OBE HANDBOOK

Est. in 1921

UNION CHRISTIAN COLLEGE

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UNION CHRISTIAN COLLEGE

ALUVA

Affiliated to Mahatma Gandhi University, Kottayam, India

OBE HANDBOOK

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ABOUT THE COLLEGE

Union Christian College, Aluva was established in 1921. Affiliated to Mahatma Gandhi University, Kottayam, the institution is known for its academic excellence and research potential. The college has 18 academic departments, with around 1900 students and 160 faculty members. The college has been rated as an 'A' Grade institution by the National Assessment and Accreditation Council (NAAC) in the fourth cycle with 3.45 points. The college strives to produce intellectually competent, morally upright, and spiritually inspired citizens in the service of the nation.

VISION & MISION OF THE INSTITUTION

VISION:

Serve the nation by facilitating and modelling wholesome and socially relevant education to actualize the values of humanism in accordance with the revelation in Jesus Christ.

MISSION:

The Union Christian College, extending God's love to all, is committed to providing such education that facilitates the growth of the whole person and brings out the best in him or her that they would serve our nation and humanity at large and the ecosystem, as intellectually competent, morally upright and spiritually inspired persons.

VISION & MISION OF IQAC

Serve the nation by facilitating and modeling wholesome and socially relevant education to actualize the values of humanism in accordance with the revelation in Jesus Christ.

Mission

The Union Christian College, extending God's love to all, is committed to providing such education that facilitates the growth of the whole person and brings out the best in him or her that they would serve our nation and humanity at large and the ecosystem, as intellectually competent, morally upright and spiritually inspired persons.

Motto

'The truth shall make you free**'.**

Core Values

- Social Commitment
- Sustainability
- Nation Building
- Empowering the powerless
- Pursuit of Truth

Coat of Arms

The Current college emblem adopted in 1939. It comprises a flaming torch, a sheaf and an open book. The torch indicates the light of truth, conveying the idea of enlightenment. The Sheaf marks the harvest of fruits from the pursuit of knowledge. And the book signifies the liberative quest for truth and knowledge.

OBE POLICY

OUTCOME BASED EDUCATION

COURSE OUTCOME, PROGRAMME OUTCOME AND PROGRAMME SPECIFIC OUTCOME ATTAINMENT AND EVALUATION POLICY

Union Christian College, Aluva, affiliated to M.G University Kottayam has a well-defined policy for OBE.The institution has a distinct mechanism for the preparation and assessment of Programme and Course Outcomes.

OBE committee:

The OBE committee works in line with IQAC and Continuous Internal Assessment (CIA) Committee. Headed by the IQAC coordinator, the committee includes members form IQAC & CIA, Head of the departments and subject experts.

The committee is organized at 3 levels

- **OBE Advisory Committee**
- **Department OBE Committee (DOC)**
- **Course Instructors**

OBE Advisory Committee:

The committee is headed by the IQAC coordinator.

Programme Outcomes(POs) for UG and PG courses are prepared at the institutional level by the OBE Advisory Committee. It also prepares the format and executes the Course Exit Survey through the departments.

The committee closely monitors the Teaching- Learning assessment process and provides timely guidelines.

Department OBE Committee (DOC)

Programme Specific Outcomes(PSOs) are prepared by the Department OBE Committee (DOC). The committee, headed by the HOD together with DOC Coordinator will map the CO-PO & CO-PSO and decide on the correlation. DOC prepares Course data sheet with CO-PO, CO-PSO mapping matrices and justifications. The committee decides the target level of attainment for each PO based on the correlation mapping and analyse the attainment levels after each internal exam. The DOC decides the benchmark of attainment each year based on the average marks of each course.

The DOC assess the entry level behaviour of the students and offer bridge course to assist them in the smooth transition to the curriculum. The DOC also decides on

additional assessment methods like assignment/seminar/project/field trip depending on the course.

The DOC analyses the attainment levels of COs, POs & PSOs with inputs from respective course instructors and devises remedial techniques.

Course Instructor

Each course in charge/course instructor maps the correlations of COs to POs and PSOs with suitable levels in the matrix as shown below:

LEVELS	CORRELATION
-	NIL
1	LOW
2	MODERATE
3	HIGH

The course instructor prepares the course plan, course assessment plan and lesson plan for the course in conformity with the weightage for the correlation. Blue prints of question paper for internal assessment marked with CO is prepared in accordance with the weightage. Assessment rubrics is prepared for assessing assignment/seminar/project.

Continuous Internal Assessments (CIA) –

There is a committee for conducting the Internal formative assessments in the College. Two such assessments per semester will be conducted in the college following a centralized time table. Internal assessment tests will be for a total of 40 marks.

All assessment methods are compulsory and students must necessarily attend and undertake all the testing components administered for a particular subject. Students who fail to complete the tests / seminars /assignment will have to meet the Principal with valid reasons for missing the same. Students who have missed an exam/test will be permitted to appear again which will be conducted in their respective departments.

Outcome Attainment Evaluation:

Program and Program Specific Outcomes attainment evaluation is done by the course instructor based on the logical mapping and attainment of cognitive levels of course outcomes with POs and PSOs. Outcome attainment evaluation is a two-tiered mechanism, Direct Evaluation and Indirect Evaluation, with 80:20 weightage.

The direct attainment of POs is calculated as the average sum product of the CO-PO correlation and the comprehensive CO attainment ratio. 80% weightage is given to direct evaluation based on each course's internal and external marks.

Indirect attainment of POs and PSOs is administrated by the Department OBE Committee through Exit Surveys of Students and Alumni (1:1 ratio) which is assigned a weightage of 20% for the overall attainment analysis.

Evaluation of Course Outcome Attainment:

As the question-wise CO marks distribution is unavailable in the end semester examinations, each CO attainment of a course is calculated based on internal examination scores. Each question in an internal examination is mapped to the corresponding CO. 80% is set as the CO attainment target level.

Attainment Analysis:

The target attainment level of POs is obtained from the CO mapping matrix. The levels of attainment of POs/PSOs/COs are defined for assessment as follows:

OUTCOME ATTAINMENT LEVELS

LEVELS	OUTCOME ATTAINMENT %
0	Not attained
1	50%- 60%
2	60%- 70%
3	>= 70%

Analysing the target level and the attainment level, Gap analysis is done to plan corrective measures.

Corrective Measures:

- Offer remedial courses to supplement the regular courses
- Proposal for amendments in the syllabus/new courses should be prepared

Transparency in the mechanism:

As an ideal Teaching-Learning process is reliant on the comprehension, application and analysis of programme and course outcomes, the comprehension of the teachers and students on the same is ensured through a well-knit mechanism.

COs & POs are displayed in the departments and college website. OBE handbook is distributed to the students for better understanding.

PROGRAMME OUTCOMES FOR UG PROGRAMMES

BA/BSc/BCom/BSM

On completion of UG programme, the student is expected to achieve the following programme outcomes.

PO 1	**Critical Thinking and Analytical Reasoning**	Analyse, and evaluate evidences and arguments critically to formulate logical arguments and develop in depth knowledge through critical evaluation of practices, policies and theories
PO 2	**Scientific Reasoning and Problem Solving**	Interpret and analyse quantitative/qualitative data and experimental evidences to draw unbiased conclusion, and develop problem solving skills.
PO 3	**Communication skills**	Develop intensive and extensive listening skills, analytical reading and writing skills so as to express themselves confidently.
PO 4	**Leadership Skills**	Demonstrate democratic values in employing effective team building and management strategies to work constructively and lead diverse teams.
PO 5	**Equity, Inclusiveness and sustainability**	Appreciate equity, inclusiveness and sustainability and acquire values of unity, secularism and national integration with a commitment to social service so as to act as dignified citizens.
PO 6	**Moral and Ethical Reasoning**	Recognise different value systems in conducting one's life, demonstrate the ability to identify ethical issues related to professional life.
PO 7	**Lifelong Learning**	Acquire skills for "learning how to learn" and develop skills for self-paced and self-directed learning so as to adapt to the changing demands of workplace through reskilling.

PROGRAMME OUTCOMES FOR PG PROGRAMMES

MA/MSc/MCA/MBA

On completion of PG programme, the student is expected to achieve the following programme outcomes.

PO1	**Domain Knowledge**	Construct deeper knowledge and expertise in specialized fields and integrate knowledge across subject areas.
PO2	**Creative and Interdisciplinary Thinking**	Develop a passion for experimenting, critically appraise and engage with others perspectives, enhance interdisciplinary thinking skills to formulate creative solutions to real life problems
PO3	**Communication and Competency**	Communicate effectively, critically assess and review ideas and present new perspectives in seminar and project presentations.
PO4	**Research skills & Ethical practices**	Aquire research skills in concerned subjects and allied fields, apply domain specific ethical principles and practices in academic professional and social engagements**.**
PO5	**Leadership Skills**	Demonstrate democratic values, commitment to social service, employ effective team building and management strategies, work constructively and lead diverse teams, develop strategic thinking with people skills.
PO6	**Career readiness and higher education**	Choose from diverse career options available in local, national and international realms, purse higher education in multidisciplinary fields.
PO7	**Lifelong Learning**	Inculcate a habit of self- learning throughout life, through self - paced and self- directed learning aimed at personal development and adapting to changing demands of work place through reskilling.

PROGRAMME OUTCOMES FOR Ph.D PROGRAMMES

On completion of PhD programme, the student is expected to achieve the following programme outcomes

PO1	**Original Research**	Design an original research problem, devise strategies to address relevant research issues, execute them to obtain data or results, analyse them using appropriate advanced qualitative/quantitative research methods, interpret the results and validate the core idea behind the research undertaken, and communicate the results in peer-reviewed publications.
PO2	**Professional Ethics**	Get hands-on training on issues related to professional ethics and plagiarism and inculcate fair practices in the field of research. Get hands-on training in understanding issues related to the broader social impacts of research in the chosen field.
PO3	**Knowledge and Communication**	Acquire basic in-depth knowledge of a branch of education and attain specialisation in one sub-branch/ core foundational subject and Acquire proficiency in oral and written communication skills by presenting papers and writing project reports.
PO4	**Independent and Collaborative Efforts**	Demonstrate individual efforts in research and learn to collaborate to maximise the research outcome.
PO5	**Doctorate Thesis**	Write the Doctorate Thesis based on the details of the scientific research carried out and defend it in the evaluation by national and international experts.

PSO FOR DEPARTMENTS

1.DEPARTMENT OF ENGLISH

Programme Specific Outcomes for **BA** English Language and Literature (Model 1)

Graduates of the programme will be able to:

PSO 1	Comprehend and analyse literary texts across different genres
PSO 2	Communicate clearly and effectively in writing and speech
PSO 3	Understand and use the linguistic and grammatical structures of the English language
PSO 4	Develop a creative outlook and ethical sensibility
PSO 5	Attain research aptitude and skills
PSO 6	Appreciate and engage with different historical, cultural and social contexts
PSO 7	Comprehend and apply various theoretical perspectives to literary texts

Programme Specific Outcomes for **MA** English

On completion of the programme the student will be able to:

PSO 1	Understand and critically analyse texts belonging to different genres
PSO 2	Ethically evaluate and respond to socio-cultural issues and representations
PSO 3	Comprehend and formulate theoretical approaches to texts
PSO 4	Involve in pedagogical and research activities
PSO 5	Appreciate the aesthetics and historicity of literary and cultural texts
PSO 6	Generate creative literary discourses and narratives
PSO 7	Engage in interactive communication and cogitation

1. DEPARTMENT OF MALAYALAM

Programme Specific Outcomes for **BA** Malayalam

On completion of the program, the students will be able to,

PSO 1	Develop an attitude to be up to date with the current trends in Malayalam language and literature.
PSO 2	Understand the historical, cultural, and intellectual spheres of Malayalam Literature
PSO 3	Create critical awareness of the cultural history of the Malayalam language and literature
PSO 4	Acquire knowledge about ancient- modern and postmodern Malayalam literature and evaluate the historical and cultural elements of Kerala.

Programme Specific Outcomes for **MA** Malayalam

On completion of the program, students will be able to,

PSO 1	Develop a passion and interest in Malayalam language and literature.
PSO 2	Appraise the history and structure of language and develop language skills
PSO 3	Acquire Presentation skills and research skills
PSO 4	Build Multicultural awareness, Gender-Sensitivity, and Ecological understanding
PSO 5	Recognise Language as an instrument of production, development, and critique of power.

Programme Specific Outcomes for **Ph.D** Malayalam

On completion of the program, the students will be able to,

PSO 1	Attain practical experience in research methodology on language and cultural studies.
PSO 2	Analyse the contemporary issues in society with critical aspects.
PSO 3	Apply critical and analytical thinking skills to create genuine research work.
PSO 4	Develop knowledge in application of contemporary literary theories and interdisciplinary approaches
PSO 5	Acquire skills in academic writing and publish research papers.

2. DEPARTMENT OF BOTANY

Programme Specific Outcomes for **B.Sc** Botany

On completion of the program, the students will be able to,

PSO 1	Develop practical skills for identification and classification of various life forms of plants along with organization and interpretation of biological data
PSO 2	Understand the morphological, structural and functional peculiarities of plants and apply the concepts for the betterment of society and environment.
PSO 3	Explain how Plants function at gene, genome, cellular and tissue level
PSO 4	Relate the physical features of the environment to the structure and ecosystems and understand the importance of natural resources and conservation
PSO 5	Impart knowledge in the field propagation of plants and make them competent enough in various analytical and technical skills related to plant sciences

Programme Specific Outcomes for **M.Sc** Botany

On completion of the program, students will be able to,

PSO 1	Gain a clear, comprehensive and advanced mastery in the field of Botany
PSO 2	Attain basic principles of biological sciences with special reference to Botany and its applied branches.
PSO 3	Enable the students to explore the intricacies of life forms at cellular, molecular and nano level
PSO 4	Develop enthusiasm and to help them not only to appreciate the beauty of different life forms but also to inspire them in the dissemination of the concept of biodiversity conservation
PSO 5	Develop problem solving skills in students and encourage them to carry out innovative research projects thereby enkindling in them the spirit of knowledge creation

Programme Specific Outcomes for **Ph.D** Botany

On completion of the program, the students will be able to,

PSO 1	Fill the existing research gap in the scientific front with their discoveries. Research discussions are mediated by the faculties to cultivate the curious minds to raise the right questions.
PSO 2	Acquire research methodology, scientific analysis, ethics etc, to rationalise the study and to circumvent the challenges faced during a research study.
PSO 3	Familiarise modern equipment and infrastructure facilitate them to design the experiments for their novel findings
PSO 4	Evaluate their progress by conducting seminars to familiarise the students with presentation skills, thus providing an encouragement to communicate their scientific investigation.
PSO 5	Become an asset to the society by refining their scientific temperament in Biology and specifically in plant science

3. DEPARTMENT OF CHEMISTRY

Programme Specific Outcomes for **B.Sc** Chemistry

On completion of the program, the students will be able to,

PSO1	Read, understand and interpret chemical information–verbal, mathematical and graphical.
PSO2	Execute critical thinking and theoretical concepts for efficient problem solving and seeking solutions to difficulties that emerge in the various fields of chemistry and interdisciplinary fields.
PSO3	Develop laboratory skills for qualitative and quantitative analysis, organic synthesis, distillation, filtration, crystallization, chromatography etc.
PSO4	Develop Environmental and ethical awareness
PSO5	Apply knowledge of chemistry to excel in higher studies and field of research.
PSO6	Kindle the urge for entrepreneurship and lifelong learning.

Programme Specific Outcomes for **M.Sc** Chemistry

On completion of the program, the students will be able to,

PSO1	Acquire comprehensive knowledge in chemistry through theory and practicals.
PSO2	Apply the theoretical concepts of chemistry to generate and interpret the data obtained through sophisticated instruments used in various analytical field of chemistry.
PSO3	Equip students to ethically conduct collaborative research, internships, projects and to communicate effectively in a scientific manner.
PSO4	Appraise and apply the skills acquired to develop as a responsible citizen who can scientifically address various social, economic, environmental and related critical issues faced by humanity at the local, national and global levels in a sustainable way.
PSO5	Interpret and effectively apply the knowledge of chemistry from the fundamental level to applications in the frontier areas of academics, research and industry.

Programme Specific Outcomes for **Ph.D** Chemistry

On completion of the program, the students will be able to,

PSO1	Gain an in-depth understanding and advanced knowledge in the chosen frontier area in chemistry.
PSO2	Plan and execute research strategies, analyse and interpret scientific data, provide theoretical models, and obtain results that advance the specific field internationally, in the form of Publications, Patents and Research Thesis.
PSO3	Develop analytical, oral and written science communication skills
PSO4	Get hands-on training on issues related to professional ethics and plagiarism and inculcate fair practices in the field of scientific research

4. DEPARTMENT OF COMPUTER SCIENCE

Programme Specific Outcomes for **B.Sc** Computer Science
On completion of the program, the students will be able to

PSO1	Acquire theoretical & practical knowledge in areas related to Computer Science.
PSO2	Develop ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
PSO3	Explore the potentially rich & employable field of computer applications.
PSO4	Act as a feeder course for pursuing advanced studies and research in the area of Computer Science/Applications.
PSO5	Equip the students to meet the requirement of the Industrial standards.
PSO6	Become computer scientists who can work on real life challenging problems.
PSO7	Become entrepreneurs who can innovate and develop software products and applications

5. DEPARTMENT OF MATHEMATICS

Programme Specific Outcomes for **B.Sc**. Mathematics

On completion of the program, the students will be able to,

PSO1	Understand and apply the basic concepts and techniques logic, set theory, calculus in other areas of Mathematics
PSO2	Relate real life situations with Mathematics and solve them logically
PSO3	Familiarize with abstract structures and analysis which are relevant in other disciplines of Mathematics
PSO4	Develop logical thinking and problem solving skill
PSO5	Understand Mathematics of nature and create positive attitude about the environment

Programme Specific Outcomes for **M.Sc.** Mathematics

On completion of the program, the students will be able to,

PSO1	Attain a strong understanding on the various mathematical concepts in areas like Analysis, Abstract Algebra and Measure theory
PSO2	Build interest and confidence to handle advanced techniques in Mathematics
PSO3	Inculcate a research mind among students through seminars and dissertation
PSO4	Attain a common level understanding in areas of Applied Mathematics
PSO5	Develop the skill of modelling real world problems into Mathematics problems and find solutions in a logical way.

