
- To study the classification, functions, and application aspects of biomolecules.
- To train students to appreciate the salient features of biomolecules in the organization of life.
- To study the significance and methodology involved in isolation and characterizing major biomolecules including nucleic acids.

Course outcome:

- Students will understand in detail about structures, types, and classifications of fundamental biomolecules like amino acids, sugars, fatty acids, and nucleotides.

- The students will have a thorough understanding on the structural and functional role of biomolecules in the living system.
- Students will understand the properties of carbohydrates, proteins, lipids, nucleic acids, and their importance in biological systems.
- The students will be able to understand the chemical properties and three-dimensional structure of the biological macromolecules in relationship to their biological function.
- They will also gain knowledge about the isolation and identification methods of macromolecules.
- Students will understand the metabolic and physiological role, their deficiency disorders and therapeutic functions associated with vitamins.

Biochemistry Practical - 2 credits, 56 hours

Course objectives:

- To study the basics of biomolecules like sugars, amino acids, fatty acids, and nucleosides.
- To gain knowledge about the structures and functions of vitamins.
- To study the influence and role of structure in reactivity of biomolecules.
- To study the classification, functions, and application aspects of biomolecules.
- To train students to appreciate the salient features of biomolecules in the organization of life.
- To study the significance and methodology involved in isolation and characterizing major biomolecules including nucleic acids.

Course outcome:

- Students will develop the skills and knowledge of analysis of different sugars and starch in a given sample
- Students will develop the skills and knowledge estimation methods proteins and Amino acids
- Students will develop the skills and knowledge of working with lipids
- Students will develop the skillsof estimation of Ascorbic acid in Biological source.
- Students will develop the skillsof extraction of lactose and casein in milk.
- Students will develop the skillsof estimation of Inorganic Phosphate, DNA, RNA
- All these skills are helpful for students to join diagnostic labs or biotech industry

IV semester

DSC-7	4+0+2 credits	Reproductive and Developmental Biology Theory	4 hrs	4 credits
		Reproductive and Developmental Biology Practical	4 hrs	2 credits
DSC-8	4+0+2 Credits	Plant Physiology II and Animal Physiology Theory	4 hrs	4 credits
		Plant PhysiologyII and Animal Physiology Practical	4 hrs	2 credits

Reproductive and Developmental Biology Theory - 4 Credits, 56 hrs

Course objectives:

- To impart knowledge on gametogenesis, fertilization and development in mammals.
- To understand the cytology of parthenogenesis and cloning.
- Developmental biology provides the basis for understanding of processes and mechanisms of development of both plant and animals.

- To teach the importance of developmental biology in agriculture and food sectors.
- To impart practical skills in concepts of Developmental Biology

Course outcome:

- Students will understand the early and post embryonic development in animals.
- Students will acquire knowledge of molecular events in fertilization.
- Students will be able to understand the processes of gastrulation.
- Students will acquire knowledge on microsporogenesis, megasporogensis and development of male and female gametophyte in plants.
- It helps the students to understand the development of plants and animals at cellular and embryonic level.
- Applications of embryology is understood as experimental embryology which has agricultural relevance.

Developmental Biology Practical - 4 Credits, 56 Hrs

Course outcome:

Students will develop the skills and knowledge of:

- Studying ovule of different flowers
- Observation of microsporogenesis and micro gametogenesis in plants
- Study of endosperms of seeds
- Mounting of embryos
- Structure of seeds and seed coat

Plant Physiology II and Animal Physiology - 4 credits 56 hours

Course objectives:

- To give students a greater understanding of the physiological processes, plant responses and environmental factors affecting growth and development.
- To identify the physiological factors that regulates growth and developmental processes of plants.
- To provide a comprehensive overview of physiological systems in a well-organized and concise manner to understand the interaction between animal and its environment.
- To understand physiology and functions of the body parts in regulation of metabolic processes like temperature and hormones etc.
- To impart practical skills in concepts of Animal Physiology.

Course outcome:

- Students will gain knowledge about various plant hormones and their applications in horticulture.
- Students will be able to integrate and apply their knowledge of plant physiology for analytical thinking and solving practical problems experienced in agricultural systems.
- This course helps students to understand the biological processes that occur in animal life at various levels of organization such as cells, organ system and complete animal.
- It provides notable clear and detailed account of physiological principles of different physiological processes such as digestion, excretion, respiration, circulation in animals, their adaptations to environments.
- It enables comprehensive understanding of endocrine and reproduction systems.
- Students will gain basic knowledge of physiology and related disorders/ diseases; this will open up opportunities in a wide variety of research areas.

Plant Physiology II and Animal Physiology - Practical 2 credits, 56 hours

Course objectives:

- To give students practical skills on physiological processes, affecting growth and development especially on application of plant hormones
- To give skills of extraction of plant metabolites.
- To impart laboratory diagnosis skills and its basic understanding related to various parameters of urine analysis and blood analysis

Course outcome:

- Students will develop practical skills on physiological processes, affecting growth and development especially on application of plant hormones and this will help the students apply when they go to the field
- Students will develop the skills of extraction of plant metabolites and this will help them to use in industry if they are join such profession.
- Students will develop diagnosis skills and its basic understanding related to various parameters of urine analysis and blood analysis. This will help the students to join diagnostic laboratories for their jobs.

Skill Enhancement Course (SEC)- PHYSICAL EDUCATION, YOGA,SPORTS
Choice Based Credit System (CBCS) With Multiple Entries And Exit Options under New Education Policy (NEP) – 2020(2021-22 Batch Onwards)
Details of Course of Study: I and II Semesters

Sem.	Skill Enhancement Course(Value Based) Paper (L+T+P)	Teaching hours/ week	Credits	Internal Assessment Marks (C1 + C2)
I	SEC-1: Physical Education and Yoga(0+0+2)	2	1	25
	SEC-2: Health and Wellness(1+0+1)	1+1	1	25
II	SEC-3: Physical Education and Sports(0+0+2)	2	1	25

Outcome:

All the above courses help in over all development of students.

Both mental and physical health status of students will be improved, this will help in theover all development.