6. DEPARTMENT OF PHYSICS

Programme Specific Outcomes for **B.Sc**. Physics

On completion of the program, the students will be able to,

PSO1	The importance and scope of the subject for higher studies in the discipline, entrepreneurship and lifelong learning.
PSO2	Fundamental concepts of mathematics required for formulating and solving problems
PSO3	Skills to understand Statistics / Chemistry as a tool for learning Physics.
PSO4	Social and environmental responsibleness.
PSO5	Communication skill
PSO6	National and international competency
PSO7	Sense of ethics, discipline, time management and critical thinking essential for nurturing employability

Programme Specific Outcomes for **M.Sc**. Physics

On completion of the program, the students will be able to,

PSO1	Develop and refine analytic and critical thinking abilities by immersing yourself in the knowledge and principles of the primary disciplines within physics.
PSO2	Graduates possess a lasting intellectual curiosity and the skills to pursue continuous learning in both physics-related subjects and other areas that hold significance for society.
PSO3	To prepare students for pursuing suitable careers in the field of physics.
PSO4	To prepare students for pursuing suitable careers in the field of physics.
PSO5	Improve pedagogical and scientific writing abilities using contemporary approaches and techniques.
PSO6	Strengthen national and international proficiency and expertise.
PSO7	Cultivate entrepreneurial skills and foster a commitment to lifelong learning.
PSO8	Develop a sense of social and environmental responsibility and become conscientious members of society.

7. DEPARTMENT OF PSYCHOLOGY

Programme specific outcomes for **B.Sc** Psychology

On completion of the program, the students will be able to,

PSO1	Equip themselves with the foundation skills necessary for higher education and to become a psychologist
PSO2	Get an understanding of nature and concepts of individual differences.
PSO3	Gain a deeper understanding about mental health and its significance
PSO4	Gain a knowledge about the diverse fields of psychology, the importance of inclusive education, and outreach programs

8. DEPARTMENT OF ZOOLOGY

Programme specific outcomes for **B.Sc** Zoology

On completion of the program, the students will be able to,

PSO1	Understand the basic concepts and theoretical principles in Zoology
PSO2	Study the animal-environment interaction and understand the importance of ecological conservation and sustainability
PSO3	Develop scientific temper and critical thinking skills to address issues like social equality, human rights, sexual and reproductive health
PSO4	Apply the theoretical knowledge and practical skills in biological sciences intended for vocational and research application
PSO5	Develop communication skills to decipher and transmit the fundamental concepts and emerging trends in Zoology.

Programme Specific Outcomes for **M.Sc**. Zoology

On completion of the program, the students will be able to,

PSO1	Inculcate advanced understanding of animal phylogeny, systematics and evolutionary relationships among different animal taxa
PSO2	Develop broad skills and deeper knowledge in the field of biotechnology, biochemistry, cell biology, physiology, developmental biology, genetics and immunology.
PSO3	Employ techniques appropriate for experimentation in different branches of biology
PSO4	Develop research aptitude and vocational skills for a prospective career in science.

9. DEPARTMENT OF ECONOMICS

Programme specific outcomes for **B.A** Economics

On completion of the program, the students will be able to,

PSO1	Gain a well founded education in economics
PSO2	Attain structured curricula which support the academic development of student
PSO3	Attain employment and further study as economists
PSO4	Pursue courses that emphasize quantitative and theoretical aspects of economics
PSO5	Focus on applied and policy issues in economics
PSO6	Choose from a wide range of economics specialization

Programme specific outcomes for **M.A** Economics

On completion of the program, the students will be able to,

PSO1	Gain knowledge in various fields of economics and an in-depth understanding of the theoretical and empirical constructs in the field of Economics.
PSO2	Disseminate awareness and appreciation of the complexity of socioeconomic interdependence and change.
PSO3	Prepare for advanced studies leading to M. Phil. and PhD.
PSO4	Apply economic theories and dilating problem-solving acumen. To teach applications of theories in analyzing current economic problems
PSO5	Develop the powers of inquiry, critical analysis, logical thinking, and your ability to apply theoretical knowledge to current issues of policy and practice in economics
PSO6	Initiate independent learning, awareness of analytical and theoretical approaches in the field of economics, exposure to recent research and state-of-the-art tools in applied for work in economics

PSO7	Build model, test economic models using advanced methods and sophisticated economic tools, analysis interpretation and formulation of development policies

10. DEPARTMENT OF HISTORY

Programme specific outcomes for **B.A** History

On completion of the program, the students will be able to,

PSO1	Evaluate the spatial and temporal shifts in Indian and world history
PSO2	Adapt curricula to enable students to be a part of an efficient workforce and for higher studies in history, and other interdisciplinary subjects
PSO3	Familiarize students with the theories of social sciences and different schools of historiography
PSO4	Empower students to focus on applied and policy issues in contemporary India
PSO5	Provide programs that allow the students to choose from a wide range of History and other allied disciplines
PSO6	Ensure an affective learning environment with emphasis on empathy, scientific temperament, secularism, civic consciousness, and welfare state

Programme specific outcomes for **M.A** History

On completion of the program, the students will be able to,

PSO1	Analyze concepts, events and movements of history
PSO2	Evaluate the shifts of power that shaped historiography
PSO3	Build expertise in Ancient/Medieval and Modern periods of historical studies
PSO4	Understand the values of democracy, humanism, secularism and scientific temperament
PSO5	Formulate a Research Problem and Plan a related Research Design

Programme specific outcomes for **P.hD** History

On completion of the program, the students will be able to,

PSO1	Realize the relevance of History in Knowledge production for betterment of humanity
PSO2	Get a perspective based profound understanding on his/her area of specialization
PSO3	Develop essential insights into the theoretical and structural aspects of the discipline.
PSO4	To narrow down the area of interest while maintaining a comprehensive, broader vision on various branches and aspects of History.

11. DEPARTMENT OF PHYSICAL EDUCATION

Programme specific outcomes for **BSM**

On completion of the program, the students will be able to

PSO1	Understand the scientific, management and legal aspects of sports industry
PSO2	Attain hands on experience of the business aspects of sports
PSO3	Effectively apply knowledge and skills learned throughout the curriculum in real world settings.
PSO4	Critically evaluate principles and practices applied to global sports management solutions
PSO5	Develop interpersonal skills requisite for successful professional collaboration
PSO6	Demonstrate the ability to recognize diversity of issues in sport management

12. DEPARTMENT OF COMMERCE

Programme specific outcomes for B.Com

On completion of the program, the students will be able to

PSO1	Demonstrate progressive learning of various tax issues and tax forms related to individuals
PSO2	Develop an attitude for working effectively and efficiently in business environment
PSO3	Develop the skill of applying concepts and techniques used in commerce
PSO4	Be capable of making decisions at personal and professional level
PSO5	Prove proficiency with ability to engage in competitive exams

13. DEPARTMENT OF BIOSCIENCES

Programme specific outcomes for **B.Sc** Biological Techniques and Specimen Preparation

On completion of the program, the students will be able to

PSO 1	Acquire fundamental and advanced knowledge in various disciplines of Life sciences.
PSO 2	Develop a strong foundation of basic concepts of Biotechnology, Biochemistry, Microbiology, Cell biology, Genetics and Bioinformatics.
PSO 3	Understand the diversity of animals, their economic importance and the basics of Human Physiology and Embryology.
PSO 4	Develop basic skills in the identification, collection and preservation of plants and animals. Also getting hands on training in Molecular Biology Techniques.

PSO 5	Accomplish skills to start entrepreneurship in the field of Plant Tissue Culture and Occupational Zoology.

Programme specific outcomes for **M.Sc .** Bioinformatics

On completion of the program, the students will be able to

PSO1	To acquire fundamental and advanced knowledge in computer programming and various aspects of life science.
PSO2	To gain understanding of basics of Bioinformatics and data mining.
PSO3	Equip students with practical approaches in Bioinformatics including computer aided drug discovery and microarray techniques.
PSO4	Provide knowledge and skill to retrieve and process DNA/RNA sequence data.
PSO5	Empower students with theoretical and practical knowledge in advanced programming languages.
PSO6	Introduce concepts of ethical practices in Bioinformatics and IPR.

Programme specific outcomes for **M.Sc .** Biotechnology

On completion of the program, the students will be able to,

PSO1	To acquire in-depth knowledge on the theoretical, analytical, and practical aspects of applied biology.
PSO2	To nurture competence in industry and research by using sophisticated techniques in biotechnology.
PSO3	To foster scientific aptitude through understanding of applicative research, bioethics, and IPR.
PSO4	To promote entrepreneurship and enhance employability skill sets in biotechnology.

14. DEPARTMENT OF MBA

Programme specific outcomes for **MBA**

On completion of the program, the students will be able to,

PSO1	Develop young MBA aspirants into professional managers who can contribute to the growth of business and industry in India and abroad
PSO2	Develop leaders with a strong ethical background who can efficiently and effectively manage business amidst of environmental turbulences
PSO3	Nurture entrepreneurial skills among young generation and make them effective change agents
PSO4	Contribute towards better management practices in the country by way of offering quality management education

15. DEPARTMENT OF MCA

Programme specific outcomes for **MCA**

On completion of the program, the students will be able to,

PSO1	Solidify foundation of Mathematics, Computer Science and problem solving methodologies for effective implementation in real life applications
PSO2	Familiarise students about principles of Software Engineering and Project Management with appropriate data modelling concepts and latest technologies
PSO3	Use of recent technologies, skills and knowledge for the design and development of applications in the computing discipline
PSO4	Inculcate employability and entrepreneurship skills among students who can contribute innovative and advanced solutions for the important life problems
PSO5	Understand the concepts of Network and communication technologies, social network and other related aspects.

COs defined

(Department wise, Course wise)

1. DEPARTMENT OF ENGLISH

COMMON COURSE SEM I	
Course code: **EN1CCT01**	
Course: **ENGLISH I: FINE-TUNE YOUR ENGLISH**	
On the completion of the course, the students will be able to:	
CO 1	Understand the sentence as the basic unit and writes effectively
CO 2	Understand the parts of speech in language and its application
CO 3	Understand the rules of subject-verb agreement and common concord errors in language
CO 4	Understand the word formation techniques
CO 5	Understand contextual usage of words
CO 6	Understand vocabulary related to body and its usage
CO 7	Understand practical use of language.

COMMON COURSE SEM I	
Course code: **EN1CCT02**	
Course: **ENGLISH I: PEARLS FROM THE DEEP**	
On the completion of the course, the students will be able to:	
CO 1	The learner is introduced to a world classic and imbibes the writer's philosophy of life
CO 2	The learner recognizes the different elements that make a short story
CO 3	The learner can identify key characters and events in the plot and express these in writing
CO 4	The learner is introduced to representative American, British, Indian drama and to key elements of drama like plot, character, setting, theme etc.
CO 5	The learner understands and appreciates the aesthetic and formal elements of poetry

COMMON COURSE SEM II	
Course code: **EN1CCT03**	
Course: **ENGLISH III: ISSUES THAT MATTER**	
On the completion of the course, the students will be able to:	
CO 1	Critically engage with contemporary issues .
CO 2	Critically engage with issues of censorship
CO 3	Critically engage with Indigenous Identities and traditions
CO 4	Critically engage with refugeeism through the texts of study and connect this to real life issues
CO 5	Critically engage with environmental issues
COMMON COURSE SEM II	
Course code: **EN1CCT04**	
Course: **ENGLISH IV: SAVOURING THE CLASSICS**	
On the completion of the course, the students will be able to:	
CO 1	Provide the students with a delectable experience of savouring a representative collection of classics.
CO 2	Give insight into the definition of a classic and its time- testedness.
CO 3	Present with the idea of rereading classics.
CO 4	Throw light upon the different value systems of different ages and lands through literature
CO 5	Familiarise with different kinds of genres of classic literature

COMMON COURSE SEM III	
Course code: **EN1CCT05**	
Course: **ENGLISH V: LITERATURE AND/AS IDENTITY**	
On the completion of the course, the students will be able to:	
CO 1	A sensitive understanding of Diasporic Literature
CO 2	Understand the fault lines in identity formation in the context of partition, war, family
CO 3	Get exposure to life writings of prominent writers/ thinkers
CO 4	Get acquainted with various modes of indigenous literature by ethnic minority groups so as to acquire a deeper understanding of their diverse cultures
CO 5	Create an awareness of alternative identities

COMMON COURSE SEM III	
Course code: **EN1CCT06**	
Course: **ENGLISH VI: ILLUMINATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Realize the value of life and the gift of skills and abilities one is endowed with.
CO 2	Maintain a positive attitude towards life, and be able to appreciate all that we have
CO 3	Learn from the lives of eminent people and the obstacles they have been through.
CO 4	Discern what morally right, and understand the complexities of human nature
CO 5	Help them attain a wider vision of life, the opportunities and various possibilities.

CORE COURSE SEM I	
Course code: **EN1CRT01**	
Course: **METHEDOLOGY OF LITERARY STUDIES**	
On the completion of the course, the students will be able to:	
CO 1	Tenets of traditional methodology of analyzing literature
CO 2	Formal elements of a literary texts and explicate how the text says what it says
CO 3	The ideological underpinnings of a literary text with respect to its production, reception and interpretation
CO 4	Textual creation and analysis from gender perspective
CO 5	Operation of colonial and anti-colonial discourses in the literary space.
CO 6	The issues of subalternity and regionality in the literary domain.
CORE COURSE SEM II	
Course code: **EN2CRT02**	
Course : **INTRODUCING LANGUAGE AND LITERARURE**	
On the completion of the course, the students will be able to:	
CO 1	The evolution and differential traits of the English language till the present time
CO 2	The evolution of literature from antiquity to postmodern times
CO 3	The diversity of genres and techniques of representation and narration
CO 4	The diversity of genres and techniques of representation and narration
CO 5	The emergence of British and American Literature through diverse periods

CORE COURSE SEM III	
Course code: **EN3CRT03**	
Course: **HARMONY OF PROSE**	
On the completion of the course, the students will be able to:	
CO 1	The course introduces the student to the prose writings that are infused with an autobiographical element and personal observations of the essayists.
CO 2	The student gets awareness of the prose style of literary figures discussing areas that include both academic and non-academic topics.
CO 3	The student is sensitized to topics of universal and regional relevance incorporating the narrative techniques of prose
CO 4	The student is introduced to the connection between nationhood and language

CORE COURSE SEM III	
Course code: **EN3CRT03**	
Course: **HARMONY OF PROSE**	
On the completion of the course, the students will be able to:	
CO 1	The course introduces the student to the prose writings that are infused with an autobiographical element and personal observations of the essayists.
CO 2	The student gets awareness of the prose style of literary figures discussing areas that include both academic and non-academic topics.
CO 3	The student is sensitized to topics of universal and regional relevance incorporating the narrative techniques of prose
CO 4	The student is introduced to the connection between nationhood and language

COMMON COURSE SEM IV	
Course code: **EN4CRT05**	
Course: **MODES OF FICTION**	
On the completion of the course, the students will be able to:	
CO 1	Comprehend the categories of British short fiction
CO 2	Comprehend the categories of Non-British short fiction
CO 3	Comprehend and experience the novel as a form of literary and social expression
CO 4	Develop skills of creative thinking
CO 5	Gain skills of critical and value- based thinking

COMMON COURSE SEM IV	
Course code: **EN4CRT06**	
Course: **LANGUAGE AND LINGUISTICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basics of Linguistics
CO 2	Gain familiarity with the sound classification
CO 3	Understand the nuances of pronunciation
CO 4	Understand the kinds of morphemes and semantics
CO 5	Gain familiarity with the different aspects of grammar, and other branches of linguistics

COMMON COURSE SEM V	
Course code: **EN5CRT07**	
Course: **ACTS ON THE STAGE**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the plot, characters and relationships in the play studied
CO 2	Recognizes and critically engages with the major themes
CO 3	Use critical sources to interpret and analyze the text
CO 4	Develop an awareness of the history/backgorund in which the play is written
CO 5	Appreciate and critique drama as an art form

COMMON COURSE SEM V	
Course code: **EN5CRT08**	
Course: **LITERARY CRITICISM AND THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Develop awareness about the major developments in literary criticism from the ancient times to the 20th C.
CO 2	Initiated to the realm of literary theory and major theoretical schools.
CO 3	Develop awareness about the chief strains of Indian literary criticism
CO 4	Analyse short poetical pieces critically.
CO 5	Develop awareness of Neoclassical, Romantic, Victorian and Modern criticism

COMMON COURSE SEM V	
Course code: **EN5CRT09**	
Course: **INDIAN WRITING IN ENGLISH**	
On the completion of the course, the students will be able to:	
CO 1	Develop awareness about the major developments in literary criticism from the ancient times to the 20th C.
CO 2	Initiated to the realm of literary theory and major theoretical schools.
CO 3	Develop awareness about the chief strains of Indian literary criticism
CO 4	Analyse short poetical pieces critically.
CO 5	Develop awareness of Neoclassical, Romantic, Victorian and Modern criticism

CORE COURSE SEM V	
Course code: **EN5CRT01**	
Course: **ENVIRONMENTAL STUDIES AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Sensitize learners to aspects of the environment and offer creative solutions to environmental concerns, based on regional perspectives, beliefs and struggles.
CO 2	Helps the learner understand the environment, sensitize them to marginalised people through a selection of poem, essay and stories
CO 3	Helps the learner to understand environment from a global perspective, examine literary works through eco critical theoretical practices.
CO 4	Learner can explain environmental issues from a scientific perspective
CO 5	Learner is able to understand basic human rights and its legal concerns.

CORE COURSE SEM VI	
Course code: **EN6CRT10**	
Course: **POSTCOLONIAL LITERATURES**	
On the completion of the course, the students will be able to:	
CO 1	Sensitize students to the social, political and cultural aspects of postcolonial societies
CO 2	Acquaint students with the richness and scope of new literatures from formerly colonised countries
CO 3	Interrogate Eurocentric notions about identity and culture
CO 4	Familiarise students with the diverse and complex postcolonial identities and heterogeneous cultures
CO 5	Interrogate the canon and expand the terrain of literary studies

CORE COURSE SEM VI	
Course code: **EN6CRT11**	
Course: **WOMEN WRITING**	
On the completion of the course, the students will be able to:	
CO 1	Gain historical, social and cultural perspectives on gender issues
CO 2	Identify how stereotypical ideas of women were constructed
CO 3	Identify the various ways in which feminist writings subvert patriarchal constructions
CO 4	Critically respond to literature from a feminist perspective
CO 5	Develop a deeper understanding of concepts like womanism, black feminism, requirement of women's writing and identity crisis.
CORE COURSE SEM VI	
Course code: **EN6CRT12**	
Course: **AMERICAN LITERATURE**	
On the completion of the course, the students will be able to:	
CO 1	Become familiar with the evolution of various literary movements in American literature.
CO 2	Get acquainted with the major prose writers in American literary history.
CO 3	Develop an understanding of diverse trends in American poetry.
CO 4	Gain exposure to American culture through representative works of American Fiction.
CO 5	Attain familiarity with some techniques and concerns of modern American Drama.
CORE COURSE SEM VI	
Course code: **EN6CRT13**	
Course: **MODERN WORLD LITERATURES**	
On the completion of the course, the students will be able to:	
CO 1	Reveal how poetry the world over engages in very deep ways with the vicissitudes of life.
CO 2	Reveal how European short stories mirror ethical concerns
CO 3	Reveal how non-European short stories defy genres/regionalities and canonical assumptions to emerge as a platform where poetics and politics fuse.
CO 4	Create among learners an in-depth knowledge of Modernism and Theatre especially knowledge of Absurd and Existential theatre
CO 5	Unfold the ritualistic pattern and the local flavour in Chronicle of a Death Foretold

M.A ENGLISH

CORE COURSE SEM I	
Course code: **EN010101**	
Course: **UP UNTILL CHAUCER: EARLY LITERATURES IN ENGLISH**	
On the completion of the course, the students will be able to:	
CO 1	Make sense of the major themes in Ancient and Medieval English literature as an expression of Anglo-Saxon culture and society as it emerges into a British-consciousness
CO 2	Understand the historical and cultural context of Old and Middle English literature
CO 3	Acquire knowledge of major Old and Middle English literary works and authors such as Chaucer, Gower and Langland
CO 4	Understand the literary style of Old and Middle English, including its poetic forms
CO 5	Understand the social, religious and political themes that are explored in Old and Middle English literature

CORE COURSE SEM I	
Course code: **EN010102**	
Course: **LITERATURES OF THE ENGLISH RENAISSANCE**	
On the completion of the course, the students will be able to:	
CO 1	Understand the social, religious and political themes that are explored in Old and Middle English literature
CO 2	Develop an understanding of Renaissance Drama
CO 3	Get an exposure to critical and theoretical readings of Renaissance Drama
CO 4	Understand the spirit of Renaissance and the idea of Humanism
CO 5	Interpret drama and poetry of the period in the light of Post – Renaissance critical theory.

CORE COURSE SEM I	
Course code: **EN010103**	
Course: **LITERATURES OF THE ENGLISH REVOLUTION/ENLIGHTENMENT**	
On the completion of the course, the students will be able to:	
CO 1	Develop familiarity with the English literary texts which reflect the austere Puritan ideals of the late 17th C
CO 2	Develop an understanding of neoclassical vigour of the 18th c considerably influenced by the philosophy of the Enlightenment
CO 3	Recognise the perspectival shift manifested in the Transitional literature towards the end of this era
CO 4	Understand the characteristics of Restoration Theatre, Comedy of Manners, Anti-sentimental Comedy etc.
CO 5	Trace the beginning of the English novel and writings by women

CORE COURSE SEM I	
Course code: **EN010104**	
Course: **19TH CENTURY ENGLISH LITERATURES**	
On the completion of the course, the students will be able to:	
CO 1	Understand and identify the fundamental premises of the Romantic Movement and the Victorian Age

CO 2	Discern the theoretical and ideological frameworks of these movements
CO 3	Discern and analyse the major trends in poetry
CO 4	Identify and analyze major trends in Prose/ Novel of 19th century England.
CO 5	Discern the major perspectives of Victorian era and culture.

CORE COURSE SEM I	
Course code: **EN010105**	
Course: **LITERARY CRITICISM**	
On the completion of the course, the students will be able to:	
CO 1	Able to engage with the key concepts and texts of literary criticism over different periods.
CO 2	Have theoretical familiarity with the range, approaches and mechanics of classical criticism.
CO 3	Gain a historical overview of major critical perspectives in British literary criticism up to 20th century.
CO 4	Familiarise themselves with some of the earlier trends in 20th century.
CO 5	Get introduced to key concepts in contemporary literary theory

CORE COURSE SEM II	
Course code: **EN010201**	
Course: **MODERNITY AND MODERNISMS**	
On the completion of the course, the students will be able to:	
CO 1	Get a historical and ideological understanding of modernism as a movement and theoretical readings on it.
CO 2	Develop familiarity with the literary trends of the early twentieth century in the context of the sensibility of literary modernism in the wake of the World War
CO 3	Analyze the experimentation in poetry that was a reaction against Romanticism and Victorianism
CO 4	Develop familiarity with the trends in drama like the Theatre of the Absurd, Political Drama etc are understood
CO 5	Get an understanding of narrative elements and techniques of modernist fiction.

CORE COURSE SEM II	
Course code: **EN010202**	
Course: **POSTMODERNISM AND BEYOND**	
On the completion of the course, the students will be able to:	
CO 1	Understand and identify features of postmodern writing
CO 2	Get acquainted with the concept of post-post modernism
CO 3	Get exposed to postmodern poems which are experimental and eclectic, subverting established norms
CO 4	Understand the idea of genre blurring in postmodern novels
CO 5	The student will get have a clear understanding of historiographic metafiction

CORE COURSE SEM II	
Course code: **EN010203**	
Course: **AMERICAN LITERATURES**	
On the completion of the course, the students will be able to:	
CO 1	Understand the evolution of one of the important branches of English literature of the non-British tradition
CO 2	Understand the major conflicts, struggles and movements that are closely connected with the experiences of a group of people struggling to establish themselves as a nation
CO 3	Gained detailed information regarding the processes and texts chiefly responsible for the evolution of American Literature as a separate branch
CO 4	Map the overarching themes and styles in American fiction from Renaissance to Post-war period
CO 5	Comprehend the role of other cultures in the making of a distinctive American tradition

CORE COURSE SEM II	
Course code: **EN010204**	
Course: **ENGLISH LANGUAGE HISTORY AND CONTEMPORARY LINGUISTICS**	
On the completion of the course, the students will be able to:	
CO 1	Attain an historical perspective of English language and the discipline of linguistics
CO 2	Be introduced to topics related to Phonetics and Phonology
CO 3	Get updated on major advancements in theory of language study
CO 4	Understand the mechanism of functions of language in human communication
CO 5	Analyse the different schools of thought in Linguistics

CORE COURSE SEM II	
Course code: **EN010205**	
Course: **THINKING THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Have a clear grasp of the following: Theory, Myth, Structure and Play
CO 2	Able to make a sound distinction between traditional and modern notions of Authorship and Texts
CO 3	Understand the bond between Literature and Psychoanalysis – esp, 'Unconscious and Cognition'
CO 4	Make sense of the Queering of Gender – esp, the notions of Liminality and Transitivity
CO 5	Have an in depth knowledge of Critical Race/Ethnic Studies – esp, 'Self and the Othered-Marginal'

CORE COURSE SEM III	
Course code: **EN010301**	
Course: **READING INDIA**	
On the completion of the course, the students will be able to:	
CO 1	Get an insight into the historical, cultural and literary heritage of India by getting acquainted with major movements and figures of Indian literature in English

CO 2	Get acquainted with the thematic and stylistic aspects of pre-Independence, post-Independence Indian poetry in English, as well as Modernism, Diaspora and issues of Identity
CO 3	Get acquainted with the cultural diversity of India, philosophy and mythology, as well as politics is explored through the Drama module
CO 4	Will be able to identify, evaluate and assess thematic issues in Indian English Fiction relating to nation, myth, caste, identity and gender along with concerns of form and style
CO 5	Address questions of language, nation and aesthetics in translated works.

CORE COURSE SEM III	
Course code: **EN010302**	
Course: **POST COLONIAL FICTION**	
On the completion of the course, the students will be able to:	
CO 1	Become familiar with the writing, reading and critical theoretical practices based on the Postcolonial experience
CO 2	Acquire a conceptual orientation in the area of Postcolonial studies
CO 3	Acquire an India specific orientation in the area of Postcolonial studies
CO 4	Acquire a West Asia specific orientation in the area of Postcolonial studies
CO 5	Acquire an Africa/South America/Caribbean specific orientation in the area of Postcolonial studies

CORE COURSE SEM III	
Course code: **EN010303**	
Course: **BODY, TEXT AND PERFORMANCE**	
On the completion of the course, the students will be able to:	
CO 1	Learn about the scope of performance studies as a discipline
CO 2	Understand the notion of performativity with specific reference to gender performativity
CO 3	Understand how power exerts influence on women's bodies with reference to size, fitness and obstetric practices
CO 4	Identify and critically analyse the performance of power and menace in literary narratives
CO 5	Identify and critically analyse the notion of power and performance in popular cinema

CORE COURSE SEM III	
Course code: **EN010304**	
Course: **LITERATURE AND GENDER**	
On the completion of the course, the students will be able to:	
CO 1	Understand the historical, ideological and cultural concerns in connection with gender.
CO 2	Understand theoretical frameworks interconnecting gender with politics, religion, race and other factors are comprehended
CO 3	Examine how gender connects with communal identity in *ecriture feminine*
CO 4	Be conscious of gender as more than the hetero-normative view,to include the Lesbian and Black perspectives.
CO 5	Get familiar with and identify the politics of gender in the Indian context

CORE COURSE SEM III	
Course code: **EN010305**	
Course: **ETHICS IN/AS LITERATURE**	
On the completion of the course, the students will be able to:	
CO 1	Be familiar the major theoretical interpretations of the narrative and narrative mores
CO 2	Have an understanding of the fabulist lane that stretches beyond what we usually understand as fictional/narrative realism
CO 3	See how fiction has dealt with the issue of disabilities at different levels.
CO 4	Have an awareness about the environment – the natural and the human and the intersectionality between them.
CO 5	Have a clarity regarding issues of Otherness, as it has been tackled by narrative fiction.

CORE COURSE SEM IV	
Course code: **EN010401**	
Course: **CULTURAL STUDIES**	
On the completion of the course, the students will be able to:	
CO 1	Discern how cultural processes and artifacts are produced, shaped, distributed, consumed, and responded to in diverse ways
CO 2	Develop an understanding of the methodologies of representation and the decoding of such social signs as such.
CO 3	Learn about the different modes that Lifestyles assume and offer means by which we can and 'read' the various negotiations of socio-cultural identities.
CO 4	Exposed to the terrain of 'Homo Ludens' – the playing human; draw attention to the poetics and politics of sports-as-myth.
CO 5	Make sense of an assemblage that can be termed 'Manifestoes; to draw attention to the horizon of cultural certitudes, expectations and anxieties.

CORE COURSE SEM IV	
Course code: **EN010402**	
Course: **POST COLONIAL POETRY**	
On the completion of the course, the students will be able to:	
CO 1	Attain conceptual orientation to situate the poetics and politics of Postcolonialisms.
CO 2	Gain exposure to the diversity of poetry coming from the erstwhile colonies of the European colonial empires.
CO 3	See the regional specifics beyond the general discursive constellations.
CO 4	Negotiate issues of sovereignty, language, race, gender, identity and place.
CO 5	Engage themselves with contemporary output in poetry.

CORE COURSE SEM IV	
Course code: **EN820401**	
Course: **MODERN EUROPEAN FICTION**	
On the completion of the course, the students will be able to:	
CO 1	Have a historical perspective of European fiction and recognise the influence of Modernism on prominent writers.
CO 2	Recognize key postmodern elements in European fiction.
CO 3	Connect literary works to the social cultural events that influenced their formation.

CO 4	Identify and critically interpret subversive narrative strategies used by authors.
CO 5	Gain a broad insight into the diversity of styles and themes employed by European writers.

CORE COURSE SEM IV	
Course code: **EN820402**	
Course: **MODERN EUROPEAN DRAMA**	
On the completion of the course, the students will be able to:	
CO 1	Acquire insights into the various trends in Modern European Drama, the ideological foundations of modernism and postmodernism, get introduced to representative works and literary terms like Realism, Naturalism, Metatheatre, Epic Theatre etc.
CO 2	Would be acquainted with representative works of various modernist dramatic modes including Realism, Naturalism
CO 3	Acquire a deeper understanding of Existentialist philosophy, Metatheatre, Epic Theatre etc. through a close reading of representative texts
CO 4	Have deeper knowledge of the Theatre of Absurd and identity crisis. The plays offer a narrative interpretation of existentialism.
CO 5	Have knowledge of European Drama in terms of topics, perspectives, and dramatic literature.

CORE COURSE SEM IV	
Course code: **EN820403**	
Course: **INDIAN POETICS**	
On the completion of the course, the students will be able to:	
CO 1	Get an overview of various schools of Indian Poetics and an in-depth understanding of Rasa and Dhvani
CO 2	Have been exposed to alternative readings of texts and their ideological ramifications
CO 3	Identify the ideologies behind drastic difference in the portrayal of women and men in the narratives
CO 4	Would have got an exposure to Tamil poetics tradition and developed a critical perspective on Tamil poetic texts of Sangam period
CO 5	Get an insight into the historical, cultural and literary heritage of India by getting acquainted with major movements and figures of Indian literature in English comprehended the various aspects of Sanskrit and Tamil epic traditions

2. DEPARTMENT OF MALAYALAM

COMMON COURSE SEM I	
Course code: **ML1CCT01**	
Course: **MALAYALAM I: KATHASAHITHYAM**	
On the completion of the course, the students will be able to:	
CO 1	Learn about the formation and developmental stages of Malayalam short story.
CO 2	Introduction to Malayalam Novel.
CO 3	Developing knowledge about the changes in culture and point of views.
CO 4	Learn to develop wide range of reading habit.
CO 5	Learn to think about the existing scenario in society and in literature.

COMMON COURSE SEM II	
Course code: **ML2CCT02**	
Course: **MALAYALAM II: KAVITHA**	
On the completion of the course, the students will be able to:	
CO 1	Introduction to Malayalam Kavita
CO 2	Enjoying poetry rhythmically and meaningfully.
CO 3	Developing knowledge about the changes in culture and perspectives of life.
CO 4	Learn to develop wide range of reading habit.
CO 5	Learn to understand the trends in poetry.

COMMON COURSE SEM III	
Course code: **ML3CCT03**	
Course: **MALAYALAM III: DRISHYAKALA SAHITHYAM**	
On the completion of the course, the students will be able to:	
CO 1	Experience the rich visual arts tradition of Kerala
CO 2	Gaining knowledge about art forms
CO 3	Comparison with Western arts
CO 4	Understanding the history of the arts
CO 5	Trying to enjoy the arts in the fullest sense

COMMON COURSE SEM IV	
Course code: **ML4CCT04**	
Course: **MALAYALAM III: MALAYALA GADHYARACHANAKAL**	
On the completion of the course, the students will be able to:	
CO 1	Realizing the potential of Malayalam prose.
CO 2	Get to know the famous writers of Malayalam.
CO 3	Hidden facts can be found in works.
CO 4	Recognizes how society influences writers.
CO 5	Understanding the social responsibility of writers.

CORE COURSE SEM I	
Course code: **ML1CRT01**	
Course: **NAVEENA KAVITHA**	
On the completion of the course, the students will be able to:	
CO 1	Acquire Knowledge About Different Sensibilities in Malayalam Poetry
CO 2	Recognize The Trends in Modern and Post-Modern Malayalam Poetry
CO 3	Gain Knowledge About Dalit, Women, Environment Perspectives in Malayalam Poetry
CO 4	Ability To Analyze Poetry and Writing Poetry Reviews
CO 5	Achieve Knowledge About Contemporary Malayalam Poetry-Language, Plurality, Cyber Writing

CORE COURSE SEM I	
Course code: **ML1CMT01**	
Course: **MALAYALATHINTE REETHI SHASTHRAM**	
On the completion of the course, the students will be able to:	
CO 1	Develop the analytical and interpretational skill in Malayalam language and literature with respect to literary and aesthetical studies
CO 2	Ability to describe the diversity of Malayalam Literature

CO 3	Can define the methodology of the study of Malayalam Language and Literature
CO 4	To identify contemporary uses of language &demonstrate the influences of social medias like Twitter, Facebook, blog etc. in our language
CO 5	Capable of evaluating the radical transformation in Culture and outlook in Malayalam Language and Literature

CORE COURSE SEM I	
Course code: **ML1CMT02**	
Course: **NADAKAVUM CINEMAYUM**	
On the completion of the course, the students will be able to:	
CO 1	Basic understanding of Theatre with a Global perspective
CO 2	Understanding Malayalam Theatre
CO 3	Understanding Film with a Global perspective
CO 4	Understanding Malayalam Movies historically and aesthetically
CO 5	Understands the media of film and drama comparatively and acquires the ability to appreciate and evaluate them

CORE COURSE SEM II	
Course code: **ML2CRT02**	
Course: **MALAYALA KAVITHA EZHUTHACHAN MUTHAL KAVITHRAYAM VARE**	
On the completion of the course, the students will be able to:	
CO 1	To develop the Knowledge of medieval literature trends and literary traditions
CO 2	To be capable of familiarizing poetry from medieval to modern trio
CO 3	To learn the characteristics of medieval Malayalam language
CO 4	Capable of evaluating the evolution of Malayalam Language
CO 5	To recognize cultural values and its representation in literature.

CORE COURSE SEM II	
Course code: **ML2CMT03**	
Course: **AADHUNIKA LOKA KAVITHA**	
On the completion of the course, the students will be able to:	
CO 1	Acquire Knowledge About Different Sensibilities in World Poetry
CO 2	Recognize The Trends in Modern World Poetry
CO 3	Colonial Influences and Cultural Impacts in The World Poetry
CO 4	Ability To Analyze Poetry and Writing Poetry Reviews
CO 5	Gain Knowledge About the Influences of World Poetry in Malayalam Poetry
CORE COURSE SEM II	
Course code: **ML2CMT04**	
Course: **FOLKLORE VIGJAANAM**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with interdisciplinary fields.
CO 2	Critical Analysis of History & culture.
CO 3	Recognizes the importance of regional history studies.
CO 4	Exploring the possibilities of contemporary cultural studies
CO 5	Practicing to blend tradition and innovation.

CORE COURSE SEM III	
Course code: **ML3CRT03**	
Course: **KERALASAMSKAARAM POORVA KHATTAM**	
On the completion of the course, the students will be able to:	
CO 1	Create a Common Understanding of History and Culture
CO 2	Introduce the Methodology of Cultural Studies
CO 3	Explore the Possibilities of Local History Writing
CO 4	Understand Kerala Social Life
CO 5	Adopt an Interdisciplinary Approach

CORE COURSE SEM III	
Course code: **ML3CMT05**	
Course: **ORU EZHUTHU KAARAN/EZHUTHU KAARI MADHAVIKUTTY**	
On the completion of the course, the students will be able to:	
CO 1	Explaining about the writer – Madhavikkutty and her stories, poems, autobiographies etc.
CO 2	Analyze the writings with the theory of feminism
CO 3	Analyze the representation of women identity and subjectivity in Mdhavikkutty's writings
CO 4	Explain the narration and narrative techniques in writings.

CORE COURSE SEM III	
Course code: **SC3CMT01**	
Course: **SANAKRIT POETRY AND DRAMA**	
On the completion of the course, the students will be able to:	
CO 1	Understand The Basics of Sanskrit Grammar
CO 2	Understand Classical Sanskrit Poetry
CO 3	Understand The Basics of Sanskrit Literary Theories
CO 4	Familiarize Sanskrit Poets
CO 5	Understand The Techniques in The Compilation of Sanskrit Dictionary

CORE COURSE SEM IV	
Course code: **ML4CRT04**	
Course: **KERALA SAMSKARAM UTHARAGHATTAM**	
On the completion of the course, the students will be able to:	
CO 1	Create a Common Understanding of Modern Kerala History and Culture
CO 2	Introduce the Methodology of Cultural Studies
CO 3	Understand Kerala Social Life
CO 4	Explore the Possibilities of Local History Writing
CO 5	Adopt an Interdisciplinary Approach

CORE COURSE SEM IV	
Course code: **ML4CMT06**	
Course: **AADHUNIKA MALAYALA BHASHA**	
On the completion of the course, the students will be able to:	
CO 1	Learn about the changes that occurred in 19th C and its resemblance on Language.
CO 2	Understands the challenges faced by the language.

CO 3	Understands the concepts of mother tongue and its academic background
CO 4	Understands the different forms of literature formed in the language and its relevance.
CO 5	Understands the different kinds of formal Malayalam.

CORE COURSE SEM IV	
Course code: **SC3CMT02**	
Course: **PROSE, VRUTHA, ALANKARA, THEORIES OF POETICS & GRAMMAR**	
On the completion of the course, the students will be able to:	
CO 1	To Familiarise the Literary Aspects of Sanskrit
CO 2	To Develop Skills in Sanskrit Prose
CO 3	To Familiarise Prosody and Poetics
CO 4	General Awareness of Conjugation and Vibhakthi
CO 5	To Familiarise with Poetic Rules

COMMON COURSE SEM V	
Course code: **ML5CRT05**	
Course: **PARISTHITHI VIJGAANAVUM MANUSHYAVAKAASHA PADANAVUM**	
On the completion of the course, the students will be able to:	
CO 1	Recognizing the need for environmental education.
CO 2	Understanding how human activities affect the environment.
CO 3	Realizing the importance of conserving natural resources.
CO 4	The values of nature conservation are included in the necessary activities.
CO 5	Identify nature conservation as your duty, not a choice.

COMMON COURSE SEM V	
Course code: **ML5CRT06**	
Course: **SAHITHYAMEEMAMSA**	
On the completion of the course, the students will be able to:	
CO 1	Familiarity with Indian aesthetic philosophies.
CO 2	Familiarity with Western aesthetic visions.
CO 3	Comparing different aesthetic visions.
CO 4	Understanding the importance of aesthetics in literary studies.
CO 5	Analyzes different opinions about art and creativity.

COMMON COURSE SEM V	
Course code: **ML5CRT07**	
Course: **CHERUKADHA NOVEL**	
On the completion of the course, the students will be able to:	
CO 1	Learn about the formation and developmental stages of Malayalam short story.
CO 2	Learn about the formation and developmental stages of Malayalam Novel.
CO 3	Developing knowledge about the changes in culture and point of views.
CO 4	Learn to develop wide range of reading habit.
CO 5	Learn to think about the existing scenario in society and in literature.

COMMON COURSE SEM V	
Course code: **ML5CRT08**	
Course: **BHASAH SHASTHRAM**	
On the completion of the course, the students will be able to:	
CO 1	Basic understanding of language
CO 2	Improves language skills by understanding phonetics and phonemics
CO 3	Understanding word formation and sentence formation
CO 4	Understanding semantics and sociological aspects of language
CO 5	Understanding language as Interdisciplinary
COMMON COURSE SEM VI	
Course code: **ML6CRT09**	
Course: **KERALEEYA DHRISHYA KALA**	
On the completion of the course, the students will be able to:	
CO 1	To understand the role of ancient art forms in developing social awareness
CO 2	To be capable of familiarizing visual art forms in Kerala and literary lessons regarding them
CO 3	To learn the characteristics of various art forms
CO 4	To analyze the socio-cultural aspects of various art forms in Kerala
CO 5	To enable them to understand art forms as a social product
COMMON COURSE SEM VI	
Course code: **ML6CRT10**	
Course: **PRACHEENA SAHITHYAM**	
On the completion of the course, the students will be able to:	
CO 1	Developing basics ideas about the identity of Malayalam
CO 2	Introduction to the early Malayalam Literature
CO 3	Literature as a representation of Culture of concerned years.
CO 4	Knowing literature and peculiarities of its language.
CO 5	Literature as means for studying language history
COMMON COURSE SEM VI	
Course code: **ML6CRT11**	
GADHYA SAHITHYAM NIRUPANAM	
On the completion of the course, the students will be able to:	
CO 1	Malayalam critics are introduced through articles
CO 2	Identifies Different stages of Criticism
CO 3	Understanding Criticism Patterns
CO 4	Introducing prose writing.
CO 5	Covers different reading styles of prose literature.
CORE ELECTIVE COURSE SEM VI	
Course code: **ML6CRT12**	
Course: **VYAKARANAM, BHASHACHARITRAM**	
On the completion of the course, the students will be able to:	
CO 1	Developing basic knowledge about Malayalam
CO 2	Developing interests in Grammar Studies
CO 3	Understanding the structure of Malayalam
CO 4	Basic knowledge in the history of Malayalam
CO 5	Language as an ever-changing phenomenon.

CORE ELECTIVE COURSE SEM VI	
Course code: **ML6CBT01**	
Course: **MALAYALATHILE STHREE RACHANAKAL**	
On the completion of the course, the students will be able to:	
CO 1	Acquire Knowledge About Women Writing
CO 2	Recognize The Politics of Feminist Theories
CO 3	Gain Knowledge About Women Perspectives in Malayalam Literature
CO 4	Ability To Read Literature in A Feminist Perspective
CO 5	Acquire Knowledge About the Language, New Trend and Rereading in Contemporary Women Writing in Malayalam

M.A MALAYALAM

CORE COURSE SEM I	
Course code: **ML010101**	
Course: **KAVITHA, PRACHEENAM, MADHYAKALAM**	
On the completion of the course, the students will be able to:	
CO 1	Acquire Knowledge about the history of Ancient Malayalam Poetry.
CO 2	Understand the history and development of Nadan Pattukal, Pattu sahithyam and Manipravala sahithyam
CO 3	Acquire Knowledge about the early Malayalam poetry through the detailed study of its literature.
CO 4	Ability to analyse ancient literary texts.
CO 5	Recognise the language, philosophy, and aesthetic side of ancient Malayalam literature

CORE COURSE SEM I	
Course code: **ML010102**	
Course: **MALAYALABHASHA CHARITHRAVUM VARTHAMANAVUM**	
On the completion of the course, the students will be able to:	
CO 1	Making participants to critically Understand the historical development of Malayalam Language
CO 2	To illustrate the influences of different languages in the development of Malayalam Prose.
CO 3	To recognize the relation of social development and mother tongue
CO 4	For developing an aptitude about language as an instrument of production, development and critique of power
CO 5	Able to identify contemporary uses of language &demonstrate the influences of social media twitter, Facebook, blog etc. in our language

CORE COURSE SEM I	
Course code: **ML010103**	
Course: **MALAYALA CHERUKADHA**	
On the completion of the course, the students will be able to:	
CO 1	Understand the politics and aesthetics of the short story as a narrative form
CO 2	Introduce new trends in short story writing
CO 3	Introduce the Methodology of Cultural studies
CO 4	Adopt an Interdisciplinary Approach
CO 5	Introduce the Origin and development of the Malayalam short story

CORE COURSE SEM I	
Course code: **ML010104**	
Course: **SAHITHYARACHANASANKETHANGAL**	
On the completion of the course, the students will be able to:	
CO 1	Basic understanding of Literary devises
CO 2	Understanding of Literary Genres
CO 3	Understanding Alankara –Figurative speech
CO 4	Understanding western Literary Devises
CO 5	Understands Rhythm, Meter

CORE COURSE SEM I	
Course code: **ML 010105**	
Course: **BHASHAYUM SAHITHYAVUM**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basics of Sanskrit Grammar
CO 2	Understand Classical Sanskrit Poetry and Prose
CO 3	Understand Norms and Principles of Sanskrit Dramatology
CO 4	Familiarise basics of Indian Philosophy
CO 5	Create awareness of contribution of Kerala to Sanskrit Lit.
CORE COURSE SEM II	
Course code: **ML010201**	
Course: **AADHUNIKA MALAYALA KAVITHA ONNAM KHATTAM**	
On the completion of the course, the students will be able to:	
CO 1	Explain the features of Malayalam poetry in the first phase of modernity. Illustrate the influence of English education in Malayalam poetry
CO 2	Printing and emergence of periodicals in the development of Malayalam language.
CO 3	Analyze the influence of renaissance, Nationalism and labour movements in Malayalam Poetry
CO 4	Analyze the different poetic devices such as romanticism, mysticism, symbolism, imagism and realism.
CO 5	Analyze the works of Asan, Ulloor and Vallathol and compare the tools they used to create poems.

CORE COURSE SEM II	
Course code: **ML010202**	
Course: **BHASHASHASTRAM**	
On the completion of the course, the students will be able to:	
CO 1	Higher level Basic understanding of language with Phonetic knowledge
CO 2	Improves language skills by understanding phonemics
CO 3	Understanding sentence formation and semantics
CO 4	Understanding sociological aspects of language
CO 5	Understanding language diachronically and Understanding language as interdisciplinary

CORE COURSE SEM II
Course code: **ML010203**
Course: **KERALA SAMSKARAM**
On the completion of the course, the students will be able to:

CO 1	Learn about Kerala History and culture combined with language and literature
CO 2	Understand the Nature of Power structures that shape different cultures
CO 3	Explore the possibilities of local History writing
CO 4	Adopt an inter-disciplinary Approach
CO 5	Introduce the Methodology of Cultural studies

CORE COURSE SEM II	
Course code: **ML010204**	
Course: **MALAYALA NOVEL**	
On the completion of the course, the students will be able to:	
CO 1	Acquire Knowledge About the Process of Evolution of Novel Literature in Malayalam
CO 2	Recognise The Importance of Colonial Modernity in The Study of Early Malayalam Novels
CO 3	Understand Different Narrative Techniques in Malayalam Novel Literature
CO 4	Acquire Skills for Theoritical Analysis of Novels
CO 5	Understand The Importance of Dalit, Women, Environment Aesthetics in The Study Of Novels

CORE COURSE SEM II	
Course code: **ML010205**	
Course: **BHARATHEEYA SAHITYA SIDHANTHANGAL**	
On the completion of the course, the students will be able to:	
CO 1	Understand Critically the History of Sanskrit Literary Theories
CO 2	Evaluate Literature in General by applying Sanskrit Literary Theories
CO 3	Develop Aesthitic and Cultural Values and promote the virtues of Life
CO 4	Understand the new trends in Sanskrit Literature
CO 5	Understand critically the chronological issues of Sanskrit Poetry

CORE COURSE SEM III	
Course code: **ML010301**	
Course: **AADHUNIKA MALAYALA KAVITHA RANDAAM KHATTAM**	
On the completion of the course, the students will be able to:	
CO 1	Understanding the Conflict between tradition and modernity
CO 2	Understanding Political Modernity in an aesthetical way
CO 3	Acquiring critical knowledge on modernity and understands initial phase of post modern poetry
CO 4	Understanding micro politics in poems
CO 5	Acquiring knowledge on cyber space and poems

CORE COURSE SEM III	
Course code: **ML010302**	
Course: **MALAYALABHASHA VYAKARANAM**	
On the completion of the course, the students will be able to:	
CO 1	Evaluate the basic concepts of Malayalam Grammar.
CO 2	Analyze the concepts of Noun, Verb, Adjective, Case, Syntax etc.

CO 3	Explain the relevance of Keralapanineeyam, Malayala Bhashavyakaranam, Vyakarana mithram etc.
CO 4	Explain the history of language through ages.
CO 5	Illustrate the evolution of Malayalam Syntax.

CORE COURSE SEM III	
Course code: **ML010303**	
Course: **MALAYALANIROOPANAM**	
On the completion of the course, the students will be able to:	
CO 1	Able to understand the historical development of Malayalam Criticism
CO 2	To evaluate literary theory and criticism
CO 3	Making Familiarise with literary philosophies and aesthetic vision
CO 4	To develop an aptitude for critical analysis of literary works
CO 5	Capable to interpret literary works in the light of various o critical approaches

CORE COURSE SEM III	
Course code: **ML010304**	
Course: **DRISHYAKALA SAHITHYAM**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate the history of ritualistic and non- ritualistic folk-art forms of Kerala.
CO 2	Explain the history and development of classical art forms.
CO 3	Classify the distinct features of different art forms through the detailed study of its literature.
CO 4	Analyze the possibilities or cultural impacts that leads to the formation of folk arts.
CO 5	Explain the literature form of different types of dance &music.

CORE COURSE SEM III	
Course code: **ML010305**	
Course: **PASCHATHYA SAHITHYA SIDHANDANGAL**	
On the completion of the course, the students will be able to:	
CO 1	Understand influence of Western Literary theories on the development of Malayalam literature
CO 2	Adopt an interdisciplinary approach to the study of literary theory
CO 3	Understand the background to the emergence of literary theories
CO 4	Explore the Philosophical dimensions of literature
CO 5	Study new approaches in Western Literary theory

CORE COURSE SEM IV	
Course code: **ML0100401**	
Course: **NADAKAVUM CINEMAYUM**	
On the completion of the course, the students will be able to:	
CO 1	Higher level Basic understanding of Indian Theatre with a Global perspective
CO 2	Understanding Malayalam Theatre

CO 3	Higher level Understanding of Film with a Global perspective
CO 4	Understanding Indian Cinema generally and Malayalam Movies historically and aesthetically
CO 5	Acquiring institutional knowledge on Movie and Theatre

CORE COURSE SEM IV	
Course code: **ML0100402**	
Course: **SAHITHYA CHARITHRA VIGJAANEEYAVUM GAVESHANATHINTE REETHI SHASTHRAVUM**	
On the completion of the course, the students will be able to:	
CO 1	To identify the tradition of literary history writings in Malayalam language and literature
CO 2	Creating an aptitude for critical analysis of literary history
CO 3	Able to understand the Ideology and politics in writing of literary history
CO 4	Capable for evaluation of the ideology of historical Narrations & General awareness about Research Methodology
CO 5	To Understand the modern trends in literary history

CORE COURSE SEM IV	
Course code: **ML800401**	
Course: **VIVARTHANA SAHITHYAM**	
On the completion of the course, the students will be able to:	
CO 1	A Theoretical and Applied Study of translation
CO 2	Understand the Cultural exchange Potential of Translation
CO 3	Introduce the methodology of translation studies
CO 4	Provide training in translation
CO 5	Understand new trends in Malayalam Translation

CORE COURSE SEM IV	
Course code: **ML800402**	
Course: **DALITH STHREE PARISTHITHI SAHITHYA VICHAARAM**	
On the completion of the course, the students will be able to:	
CO 1	Understand The Trends in Post Modern Literature
CO 2	Familiarize Dalit Aesthetics and Literature
CO 3	Realize Importance of Feminist Criticism and Women Literature in Malayalam
CO 4	Study Ecotheory and Literature
CO 5	Acquire Skills to Analyze Dalit, Echo, Women Literature
CORE COURSE SEM IV	
Course code: **ML800403**	
Course: **CYBER SAMSKAARAVUM SAHITHYAVUM**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate the basic concepts about information technologies like internet, multimedia, blog, face book etc.
CO 2	Analyze the cyber culture.
CO 3	Illustrate the cyber journalism, troll, meme etc.
CO 4	Explain the growth of Malayalam language in cyber space.
CO 5	Demonstrate the new trends in cyber literature.

3. DEPARTMENT OF HINDI

COMMON COURSE SEM I	
Course code: **HNICCT01**	
Course: **PROSE AND ONE ACT PLAYS**	
On the completion of the course, the students will be able to:	
CO 1	Apply the acquired knowledge related to literary works (prose & one-act plays) as well as literary persons in their own words
CO 2	Provide summary or details of the learned literary forms (prose & one-act plays) thereby justifying their understanding ability
CO 3	Analyse and interpret various contexts referred in the literary forms (prose & one-act plays) regarding the present challenging era.
CO 4	Critically examine and evaluate the views of the writer thereby creating the demanded conclusion

COMMON COURSE SEM II	
Course code: **HN2CCT01**	
Course: **SHORT STORIES AND NOVELS**	
On the completion of the course, the students will be able to:	
CO 1	Apply the acquired knowledge related to literary works (short stories & novels) as well as literary persons in their own words
CO 2	Provide summary or details of the learned literary forms (short stories & novels) thereby justifying their understanding ability
CO 3	Analyse and interpret various contexts referred in the literary forms (short stories & novels) regarding the present challenging era
CO 4	Critically examine and evaluate the views of the writer thereby creating the demanded conclusion

COMMON COURSE SEM III	
Course code: **HN3CCT01**	
Course: **POETRY GRAMMER AND TRANSLATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Apply the acquired knowledge related to literary works (poetry)as well as Literary persons in their own words
CO 2	Provide summary or details of the learned literary forms (poetry)thereby justifying their understanding ability.
CO 3	Analyse and interpret various contexts referred in the syllabus portions of Grammar and Translation to confidently deal with the present challenging era
CO 4	Critically examine and evaluate the views of the writer thereby creating the demanded conclusion
COMMON COURSE SEM IV	
Course code: **HN4CCT01**	
Course: **DRAMA AND LONG POEM**	
On the completion of the course, the students will be able to:	
CO 1	Apply the acquired knowledge related to literary works (drama and long poem) as well as Literary persons in their own words
CO 2	Provide summary or details of the learned literary forms (drama and long poem) thereby justifying their understanding ability
CO 3	Analyse and interpret various contexts referred in the syllabus portions of (drama and long poem) to confidently deal with the present challenging era

CO 4	Critically examine and evaluate the views of the writer thereby creating the demanded conclusion

4.DEPARTMENT OF MATHEMATICS

B.Sc Mathematics

CORE COURSE SEM I	
Course code:	
Course**: FOUNDATION OF MATHEMATICS**	
On the completion of the course, the students will be able to:	
CO 1	Prove statements about sets and functions
CO 2	Familiarise basic concepts of logic
CO 3	Analyze statements using truth tables
CO 4	Construct simple proofs.
CO 5	Familiarize mathematical Symbols and standard methods of proofs.

CORE COURSE SEM II	
Course code:	
Course**: ANALYTIC GEOMETRY, TRIGONOMETRY AND DIFFERENTIAL CALCULUS**	
On the completion of the course, the students will be able to:	
CO 1	Find the equation to tangent, normal at a point on a conic
CO 2	Find the polar equation of a line, circle, tangent and normal to conics
CO 3	Familiarize real and imaginary parts of a circular and hyperbolic functions of a complex variable
CO 4	Find the higher order derivative of the product of two functions
CO 5	Find limits of indeterminate forms

CORE COURSE SEM II	
Course code:	
Course**: CALCULUS**	
On the completion of the course, the students will be able to:	
CO 1	Expand a function using Taylor's and Maclaurin's series.
CO 2	Conceive the concept of asymptotes and obtain their equations.
CO 3	Conceive the concept of asymptotes and obtain their equations.
CO 4	Find the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form.
CO 5	Find the area and volume by applying the techniques of double and triple integrals

CORE COURSE SEM II	
Course code:	
Course**: VECTOR CALCULUS, THEORY OF NUMBERS AND LAPLACE TRANSFORM**	
On the completion of the course, the students will be able to:	
CO 1	Parametrize lines planes in space and surfaces
CO 2	Differentiate vector valued functions
CO 3	Find arc length and unit tangent vector, curvature and the unit normal vector, tangential and normal components of acceleration

CO 4	Find directional derivatives, gradient vectors, tangent planes and normal lines
CO 5	Familiarize line integrals and surface integrals
CO 6	Find work, circulation and flux, conservative fields and potential functions
CO 7	Apply Green's theorem, Stokes' theorem and Divergence theorem
CO 8	Familiarize with congruence and its properties

CORE COURSE SEM II	
Course code:	
Course**: CALCULUS**	
On the completion of the course, the students will be able to:	
CO 1	Expand a function using Taylor's and Maclaurin's series.
CO 2	Conceive the concept of asymptotes and obtain their equations.
CO 3	Conceive the concept of asymptotes and obtain their equations.
CO 4	Find the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form.
CO 5	Find the area and volume by applying the techniques of double and triple integrals

CORE COURSE SEM II	
Course code:	
Course**: MATHEMATICAL ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the algebraic and order properties of R, The Completeness Property of R
CO 2	Familiarize with sequences and their Limits
CO 3	Familiarize with series and get used to tests for convergence and absolute convergence
CO 4	Find limits of functions

CORE COURSE SEM	
Course code:	
Course**: DIFFERENTIAL EQUATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Obtain an integrating factor which may reduce a given differential equation into an exact one and eventually provide its solution
CO 2	Identify and obtain the solution of Clairaut's equation.
CO 3	Identify and obtain the solution of Clairaut's equation.
CO 4	Familiarize the orthogonal trajectory of the system of curves on a given surface.
CO 5	Method of solution of the differential equation $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$
CO 6	Describe the origin of partial differential equation and distinguish the integrals of first order linear partial differential equation into complete, general and singular integrals.
CO 7	Use Lagrange's method for solving the first order linear partial differential equation

CORE COURSE SEM	
Course code:	
Course**: ABSTRACT ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with Groups and subgroups, Isomorphic binary structures, elementary properties of groups, finite groups and group tables
CO 2	Understand the concepts of Homomorphism and Isomorphism
CO 3	Identify different types of groups- normal subgroup, simple group, cyclic group
CO 4	Study Cayley's Theorem, Theorem of Lagrange, Fundamental homomorphism Theorem
CO 5	Construct group tables and subgroup diagrams.
CO 6	Familiarize with permutations and its properties
CO 7	Conceive the concepts of Rings, fields, Integral domains

CORE COURSE SEM	
Course code:	
Course**: HUMAN RIGHTS AND MATHEMATICS FOR ENVIORNMENTAL STUDIES**	
On the completion of the course, the students will be able to:	
CO 1	Encourage students to research, investigate how and why things happen, and make their own decisions about complex environmental issues. By developing and enhancing critical and creative thinking skills, it helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.
CO 2	Understand how their decisions and actions affect the environment, builds knowledge and skills necessary to address complex environmental issues, as well as ways we can take action to keep our environment healthy and sustainable for the future, encourage character building, and develop positive attitudes and values.
CO 3	Develop the sense of awareness among the students about the environment and its various problems and to help the students in realizing the inter-relationship between man and environment for protecting the nature and natural resources.
CO 4	Acquire the basic knowledge about environment and to inform the students about the social norms that provide unity with environmental characteristics and create positive attitude about the environment

CORE COURSE SEM VI	
Course code: **MM6CRT01**	
Course**: REAL ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with Continuous Functions and Uniform continuityof functions
CO 2	Apply Mean Value Theorem, L' Hospital Rule and Taylor's Theorem
CO 3	Understand the Riemann Integral and Riemann Integrable Functions
CO 4	Familiarize with sequence and series of functions
CO 5	Understand Point wise and Uniform Convergence, Interchange of Limits.

CORE COURSE SEM VI
Course code: **MM6CRT02**
Course**: GRAPH THEORY AND METRIC SPACES**

On the completion of the course, the students will be able to:	
CO 1	Familiarize with graphs, sub graphs, paths and cycles
CO 2	Represent graphs in matrix form
CO 3	Conceive the ideas of trees, Bridges, Spanning trees, Cut vertices and Connectivity.
CO 4	Familiarize with Euler graphs and Hamiltonian graphs
CO 5	Conceive the concepts of Metric Spaces, Open sets, Closed Sets
CO 6	Understand convergence in metric spaces and will be familiar with completeness

CORE COURSE SEM VI	
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CO 6	Understand convergence in metric spaces and will be familiar with completeness

CORE COURSE SEM VI	
Course code: **MM6CRT03**	
Course**: COMPLEX ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Conceive the concept of analytic functions
CO 2	Familiar with the elementary complex functions and their properties
CO 3	Familiar with the theory and techniques of complex integration
CO 4	Familiar with the theory and application of the power series expansion of analytic functions

CORE COURSE SEM VI	
Course code: **MM6CRT04**	
Course**: LINEAR ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Conceive the concept of analytic functions
CO 2	Understand the theory and concepts of matrices in a broader sense
CO 3	Familiarise with vector spaces, subspaces, linear combination of vectors, spanning set, linear independence and basis.
CO 4	Conceive the concepts of Linear transformations and Linear isomorphism.
CO 5	Understand the application of matrices in vector spaces
CO 6	Familiarise with Eigen values, Eigenvectors and Eigen space.

CORE COURSE SEM VI	
Course code: **MM6CBT01**	
Course**: OPERATIONS RESEARCH**	
On the completion of the course, the students will be able to:	
CO 1	Define a Euclidean space, a vector space and its basis.
CO 2	Write a given LPP in standard form and in a canonical form
CO 3	Identify a feasible solution, a basic feasible solution, and an optimal solution using simplex method.
CO 4	Identify the Transportation Problem and formulate it as an LPP and hence solve the problem
CO 5	Determine that an Assignment problem is a special case of LPP and hence solve by Hungarian method.
CO 6	Identify the queueing models.

CORE COURSE SEM VI	
Course code: **MM5GET02**	
Course**: APPLICABLE MATHEMATICS**	
On the completion of the course, the students will be able to:	
CO 1	Prepare students of all streams, particularly those with arts and commerce back ground for their higher studies.
CO 2	Solve logical problems for competitive examinations
CO 3	Familiarise with the theories of basic Mathematics and their simple applications
CO 4	Understand the basic concepts of trigonometry and calculus

COMPLEMENTARY COURSES (to B.Sc. Physics/Chemistry)	
Course code: **MM1CMT01**	
Course**: PARTIAL DIFFERENTIATION, MATRICES, TRIGONOMETRY AND NUMERICALMETHODS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise functions of several variables
CO 2	Apply chain rule to find partial derivatives
CO 3	Conceive the basic concepts of matrices such as rank of a matrix, Characteristic equation, Characteristic roots, and characteristic vectors of a square matrix
CO 4	Solve system of Linear equations using Matrices

CO 5	Find the sum of infinite series
CO 6	Familiarize real and imaginary parts of a circular and hyperbolic functions of a complex variable
CO 7	Use numerical methods to solve higher order algebraic equations and transcendental equations

COMPLEMENTARY COURSES (to B.Sc. Physics/Chemistry)	
Course code: **MM2CMT01**	
Course**: INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Use the tools of integration to find volume ,arc length ,area of surface of revolution
CO 2	Find the area and volume by applying the techniques of double and triple integrals
CO 3	Find solutions to Ordinary Differential Equations like variable separable, Linear and Bernoulli equations
CO 4	Generate Partial Differential Equations
CO 5	Solve the differential equation $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$
CO 6	Use Lagrange's method for solving the first order linear partial differential equation

COMPLEMENTARY COURSES (to B.Sc. Physics/Chemistry)	
Course code: **MM3CMT01**	
Course**: VECTOR CALCULUS, ANALYTIC GEOMETRY AND ABSTRACT ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Differentiate vector valued functions
CO 2	Find arc length and unit tangent vector, curvature and the unit normal vector, tangential and normal components of acceleration
CO 3	Find directional derivatives, gradient vectors, tangent planes and normal lines
CO 4	Familiarize line integrals and surface integrals
CO 5	Find work, circulation and flux, conservative fields and potential functions
CO 6	Apply Green's theorem, Stokes' theorem and Divergence theorem
CO 7	Sketch conics and solve problems in conic sections
CO 8	Familiarize basic concepts of Abstract Algebra like Groups , Subgroups and Homomorphism

COMPLEMENTARY COURSE (to B.Sc. Physics/Chemistry)	
Course code: **MM4CMT01**	
Course**: FOURIER SERIES, LAPLACE TRANSFORM AND COMPLEX ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Find Fourier series of functions
CO 2	Solve problems involving Fourier Series and Legendre polynomials
CO 3	Apply Power series method to solve differential equations
CO 4	Familiarize Laplace transform and its properties
CO 5	Apply Laplace transforms to solve differential equations
CO 6	Conceive the concept of analytic functions
CO 7	Familiar with the theory and techniques of complex integration

COMPLEMENTARY COURSE (to B.A. Economics)	
Course code: **MM1CMT04**	
Course**: GRAPHING FUNCTIONS, EQUATIONS, DIFFERENTIAL CALCULUS AND LOGARTHIMIC AND EXPONENTIAL FUNCTION**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise linear equations, functions and graphing functions.
CO 2	Find solutions to quadratic equations and system of linear equations
CO 3	Understand the basic concepts of differential calculus and its applications
CO 4	Familiarise exponential and logarithmic functions
CO 5	Compute simple and compound interest
CO 6	Apply the above theories in business and economics

COMPLEMENTARY COURSE (to B.A. Economics)	
Course code: **MM2CMT04**	
Course **MATRIX, LINEAR PROGRAMMING AND INTEGRAL CALCULUS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise Matrices and basic operations on Matrices
CO 2	Use matrix method to solve linear equations
CO 3	Solve Linear Programming Problems
CO 4	Familiarize the basic concept of Integral Calculus
CO 5	Apply integration to find area under a curve and area between curves
CO 6	Understand functions of several variables
CO 7	Apply the above theories in business and economics

COMPLEMENTARY COURSE (to B.Sc. Computer Science)	
Course code: **MM1CMT03**	
Course **DISCRETE MATHEMATICS(I)**	
On the completion of the course, the students will be able to:	
CO 1	Understand basic concepts of sets and functions
CO 2	Familiarise basic concepts of logic
CO 3	Analyze statements using truth tables
CO 4	Familiarize with congruence and its properties

COMPLEMENTARY COURSE (to B.Sc. Computer Science)	
Course code: **MM2CMT03**	
Course **: DISCRETE MATHEMATICS (II)**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with graphs, sub graphs, paths and cycles
CO 2	Represent graphs in matrix form
CO 3	Conceive the ideas of trees, Bridges, Spanning trees
CO 4	Understand Boolean Function
CO 5	Represent Boolean Functions and Logic Gates
CO 6	Conceive the basic concepts of matrices such as rank of a matrix, Characteristic equation, Characteristic roots, and characteristic vectors of a square matrix

M.Sc MATHEMATICS

CORE COURSE SEM I	
Course code: **MM2CMT03**	
Course **: ABSTRACT ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize Direct products, finitely generated Abelian groups, factor groups.
CO 2	Understand inner automorphism, group action on sets isotropy subgroups
CO 3	Apply G-sets to counting
CO 4	Understand and apply Isomorphism theorems and Sylow theorems
CO 5	Conceive more on the field of quotients of an integral domain and factor rings
CO 6	Factorise polynomials over a field

CORE COURSE SEM I	
Course code: **ME010102**	
Course **: LINEAR ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Conceive more on the theory of Vector spaces
CO 2	Understand the algebra of linear transformations and linear functionals
CO 3	Represent transformations by matrices and find transpose of a linear transformation
CO 4	Familiarize general properties of determinant and applications
CO 5	Understand elementary canonical forms, characteristic values, annihilatory polynomials, invariant subspaces, Direct sum Decompositions

CORE COURSE SEM I	
Course code: **ME010103**	
Course **: BASIC TOPOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize topological spaces, bases and subbases, subspaces
CO 2	Understand Closures, Neighbourhoods, Interior and Accumulation points
CO 3	Conceive the concepts of continuous functions and Quotient spaces
CO 4	Identify spaces with special properties like compactness and Lindell off ness, second countability and their properties
CO 5	Understand Connectedness, Local connectedness and Path connectedness of spaces
CO 6	Acquire basic concepts of Separation axioms and understand hierarchy of separation axioms

CORE COURSE SEM I	
Course code: **ME010104**	
Course **: BASIC TOPOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand functions of bounded variation, total variation, additive property of total variation and their properties
CO 2	Express total variation on (a, x) as a functions of x and functions of bounded variation as the difference of increasing functions

CO 3	Familiarise rectifiable path and arc length, additive and continuity properties of arc length, equivalence of paths and change of parameter
CO 4	Conceive the basic concepts and properties of the Riemann-Stieltjes Integral
CO 5	Integrate vector valued functions
CO 6	Attain a deeper and wider knowledge of Sequence and Series of Functions
CO 7	Understand algebraic completeness of complex field

CORE COURSE SEM I	
Course code: **ME010105**	
Course **: GRAPH THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise automorphism of a simple graph
CO 2	Understand basic concepts of directed Graphs and tournaments
CO 3	Conceive more on connectivity like blocks, cyclical edge connectivity
CO 4	Find the centres and cancroids of trees
CO 5	Apply Cayley's formula to solve problems
CO 6	Understand more about Eulerian and Hamiltonian Graphs
CO 7	Acquire knowledge on Graph Colorings and its applications
CO 8	Familiarise planar graphs and their properties including Euler Formula and its Consequences, Dual of a Plane Graph
CO 9	Understand Spectral Properties of Graphs

CORE COURSE SEM II	
Course code: **ME010201**	
Course **: ADVANCED ABSTRACT ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise extension fields, algebraic extensions
CO 2	Understand geometric constructions finite fields
CO 3	Acquire knowledge about Gaussian integers and multiplicative norms
CO 4	Find automorphism of fields
CO 5	Understand isomorphism extension theorem
CO 6	Understand Galois Theory and its applications

CORE COURSE SEM II	
Course code: **ME010202**	
Course **: ADVANCED TOPOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Conceive more on compactness and Separation axioms
CO 2	Understand and apply the Urysohn Characterisation of normality and Tietze Characterisation of normality
CO 3	Familiarize the product space and product topology
CO 4	Identify productive properties
CO 5	Understand and apply embedding lemma, Tychonoff Embedding and The Urysohn Metrisation Theorem
CO 6	Identify different forms of compactness
CO 7	Familiarise the idea of Homotopy of paths.
CORE COURSE SEM II	
Course code: **ME010203**	
Course **: NUMERICAL ANALYSIS WITH PYTHON**	

On the completion of the course, the students will be able to:	
CO 1	Identify Symbols and Symbolic Operations
CO 2	Solve Equations and Plot Using SymPy
CO 3	Apply the techniques of differentiation and integration to solve problems
CO 4	Program problems to verify the continuity of a function at a point, area between two curves and finding the length of a curve
CO 5	Familiarise Interpolation and Curve Fitting
CO 6	Find roots of equations using iterative methods
CO 7	Apply Gauss Elimination Method, Doolittle's Decomposition Method to solve problems
CO 8	Understand and apply Numerical Integration methods
CO 9	Develop program to solve problems applying numerical differentiation and integration

CORE COURSE SEM II	
Course code: **ME010204**	
Course **: COMPLEX ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise Riemann Sphere and Stereographic projection
CO 2	Understand and apply theorems on convergence of the power series
CO 3	Solve problems related to analytic functions in regions, conformal mappings and linear transformations
CO 4	Familiar with the theory and techniques of complex integration
CO 5	Find higher order derivatives of complex functions
CO 6	Understand Morera's Theorem, Liouville's Theorem, Fundamental Theorem and their applications in solving problems
CO 7	Integrate complex valued functions using residue theorem
CO 8	Evaluate definite integrals

CORE COURSE SEM II	
Course code: **ME010205**	
Course **: MEASURE THEORY AND INTEGRATION**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize Lebesgue outer measure, The σalgebra of Lebesgue measurable sets, Outer and inner approximation of Lebesgue measurable sets
CO 2	Understand continuity and Borel-Cantelli Lemma
CO 3	Conceive the idea of Lebesgue Measurable Functions and Lebesgue Integration
CO 4	Understand and apply the Riemann Integral and the Lebesgue integral
CO 5	Familiarize General Measure Space and Measurable Functions
CO 6	Understand and apply Integration over General Measure Space and Product Measures
CO 7	Apply the theorems of Fubini and Tonelli

CORE COURSE SEM III
Course code: **ME010301**
Course **: ADVANCED COMPLEX ANALYSIS**
On the completion of the course, the students will be able to:

CO 1	Familiarize Harmonic Functions and its basic properties
CO 2	Understand and apply the Mean-Value Property, Poisson's Formula, Schwarz's theorem and the Reflection Principle
CO 3	Familiar with the theory and applications of the power series expansions
CO 4	Apply Jensen's Formula and Hadamard's Theorem to solve problems
CO 5	Familiarize the Riemann Zeta Function and its properties
CO 6	Understand and apply the Riemann Mapping Theorem, Boundary Behaviour and the Reflection Principle
CO 7	Conceive the idea of the Weierstrass' ρ-function and the functions sζ and zσ

CORE COURSE SEM III	
Course code: **ME010302**	
Course **: PARTIAL DIFFERENTIAL EQUATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize the orthogonal trajectory of the system of curves on a given surface
CO 2	Solve differential equation of the form $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$
CO 3	Identify Pfaffian differential forms and solve of Pfaffian differential equations in three variables
CO 4	Find integral surfaces passing through a given curve and surfaces orthogonal to a given system of surfaces
CO 5	Understand nonlinear partial differential equation of the first order
CO 6	Solve different types of first order equations
CO 7	Find solutions of Linear partial differential equations with constant coefficients
CO 8	Solve non linear equations of the second order
CO 9	Familiarize families of equipotential surfaces

CORE COURSE SEM III	
Course code: **ME010303**	
Course **: MULTIVARIATE CALCULUS AND INTEGRAL TRANSFORMS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize other forms of Fourier series
CO 2	Understand the Fourier integral theorem, the exponential form of the Fourier integral theorem and the convolution theorem for Fourier transforms
CO 3	Conceive the theory of directional derivatives and continuity and the total derivative
CO 4	Find the Jacobian matrix of a linear function, the matrix form of the chain rule
CO 5	Understand the mean value theorem for differentiable functions
CO 6	Derive sufficient condition for differentiability
CO 7	Understand the inverse function theorem and the implicit function theorem
CO 8	Familiarize integration of Differential Forms

CORE COURSE SEM III	
Course code: **ME010304**	
Course **: FUNCTIONAL ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize Normed Spaces and its properties
CO 2	Understand compactness of normed spaces
CO 3	Familiarize Linear Operators, Bounded and Continuous Linear Operators and Linear Functionals
CO 4	Normed spaces of operators, Dual space
CO 5	Familiarise Inner Product Space, Hilbert space and further properties
CO 6	Understand orthonormal sets and sequences
CO 7	Derive representation of Functionals on Hilbert Spaces
CO 8	Conceive more on the theory of operators- Hilbert-Adjoint Operator, Self-Adjoint, Unitary and Normal Operators, Adjoint Operators
CO 9	Understand Zorn's lemma, Hahn-Banach theorem, Hahn-Banach theorem for Complex Vector Spaces and Normed Spaces

CORE COURSE SEM III	
Course code: **ME010305**	
Course **: OPTIMIZATION TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Solve linear programming problems
CO 2	Solve General I.L.P. and M.I.L.P problems
CO 3	Familiarise cutting plane methods , branch and bound method
CO 4	Solve Goal programming using graphs
CO 5	Schedule sequential activities
CO 6	Identify duality in the maximum flow problem
CO 7	Understand non-linear programming

CORE COURSE SEM IV	
Course code: **ME010401**	
Course **: SPECTRAL THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Understand category theorem and Uniform Boundedness theorem
CO 2	Familiarise Convergence of Sequences of Operators and Functionals
CO 3	Understand Open Mapping Theorem and Closed Graph Theorem
CO 4	Conceive Spectral Properties of Bounded Linear Operators
CO 5	Use Complex Analysis in Spectral Theory
CO 6	Familiarize Banach Algebras and Properties of Banach Algebras
CO 7	Understand concepts and spectral Properties of compact Linear Operators on Normed spaces
CO 8	Conceive Spectral Properties of Bounded Self adjoint linear operators
CO 9	Understand Projection Operators and properties of Projections

CORE COURSE SEM IV	
Course code: **ME010402**	
Course **: ANALYTIC NUMBER THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the theory of Arithmetic Functions

CO 2	Understand The Möbius function μ(n),The Euler totient function φ(n), and the relation connecting μ and φ
CO 3	Find product of arithmetical functions, Dirichlet inverses and the Möbius inversion formula
CO 4	Familiarize Multiplicative functions and Dirichlet Multiplication
CO 5	Understand The Liouville's function λ(n),The divisor function $\sigma\alpha$(n) and Generalized convolutions
CO 6	Conceive more on the theory Arithmetical functions and its applications
CO 7	Understand some Elementary Theorems on the Distribution of Prime Numbers
CO 8	Acquire deep knowledge on the theory of Congruences
CO 9	Understand more about Quadratic Residues and further properties of Quadratic Residues
CO 10	Familiarise Primitive roots and reduced residue systems

CORE COURSE SEM IV	
Course code: **ME810401**	
Course **: PROBABILITY THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise different approaches to probability
CO 2	Understand and apply Probability Axioms to solve problems
CO 3	Familiarise Probability distribution of Discrete and Continuous random variables
CO 4	Solve problems using Generating Functions and Moment inequalities
CO 5	Understand theories involving multiple random variables
CO 6	Use Cr inequality, Holder's inequality, Cauchy-Schwartz's inequality, Jensen's inequality, Minkowski's inequality to solve problems
CO 7	Familiarise the theory of Convergence of sequence of random variables
CO 8	Understand and apply Weak Law of Large Numbers and Strong Law of Large Numbers
CO 9	Apply Central Limit Theorems to solve application problems

CORE COURSE SEM IV	
Course code: **ME810402**	
Course **: OPERATIONS RESEARCH**	
On the completion of the course, the students will be able to:	
CO 1	Understand and solve Dynamic Programming Problems
CO 2	Understand Computational economy in DP and Serial multistage model
CO 3	Apply D.P to continuous systems
CO 4	Familiarise continuous time random processes such as Steady state probabilities, Birth death processes and the Poisson process
CO 5	Familiarise General Characteristics of Queueing Systems
CO 6	Understand Performance Measures and Markovian Queueing Models
CO 7	Familiarise some deterministic and probabilistic inventory models
CO 8	Understand and solve problems of the classical Economic Order Quantity with and without shortages

CORE COURSE SEM IV	
Course code: **ME810403**	
Course **: CODING THEORY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise with various methods of coding and decoding
CO 2	Understand more general facts of coding theory
CO 3	Understand and solve problems involving Self dual codes, The Golay codes and A double error correction BCH code
CO 4	Understand the applications of Finite fields to coding theory
CO 5	Understand Cyclic Codes and BCH codes

5. DEPARTMENT OF PHYSICS

B.Sc

CORE COURSE SEM I	
Course code: **PH1CRT01**	
Course: **METHODOLOGY AND PERSPECTIVES OF PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Develop a historical perspective of universal laws and international developments in Physics.Discuss science, scientific temper, and scientific methods.
CO 2	Acquire adequate knowledge in number systems and binary arithmetic. Perform vector operations relevant to learning Physics.
CO 3	Outline coordinate systems to problems upcoming in other courses.
CO 4	Understand units, common laboratory instruments and evaluate errors in measurements.

COMPLEMENTARY COURSE SEM I	
Course code: **UG21PH1CM01- COMPLEMENTARY PHYSICS FOR MATHEMATICS**	
Course: **PROPERTIES OF MATTER AND ERROR ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the elastic characteristics of materials
CO 2	Apply the theory to practical uses in bending of materials
CO 3	Understand the theory and applications of properties of fluids such as surface tension and viscosity
CO 4	Equip themselves for higher studies and develop an aptitude for research Apply the theory to develop problem solving skills.
CO 5	Apply the theory to develop problem solving skills
CO 6	Analyse data and accounting for errors.

CORE COURSE SEM I	
Course code: **UG21PH1CM02- PROPERTIES OF MATTER AND THERMODYNAMICS**	
Course: **PROPERTIES OF MATTER AND THERMODYNAMICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the elastic characteristics of materials
CO 2	Apply the theory to practical uses in bending of materials
CO 3	Understand the theory and applications of properties of fluids such as surface tension and viscosity

CO 4	Equip themselves for higher studies and develop an aptitude for research Apply the theory to develop problem solving skills.
CO 5	Apply the theory to develop problem solving skills
CO 6	Analyse data and accounting for errors.

CORE COURSE SEM I	
Course code: **PH1CRT01**	
Course: **MECHANICS AND PROPERTIES OF MATTER**	
On the completion of the course, the students will be able to:	
CO 1	Understand the elastic characteristics of materials
CO 2	Apply the theory to practical uses in bending of materials
CO 3	Understand the theory and applications of properties of fluids such as surface tension and viscosity
CO 4	Equip themselves for higher studies and develop an aptitude for research Apply the theory to develop problem solving skills.
CO 5	Apply the theory to develop problem solving skills
CO 6	Analyse data and accounting for errors.

CORE COURSE SEM II	
Course code: **UG21PH2CM01**	
Course: **MECHANICS AND ASTROPHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the theory of different types of motion such aslinear motion, rotational motion and oscillations
CO 2	Apply the theory to practical uses of mechanics.
CO 3	Understand the theory of waves.
CO 4	Apply the theory to develop problem solving skills.
CO 5	Invoke curiosity by introducing the theory of Astrophysics.

CORE COURSE SEM II	
Course code: **UG21PH2CM02**	
Course: **MECHANICS AND SUPERCONDUCTIVITY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the theory of different types of motion such aslinear motion, rotational motion and oscillations
CO 2	Apply the theory to practical uses of mechanics.
CO 3	Understand the theory of waves.
CO 4	Apply the theory to develop problem solving skills.
CO 5	Invoke curiosity by introducing the theory ofsuperconductivity and its applications

CORE COURSE SEM II	
Course code:	
Course: **MECHANICS AND PROPERTIES OF MATTER (PRACTICALS)**	
On the completion of the course, the students will be able to:	
CO 1	Upon completion of this course, the students will be able to:
CO 2	Study the elastic behaviour and working of torsional pendulum
CO 3	Study of bending behaviour of beams and analyse the expression for young's modulus

CO 4	Understand the surface tension and viscosity of fluid, Perform experiments and interpret the results of observation, including making an assessment of experimental uncertainties and errors
CO 5	Analyse the relationship between various types of experiments
CO 6	Perform the procedure as per standard values
CO 7	Understand the applications

COMPLEMENTARY COURSE SEM II	
Course code:	
Course: **COMPLEMENTARY PHYSICS PRACTICAL FOR MATHS// CHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Explore the fundamental concepts of physics
CO 2	Acquire knowledge on elementary ideas and importance of material properties, heat, sound, optics, electricity and magnetism.
CO 3	Apply the characteristics of electronic devices in practicals
CO 4	Carry out the practical by applying these concepts
CO 5	Perform experiments and interpret the results of observation, including making an assessment of experimental uncertainties and errors
CO 6	Get depth knowledge of physics in day today life

CORE COURSE SEM III	
Course code: **PH3CRT03**	
Course: **OPTICS, LASER AND FIBER OPTICS**	
On the completion of the course, the students will be able to:	
CO 1	Identifying the various optical phenomenon in nature
CO 2	Learning the basic ideas of interference, diffraction and polarization
CO 3	Understand the concepts of lasers and fiber optics
CO 4	Application of optical fibers and laser in various real problems.

CORE COURSE SEM III	
Course code: **PH3CRT03**	
Course: **OPTICS, LASER AND FIBER OPTICS**	
On the completion of the course, the students will be able to:	
CO 1	Identifying the various optical phenomenon in nature
CO 2	Learning the basic ideas of interference, diffraction and polarization
CO 3	Understand the concepts of lasers and fiber optics
CO 4	Application of optical fibers and laser in various real problems.

CORE COURSE SEM III	
Course code: **PH3CMT02**	
Course: **MODERN PHYSICS AND ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand structure and properties of the nuclei
CO 2	Understand the theory of Quantum mechanics
CO 3	Apply the theory of quantum mechanics for practical applications using spectroscopy
CO 4	Deeper understanding of electronic components and circuits. Apply the theory to develop problem solving skills.
CO 5	Understanding of basics of digital electronics
CO 6	Apply the theory to develop problem solving skills

CORE COURSE SEM III	
Course code: **PH3CMT02**	
Course: **MODERN PHYSICS AND MAGNETISM**	
On the completion of the course, the students will be able to:	
CO 1	Understand structure and properties of the nuclei
CO 2	Understand the theory of Quantum mechanics
CO 3	Apply the theory of quantum mechanics for practical applications using spectroscopy
CO 4	Deeper understanding of electronic components and circuits.Apply the theory to develop problem solving skills.
CO 5	Understanding of basics of magnetism
CO 6	Apply the theory to develop problem solving skills

CORE COURSE SEM IV	
Course code: **PH4CRT04**	
Course: **SEMICONDUCTOR PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	To plot and study the Diode characteristics
CO 2	Applications of diodes in rectification and wave shaping
CO 3	Analyze the parameters and applications of transistors
CO 4	Understanding the concepts of oscillators
CO 5	Analysis of FET and Op amp based circuits
CO 6	Concepts of modulation

CORE COURSE SEM IV	
Course code: **PH4CMT01**	
Course: **OPTICS & ELECTRICITY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the different type of phenomenon like interference, Diffraction,Dispersion and Polarization.
CO 2	Understand the basics behind lasers and fibre optic network.
CO 3	Understand the dielectric material properties.
CO 4	Apply the theory to develop problem solving skills.
CO 5	Invoke curiosity by introducing basic understanding of varying current.

CORE COURSE SEM IV	
Course code:	
Course: **PRACTICALS_OPTICS AND SEMICONDUCTOR PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Design and execute a general physics experiment
CO 2	Apply basic data collection, plotting and data analysis techniques.
CO 3	Apply theoretical knowledge for analysing errors in experimentally measureddata.

COMPLEMENTARY COURSE SEM IV	
Course code:	
Course: **COMPLEMENTARY PHYSICS PRACTICAL FOR MATHS/ CHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	To gain practical knowledge by applying the experimental methods to correlate with the physics theory.

CO 2	To study the elastic and magnetic properties of materials and tolearn the usage of electrical and optical systems for various measurements
CO 3	Apply the analytical techniques and graphical analysis to the experimental data and interpret the results.

CORE COURSE SEM V	
Course code: **PH5CRT05**	
Course: **ELECTRICITY AND ELECTRODYNAMICS**	
On the completion of the course, the students will be able to:	
CO 1	Determine the transient and AC response of circuits containing R, L and Ccomponents;
CO 2	Basic understanding of network theorem and thermoelectricity.
CO 3	Use methods of vector calculus to solve problems in electromagnetism;
CO 4	Understanding electrostatics and magnetostatics.
CO 5	Describe and explain electrodynamics, and explain Maxwell's equations in vacuum;

CORE COURSE SEM V	
Course code: **PH5CRT06**	
Course: **CLASSICAL AND QUANTUM MECHANICS**	
On the completion of the course, the students will be able to:	
CO 1	Provide elementary ideas on Classical Mechanics and will be able to write equationsfor real time problems using Classical Mechanics. Explain the ideas of degrees of freedom and identify them for a given mechanical system.
CO 2	Understand the Failure of classical theory, Dual nature of light .
CO 3	Understand formalism of quantum mechanics
CO 4	To acquire ability to design and particle equation in the free and bound states as wellas to analyze and interpret these results.

CORE COURSE SEM V	
Course code: **PH5CRT07**	
Course: **DIGITAL ELECTRONICS AND PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO 1	Learn relevant theorems of digital electronics
CO 2	Understand the working of basic digital circuits
CO 3	Simplify boolean equations and design digital circuits
CO 4	Write programs in C++ language

CORE COURSE SEM V	
Course code: **PH5CRT08**	
Course**: ENVIRONMENTAL PHYSICS AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Identifying the various Environmental phenomenon in nature
CO 2	Learning the basic ideas of waste management, sanitation, production of energyand environmental impact.
CO 3	Understand the concepts human rights
CO 4	Treating others humanely and to help people facing human rights violations

CORE COURSE SEM V	
Course code: **PH5OPT0X**	
Course: **OPEN COURSE PHYSICS IN DAILY LIFE**	
On the completion of the course, the students will be able to:	
CO 1	To have an idea of the different units used to measure physical quantities, study of dimensional analysis, error analysis.
CO 2	Understanding the various phenomena and terms associated with the study of light, study of human eye
CO 3	Review of basic terms associated with the study of motion, laws of motion, applications in daily life
CO 4	Study of electricity- various electrical devices, methods of production of electrical energy
CO 5	Comparative study of the different phases of matter,
CO 6	Understanding our Universe – solar system, stars, satellites etc

CORE COURSE SEM VI	
Course code: **PH1CRT09**	
Course: **THERMAL AND STATISTICAL PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Identify and describe the concepts and laws in thermodynamics, in particular: entropy, temperature, Free energies and thermodynamic functions.
CO 2	Apply the concepts and principles of thermodynamics to heat engines
CO 3	Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators
CO 4	Understand the statistical physics methods, such as microstate and macrostate, ensemble formulation, partition function and equipartition theorem
CO 5	Apply the theory to develop problem solving skills.

CORE COURSE SEM VI	
Course code: **PH6CRT10**	
Course: **RELATIVITY AND SPECTROSCOPY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the concepts of relativity
CO 2	Understand the theory of Atomic spectroscopy
CO 3	Theory of Molecular spectroscopy- Basic understanding.
CO 4	Understand the concepts of relativity
CO 5	Understand the theory of Atomic spectroscopy
CO 6	Theory of Molecular spectroscopy- Basic understanding.

CORE COURSE SEM VI	
Course code: : **PH6CRT11**	
Course***:*** **NUCLEAR, PARTICLE PHYSICS AND ASTROPHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Acquire knowledge of the fundamental physics of nuclear physics
CO 2	Understand the concepts and potential applications of nuclear physics
CO 3	Analyse the production and decay reaction for fundamental particles
CO 4	Understand the fundamental concepts regarding the birth and evolution of our universe

CORE COURSE SEM VI	
Course code: **PH6CRT12**	
Course***:*** **SOLID STATE PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Be able to differentiate between different Lattice types and explain the concepts of reciprocal lattice and crystal diffraction
CO 2	Be able to explain the concept of energy bands and effect of the same on electrical properties
CO 3	Explain various types of magnetic phenomenon, physics behind them, theirproperties and applications.
CO 4	Explain superconductivity, its properties, important parameters related to possible applications
CO 5	Understand the semiconducting properties of materials
CO 6	Understand Hall Effect and principles of LED, Photodiodes
CO 7	Acquire knowledge in dielectric properties of materials.

CORE COURSE SEM VI	
Course code: **PH6CBT03**	
Course***:*** **NUMERICAL PHYSICS (CHOICE BASED)**	
On the completion of the course, the students will be able to:	
CO 1	To understand the methods of Computational Physics and to apply the knowledge in analyzing data and simulating Physical systems.
CO 2	Learning the basic ideas of solving equations – both algebraic, transcendental and also the equations involving large matrices.
CO 3	Understand the concepts curve fitting.
CO 4	Application of computational physics in calculus.

CORE COURSE SEM VI	
Course code: **PH6CRP03**	
Course: **ELECTRICITY, MAGNETISM AND LASER**	
On the completion of the course, the students will be able to:	
CO 1	Study the emf, resistance, behaviour of the materials
CO 2	Realise the working of prism and grating and determine the resolving power anddispersive power
CO 3	Analyse the specific heat capacity, refractive index, as per the standard procedure
CO 4	Understand the standard values of the results
CO 5	Apply the concepts and principles of thermodynamics to find out the thermalconductivity of various materials
CO 6	Understands the basic concepts of computational methods in solving problems inphysics
CO 7	Acquire knowledge to apply and develop numerical methods and apply to physical problems

CORE COURSE SEM VI	
Course code: **PH6CRP04**	
Course: **DIGITAL ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	Study the emf, resistance, behaviour of the materials
CO 2	Realise the working of prism and grating and determine the resolving power anddispersive power

CO 3	Analyse the specific heat capacity, refractive index, as per the standard procedure
CO 4	Understand the standard values of the results
CO 5	Apply the concepts and principles of thermodynamics to find out the thermalconductivity of various materials
CO 6	Understands the basic concepts of computational methods in solving problems inphysics
CO 7	Acquire knowledge to apply and develop numerical methods and apply to physical problems

CORE COURSE SEM VI	
Course code: **PH6CRP05**	
Course: **THERMAL PHYSICS, SPECTROSCOPY ANDC++PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO 1	Study the emf, resistance, behaviour of the materials
CO 2	Realise the working of prism and grating and determine the resolving power anddispersive power
CO 3	Analyse the specific heat capacity, refractive index, as per the standard procedure
CO 4	Understand the standard values of the results
CO 5	Apply the concepts and principles of thermodynamics to find out the thermalconductivity of various materials
CO 6	Understands the basic concepts of computational methods in solving problems inphysics
CO 7	Acquire knowledge to apply and develop numerical methods and apply to physical problems

CORE COURSE SEM VI	
Course code: **PH6CRP06**	
Course: **ACOUSTICS, PHOTONICS AND ADVANCED SEMICONDUCTOR PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Study the emf, resistance, behaviour of the materials
CO 2	Realise the working of prism and grating and determine the resolving power anddispersive power
CO 3	Analyse the specific heat capacity, refractive index, as per the standard procedure
CO 4	Understand the standard values of the results
CO 5	Apply the concepts and principles of thermodynamics to find out the thermalconductivity of various materials
CO 6	Understands the basic concepts of computational methods in solving problems inphysics
CO 7	Acquire knowledge to apply and develop numerical methods and apply to physicalproblems

M.Sc PHYSICS

CORE COURSE SEM I
Course code: **PH1C03**
Course: **ELECTRODYNAMICS**

On the completion of the course, the students will be able to:	
CO 1	Understand the fundamentals of electricity and magnetism
CO 2	Evaluate the electric field , magnetic field and potentials . Solving Laplace's equation
CO 3	Understand the wave properties of EM waves and its interaction with matter.
CO 4	Evaluate electromagnetic field radiating from a accelerated charge
CO 5	Understand Relativistic behaviour of EM waves
CO 6	Analyze the propagation of waves through waveguides

CORE COURSE SEM I	
Course code: **PH010104**	
Course: **ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamentals, characteristics and working of semiconductor devices
CO 2	Analyze op-amp and its different configurations with their physical Operation
CO 3	Design and analyze different applications of op-amps
CO 4	Evaluate frequency response to understand behaviour of op-amps and electronics circuits using op-amps
CO 5	Demonstrate the ability to design practical circuits that perform the desiredoperations
CO 6	Review of different modulation and demodulation techniques used in analogue communication
CO 7	Analyze transmitter and receiver circuits
CO 8	Compare and contrast advantages, disadvantages and limitations of analoguecommunication systems
CO 9	Analyze important types of integrated circuits.
CO 10	Select the appropriate integrated circuit modules to build a given application

CORE COURSE SEM I	
Course code: **PH010101**	
Course: **MATHEMATICAL METHODS IN PHYSICS – I**	
On the completion of the course, the students will be able to:	
CO 1	Learn relevant theorems of matrices, vectors, and Tensors
CO 2	Understand the analysis of related problems
CO 3	Understand conversion between different orthogonal curvilinear coordinate systems
CO 4	Familiarize probability theory and different distributions in statistics

CORE COURSE SEM II	
Course code: **PH010202**	
Course**: QUANTUM MECHANICS -I**	
On the completion of the course, the students will be able to:	
CO 1	Develop in students an idea of the basic structure of Quantum Mechanics.
CO 2	Understand the basic idea of Dirac Formalism
CO 3	Understand the use of operators and the concept of eigen values and eigenfunctions
CO 4	To get an idea of how quantum systems evolve in time

CO 5	Understand the quantum theory of angular momentum
CO 6	Enable the student to solve the hydrogen atom problem which is fundamental to more complicated problems.

CORE COURSE SEM II	
Course code: **PH010203**	
Course**: STATISTICAL MECHANICS -I**	
On the completion of the course, the students will be able to:	
CO 1	Give an account of the relevant quantities used to describe macroscopic systems, thermodynamic potentials and ensembles
CO 2	Give an account of the macroscopic and microscopic description of temperature, entropy and free energy and their descriptions in terms of probabilities
CO 3	Converse with correct concepts of thermodynamics and statistical mechanics,
CO 4	To understand of microcanonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 5	To understand of canonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 6	To understand of canonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 7	Understand the formulation of quantum statistics
CO 8	Understand apply the BE and FD statistics

CORE COURSE SEM II	
Course code: **PH010203**	
Course**: STATISTICAL MECHANICS -I**	
On the completion of the course, the students will be able to:	
CO 1	Give an account of the relevant quantities used to describe macroscopic systems, thermodynamic potentials and ensembles
CO 2	Give an account of the macroscopic and microscopic description of temperature, entropy and free energy and their descriptions in terms of probabilities
CO 3	Converse with correct concepts of thermodynamics and statistical mechanics,
CO 4	To understand of microcanonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 5	To understand of canonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 6	To understand of canonical ensemble theory and apply it to systems and compare it with the results of thermodynamics
CO 7	Understand the formulation of quantum statistics
CO 8	Understand apply the BE and FD statistics
CO 9	Basic understanding of critical phenomena

CORE COURSE SEM II	
Course code: **PH010204**	
Course**: CONDENSED MATTER PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Understanding the different types of crystal lattice, reciprocal lattice and its properties, diffraction of waves by crystals

CO 2	Review of different symmetry elements in crystals, point groups and space groups
CO 3	To acquire knowledge about the various energy levels in materials and the different models proposed for their study.
CO 4	Studying about semiconductor crystals, crystal vibrations and thermal properties.
CO 5	Discussion of the magnetic properties of solids, different types of magnetic materials and the various theories, review of various magnetic phenomena

CORE COURSE SEM III	
Course code: **PH010302**	
Course**: COMPUTATIONAL PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamentals of Computational Physics
CO 2	Use curve fitting and interpolation techniques.
CO 3	Integrate and differentiate the tabulated functions.
CO 4	Numerically solve differential equations.
CO 5	Numerically solve simultaneous equations.
CO 6	Numerically solve Partial differential equations.

CORE COURSE SEM III	
Course code: **PH010303**	
Course**: ATOMIC AND MOLECULAR PHYSICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand Atomic structure and spectra of typical one- electronand two-electron systems.
CO 2	Analyze the rotational and vibrational spectra
CO 3	The basics of Raman spectroscopy and the nonlinear Raman effects
CO 4	The spin resonance spectroscopies such as NMR and ESR and Mossbauer spectroscopy .

CORE COURSE SEM III	
Course code:	
Course**: SOLID STATE PHYSICS FOR MATERIALS (Special Paper)**	
On the completion of the course, the students will be able to:	
CO 1	Understanding the different types of defects in crystals voids in crystals and their importance, different phenomena like allotropy, polymorphism and polytypism
CO 2	Study of atomic diffusion in materials, the laws governing the process, solutions and applications, review of different processes and mechanisms of diffusion and their applications.
CO 3	To acquire knowledge about the various types of interactions associated with crystal binding, different kinds of crystals and bonding.
CO 4	Studying about phase diagrams and the various types of interactions leading to excitations in solids

CORE COURSE SEM IV	
Course code:	
Course: **NANOSTRUCTURES & MATERIALS CHARACTERISATION**	
On the completion of the course, the students will be able to:	
CO 1	Understanding the different types of nanostructures and the different methods of their synthesis and properties
CO 2	Study of different nano materials, their properties and applications.
CO 3	To acquire knowledge about the various types of instruments used for optical absorption and emission spectroscopy- principle, working and applications
CO 4	Review of different types of chemical, thermal and diffraction methods of characterization of nanomaterials -

CORE COURSE SEM IV	
Course code: **PH810402**	
Course: **SCIENCE OF ADVANCED MATERIALS**	
On the completion of the course, the students will be able to:	
CO 1	Learn relevant properties of ceramics, polymers, composites etc.
CO 2	Understand different thin film deposition techniques
CO 3	Understand device structures of optoelectronic devices like LED, solar cells and Lasers
CO 4	Learn basic concepts of metamaterials, CCD detectors, electro optic effect, magneto optic effect etc.

6. DEPARTMENT OF CHEMISTRY

B.Sc

COMPLEMENTARY COURSE SEM I	
Course code**: CH1CMT01**	
Course: **BASIC THEORETICAL AND ANALYTICAL CHEMISTRY (COMPLEMENTARY-BOTANY)**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic knowledge about the atomic structure and chemical bonding
CO 2	Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium
CO 3	Compare and analyze the various analytical techniques involved in the laboratory.
CO 4	Use different types of chromatographic techniques and the principle behind chromatography
CO 5	Apply the basic knowledge about the atomic structure and chemical bonding

COMPLEMENTARY COURSE SEM I	
Course code**: CH1CMT01**	
Course: **BASIC THEORETICAL AND ANALYTICAL CHEMISTRY (COMPLEMENTARY- ZOOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic knowledge about the atomic structure and chemical bonding

CO 2	Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium
CO 3	Compare and analyze the various analytical techniques involved in the laboratory.
CO 4	Use different types of chromatographic techniques and the principle behind chromatography

COMPLEMENTARY COURSE SEM I	
Course code**: CH1CMT01**	
Course: **BASIC THEORETICAL AND ANALYTICAL CHEMISTRY (COMPLEMENTARY- PHYSICS)**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic knowledge about the atomic structure and chemical bonding
CO 2	Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium
CO 3	Compare and analyze the various analytical techniques involved in the laboratory.
CO 4	Use different types of chromatographic techniques and the principle behind chromatography

CORE COURSE SEM I	
Course code**: CH1CRT01**	
Course: **GENERAL AND ANALYTICAL CHEMISTRY– (CORE)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the methodology of chemistry
CO 2	Practice the fundamental concepts of chemistry including periodic properties
CO 3	Apply the basic knowledge about analytical techniques used in chemical laboratory
CO 4	Use different types of chromatographic techniques and the principle behind chromatography
CO 5	Evaluate analytical data

COMPLEMENTARY COURSE SEM II	
Course code**: CH2CMT02**	
Course: **-BASIC ORGANIC CHEMISTRY(COMPLEMENTARY-BOTANY)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamental concepts of organic chemistry
CO 2	Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism
CO 3	Differentiates stereoisomers and describe stereochemistry of organic compounds
CO 4	Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics

COMPLEMENTARY COURSE SEM II	
Course code**: CH2CMT02**	
Course: **- BASIC ORGANIC CHEMISTRY(COMPLEMENTARY-ZOOLOGY)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamental concepts of organic chemistry

CO 2	Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism
CO 3	Differentiates stereoisomers and describe stereochemistry of organic compounds
CO 4	Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics

COMPLENTARY COURSE SEM II	
Course code**: CH2CMT02**	
Course: **- BASIC ORGANIC CHEMISTRY(COMPLEMENTARY-PHYSICS)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamental concepts of organic chemistry
CO 2	Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism
CO 3	Differentiates stereoisomers and describe stereochemistry of organic compounds
CO 4	Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics

CORE COURSE SEM II	
Course code**: CH2CRT02**	
Course: **- THEORETICAL AND INORGANIC CHEMISTRY (CORE)**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic knowledge about the atomic structure
CO 2	Understand various theories of chemical bonding
CO 3	Practice the fundamental concepts of chemistry including periodic properties of s-block and p-block elements
CO 4	Practice the fundamental concepts of chemistry including periodic properties, synthesis method and general characteristics of s-block, p-block, d-block and f-block elements

COMPLEMENTARY COURSE SEM II	
Course code**: CH2CMP01**	
Course: **- VOLUMETRIC ANALYSIS (COMPLEMENTARY-BOTANY)**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic knowledge about the atomic structure
CO 2	Understand various theories of chemical bonding
CO 3	Practice the fundamental concepts of chemistry including periodic properties of s-block and p-block elements
CO 4	Practice the fundamental concepts of chemistry including periodic properties, synthesis method and general characteristics of s-block, p-block, d-block and f-block elements

COMPLEMENTARY COURSE SEM II	
Course code**: CH2CMP01**	
Course: **- VOLUMETRIC ANALYSIS (COMPLEMENTARY-ZOOLOGY)**	
On the completion of the course, the students will be able to:	
CO 1	Develop basic skill in titration
CO 2	Apply the basic principles of volumetric analysis for estimating the amount of analyte in solution

COMPLEMENTARY COURSE SEM II
Course code**: CH2CMP01**

Course: **- VOLUMETRIC ANALYSIS (COMPLEMENTARY-PHYSICS)**	
On the completion of the course, the students will be able to:	
CO 1	Develop basic skill in titration
CO 2	Apply the basic principles of volumetric analysis for estimating the amount of analyte in solution

CORE COURSE SEM II	
Course code**: CH2CMP01**	
Course: **- VOLUMETRIC ANALYSIS (Core)**	
On the completion of the course, the students will be able to:	
CO 1	Get practice with acidimetry, alkalimetry, complexometry and redox titrations
CO 2	Able to apply the volumetric knowledge in commercial samples.

CORE COURSE SEM III	
Course code**: CH3CRT03**	
Course: **- ORGANIC CHEMISTRY I**	
On the completion of the course, the students will be able to:	
CO 1	Illustrate the basic concepts of organic reactions, intermediates and their mechanisms.
CO 2	Apply IUPAC nomenclature rules to different organic compounds and their derivatives
CO 3	Appreciating the beauty of stereochemistry of organic molecules in terms of various conformations, configurations and their stability
CO 4	Distinguish aliphatic, aromatic and nonaromatic hydrocarbons and apply the concepts studied in predicting the products of reactions and its mechanisms.
CO 5	Familiarizing the basics of pericyclic reactions with examples

COMPLEMENTARY COURSE SEM III	
Course code**: CH3CMT04**	
Course: **- INORGANIC AND ORGANIC CHEMISTRY (COMPLEMENTARY-ZOOLOGY)**	
On the completion of the course, the students will be able to:	
CO 1	Identifying and familiarizing heterocyclic compounds Furan, Pyrrole, Pyridine and Indole and their chemical properties.
CO 2	Understanding the importance of chemistry and role of metal ions in biological systems
CO 3	Developing a critical understanding about the role and application of pesticides, fungicides and Insecticides
CO 4	Enhancing the fundamental understanding of nucleus and nuclear forces in terms of nuclear chemistry
CO 5	Appreciating the chemistry of drugs and its pharmacological applications

COMPLEMENTARY COURSE SEM III
Course code**: CH3CMT04**
Course: **- INORGANIC AND ORGANIC CHEMISTRY (COMPLEMENTARY-BOTANY)**
On the completion of the course, the students will be able to:

CO 1	Identifying and familiarizing heterocyclic compounds like Furan, Pyrrole, Pyridine and Indole and their chemical properties.
CO 2	Understanding the importance of chemistry and role of metal ions in biological systems
CO 3	Developing a critical understanding about the role and application of pesticides, fungicides and insecticides
CO 4	Enhancing the fundamental understanding of nucleus and nuclear forces in terms of nuclear chemistry
CO 5	Appreciating the chemistry of drugs and its pharmacological applications

COMPLEMENTARY COURSE SEM III	
Course code**: CH3CMT03**	
Course: **- PHYSICAL CHEMISTRY – I (COMPLEMENTARY- PHYSICS)**	
On the completion of the course, the students will be able to:	
CO 1	Understand and study the properties of solids, behaviour of liquids and solutions and gases.
CO 2	Gain basic understanding about the different types of adsorption, colloids – types, properties and applications
CO 3	Familiarize phase rule and phase equilibria of one and two-component system, Nernst Distribution law and its applications

CORE COURSE SEM IV	
Course code**: CH4CRT04**	
Course: **ORGANIC CHEMISTRY II**	
On the completion of the course, the students will be able to:	
CO 1	Examine the structure and identify the reaction mechanism of organic compounds such as alcohols, diols, and phenols including their applications
CO 2	Distinguish the structure and reaction mechanisms of ethers and epoxides
CO 3	Predict the products and interpret the mechanisms of reactions of carbonyl compounds

COMPLEMENTARY COURSE SEM IV	
Course code**: CH4CMT05**	
Course: **PHYSICAL CHEMISTRY – II (COMPLEMENTARY- PHYSICS)**	
On the completion of the course, the students will be able to:	
CO 1	Apply the basic facts and concepts of spectroscopy.
CO 2	Understand the basics and preparation methods of nano compounds.
CO 3	Summarize the concepts of kinetics, Catalysis and Photochemistry.
CO 4	Explain and apply the concepts of electrochemistry

COMPLEMENTARY COURSE SEM IV	
Course code**: CH4CMT06**	
Course: **ADVANCED BIO-ORGANIC CHEMISTRY (COMPLEMENTARY - ZOOLOGY)**	
On the completion of the course, the students will be able to:	
CO 1	Examine the structure and identify the physiological activities of various natural product

CO 2	Understanding the various classifications of lipids and soaps, its chemical properties and environmental impact of detergents
CO 3	Deducing the synthesis of amino acids, polypeptides and differentiating various structures of proteins
CO 4	Recognizes enzymes, cofactors, coenzymes, structure of DNA, RNA and its replication.
CO 5	Identifying energy rich molecules, vitamins, steroids and Hormones, their structure and functions
CO 6	Differentiate carbohydrates, gain detailed understanding of their cyclic structures and the industrial applications of cellulose

COMPLEMENTARY COURSE SEM IV	
Course code**: CH4CMT06**	
COURSE: **ADVANCED BIO-ORGANIC CHEMISTRY (COMPLEMENTARY - BOTANY)**	
On the completion of the course, the students will be able to:	
CO 1	Examine the structure and identify the physiological activities of various natural product
CO 2	Understanding the various classifications of lipids and soaps, its chemical properties and environmental impact of detergents
CO 3	Deducing the synthesis of amino acids, polypeptides and differentiating various structures of proteins
CO 4	Recognizes enzymes, cofactors, coenzymes, structure of DNA, RNA and its replication.
CO 5	Identifying energy rich molecules, vitamins, steroids and Hormones, their structure and functions
CO 6	Differentiate carbohydrates, gain detailed understanding of their cyclic structures and the industrial applications of cellulose

CORE COURSE SEM IV	
Course code**: CH4CRP02**	
Course: **QUALITATIVE ORGANIC ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Systematically analyse organic compound and preparation of solid derivative
CO 2	To determine the physical constants of solids and liquids – melting and boiling points
CO 3	To understand the reactions of various functional groups

COMPLEMENTARY COURSE SEM IV	
Course code**: CH4CMP03**	
Course: **ORGANIC CHEMISTRY PRACTICALS (COMPLEMENTARY- ZOOLOGY)**	
On the completion of the course, the students will be able to:	
CO 1	Detect the different functional groups of organic compounds
CO 2	Examine the physical constants like melting point and boiling point
CO 3	Detect the different functional groups of organic compounds

COMPLEMENTARY COURSE SEM IV	
Course code**: CH4CMP03**	
Course: **ORGANIC CHEMISTRY PRACTICALS (COMPLEMENTARY- BOTANY)**	
On the completion of the course, the students will be able to:	
CO 1	Detect the different functional groups of organic compounds

CO 2	Examine the physical constants like melting point and boiling point

CORE COURSE SEM IV	
Course code**: CH4CMP02**	
Course **PHYSICAL CHEMISTRY PRACTICALS**	
On the completion of the course, the students will be able to:	
CO 1	Determine viscosity, CST, Transition temperature etc
CO 2	Find the heat of neutralization, kinetics of a reaction
CO 3	Estimate the mass of ion or compound using conductometric and potentiometric titrations

CORE COURSE SEM V	
Course code**: CH4CMP02**	
Course **ENVIRONMENT, ECOLOGY AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fragility and sensitivity of our environment and the importance of its protection.
CO 2	Discuss ways to promote environmental awareness
CO 3	Recognize environmental responsibility and proactive citizenship
CO 4	Understand the concept of Human rights in the context of Indian constitution, UN and Universal environmental treaties

CORE COURSE SEM V	
Course code**: CH5CRT06**	
Course **ORGANIC CHEMISTRY -III**	
On the completion of the course, the students will be able to:	
CO 1	Develop concrete idea about nitrogen containing compounds and their synthesis
CO 2	Recognise the importance of heterocyclic compounds
CO 3	Apply the chemistry of active methylene compounds for the synthesis of non-hetero molecules
CO 4	Develop an aptitude towards the structure, synthesis and industrial applications of carbohydrates

CORE COURSE SEM V	
Course code**: CH5CRT07**	
Course **PHYSICAL CHEMISTRY – I**	
On the completion of the course, the students will be able to:	
CO 1	Behaviour of ideal gases and the real gases. A deeper look on the distribution of velocities and energies among the molecules, an overview on the collision properties.
CO 2	Develop a qualitative idea about the intermolecular forces in liquid, to know in detail about viscosity and surface tension and its determination
CO 3	Review on the nature of solid state, different crystal systems, analysis of cubic crystals, to have a deep idea on the different types of ionic compounds and to know in detail about the liquid crystals.
CO 4	Discover and analyse the interfacial phenomenon of adsorption, explains different types of adsorptions and its significance, enumerate the nature of colloidal state, its preparation and properties.

CORE COURSE SEM V	
Course code**: CH5CRT08**	
Course **PHYSICAL CHEMISTRY – II**	
On the completion of the course, the students will be able to:	
CO 1	Create a strong foundation in Quantum chemistry
CO 2	Use scientific knowledge to link experiment with theory
CO 3	Describe the fundamentals of various spectroscopic techniques
CO 4	Apply the basic skills in analyzing and interpreting spectrum
CO 5	Compare and analyze the basic principles of NMR and ESR spectroscopy

CORE COURSE SEM V	
Course code**: CH5OPT01**	
Course **CHEMISTRY IN EVERYDAY LIFE (OPEN COURSE)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic concepts of Food Additives, Soaps, Detergents and Cosmetics.
CO 2	Describe about Plastics, Paper, Dyes and Drugs
CO 3	Summarize about Nanomaterials and the interdependence between Chemistry and Agriculture

CORE COURSE SEM VI	
Course code**: CH6CRT09**	
Course **INORGANIC CHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Apply the knowledge of coordination chemistry for industrially relevant compounds
CO 2	Examine and analyse organometallic compounds
CO 3	Compare and categorize the importance of metals in bioinorganic chemistry

CORE COURSE SEM VI	
Course code**: CH6CRT10**	
Course **ORGANIC CHEMISTRY -IV**	
On the completion of the course, the students will be able to:	
CO 1	Introduce students to the world of natural products, lipids, vitamins, steroids and hormones.
CO 2	Familiarize the concepts of amino acids, peptides, proteins, enzymes and nucleic acids
CO 3	Provide an elementary idea about supramolecular chemistry.
CO 4	Basic idea of organic photochemistry
CO 5	Equip the students to interpret spectra of organic molecules using various spectroscopic tools like UV, IR, NMR and Mass.

CORE COURSE SEM VI	
Course code**: CH6CRT11**	
Course **-PHYSICAL CHEMISTRY –III**	
On the completion of the course, the students will be able to:	
CO 1	To learn in detail about the concepts and applications of thermodynamics.

CO 2	To understand the basic concepts of Chemical, Ionic and Phase Equilibria
CO 3	To get brief idea of Chemical Kinetics

CORE COURSE SEM VI	
Course code**: CH6CRT12**	
Course **- NANOCHEMISTRY AND NANOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Deduce critical knowledge of various binary solutions and their distillation behaviour
CO 2	Apply Nernst distribution law to various system
CO 3	Discuss the concept of chemical potential
CO 5	Apply the electrical conductance and electrochemical cells
CO 6	Analyze the laws of photochemistry
CO 7	Categorize various molecules into point groups based on group theory

CORE COURSE SEM VI	
Course code**: CH6CBT02**	
Course **-PHYSICAL CHEMISTRY –IV**	
On the completion of the course, the students will be able to:	
CO 1	Provide basic understanding of nanomaterials and nanotechnology
CO 2	Insight into the synthetic methodology, properties and applications of nanomaterials.
CO 3	Inculcate basic knowledge in the characterization techniques of nanomaterials
CO 5	Detailed understanding of applications of nanomaterials in medical, industrial, biotechnology and environmental hazards
CO 6	Provide basic understanding of nanomaterials and nanotechnology
CO 7	Insight into the synthetic methodology, properties and applications of nanomaterials.

CORE COURSE SEM VI	
Course code**: CH6CRP04**	
Course **- ORGANIC PREPARATIONS AND LABORATORY TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Operating laboratory techniques like crystallization, distillation, solvent extraction etc.
CO 2	Implementing different types of Organic Preparations
CO 3	Apply the basis of TLC and column Chromatography to separate a component from a mixture of compounds.
CO 5	Operating laboratory techniques like crystallization, distillation, solvent extraction etc.
CO 6	Implementing different types of Organic Preparations
CO 7	Apply the basis of TLC and column Chromatography to separate a component from a mixture of compounds.

CORE COURSE SEM VI
Course code**: CH6CRP03**
Course **- QUALITATIVE INORGANIC ANALYSIS**

On the completion of the course, the students will be able to:	
CO 1	Understand a systematic way of analyzing inorganic mixtures using a semi micro method.
CO 2	Identifies and differentiates the cations and anions present in a given mixture two acid and basic radicals
CO 3	Describes the methodologies used for the elimination of radicals from the inorganic mixtures

CORE COURSE SEM VI	
Course code**: CH6CRP03**	
Course **- QUALITATIVE INORGANIC ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Understand a systematic way of analyzing inorganic mixtures using a semi micro method.
CO 2	Identifies and differentiates the cations and anions present in a given mixture two acid and basic radicals
CO 3	Describes the methodologies used for the elimination of radicals from the inorganic mixtures

CORE COURSE SEM VI	
Course code**: CH6CRP05**	
Course **- PHYSICAL CHEMISTRY PRACTICALS**	
On the completion of the course, the students will be able to:	
CO 1	Analyze the way of determining the viscosity of a solution.
CO 2	Use calorimetric method in determining the heat of neutralization
CO 3	Apply colligative property in finding the molecular weight solute
CO 4	Analyze the concentration of a solution using conductometric and potentiometric titrations
CO 5	Prepare graph by plotting experimental results using spreadsheet program

CORE COURSE SEM VI	
Course code**: CH6CRP06**	
Course **- GRAVIMETRIC ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Apply gravimetry as a tool for quantitative estimation.
CO 2	Competent enough to perform the quantitative estimation of the metals such as Nickel, Copper, Iron , Barium and radicals such as sulphate gravimetrically
CO 3	Able to determine the atomic masses of many elements to four figure accuracy
CO 4	Apply gravimetry as a tool for quantitative estimation.
CO 5	Competent enough to perform the quantitative estimation of the metals such as Nickel, Copper, Iron , Barium and radicals such as sulphate gravimetrically

7. DEPARTMENT OF BOTANY

BSc BOTANY

CORE COURSE SEM I	
Course code: **BO1CRT01**	
Course: **METHODOLOGY OF SCIENCE AND AN INTRODUCTION TO BOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the universal nature of science
CO 2	Demonstrate the use of scientific method
CO 3	Lay a strong foundation to the study in Botany
CO 4	Impart an insight into the different types of classifications in the living kingdom.
CO 5	Appreciate the world of organisms and its course of evolution and diversity.
CO 6	Develop basic skills to study Botany in detail

COMPLEMENTARY COURSE SEM I	
Course code: **BO1CMT01**	
Complementary course (History): **CRYPTOGAMS, GYMNOSPERMS AND PLANT PATHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Acquire fundamental knowledge in plant science and to make the student to understand that Botany is an integral part of the human life and developments.
CO 2	Foster and encourage an attitude of curiosity, appreciation and enquiry of various life forms of plants.
CO 3	Understand the identifying characters of the different types included in the syllabus.
CO 4	Understand the diversity of plants with respect to Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms
CO 5	Develop basic skills to study Botany in detail
CO 6	To understand the universal nature of science

CORE COURSE SEM II	
Course code: **BO2CRT02**	
Course: **MICROBIOLOGY, MYCOLOGY AND PLANT PATHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the world of microbes, fungi and lichens
CO 2	Appreciate the adaptive strategies of the microbes, fungi and lichens
CO 3	To study the economic and pathological importance of microorganisms
CO 4	To understand the universal nature of science
CO 5	Develop basic skills to study Botany in detail

COMPLEMENTARY COURSE SEM II
Course code: **BO2CMT02**
Course: **COMPLEMENTARY II: PLANT PHYSIOLOGY**
On the completion of the course, the students will be able to:

CO 1	Make the students realize the importance of all physiological processes which take place in plants.
CO 2	Understand the mechanism of various physiological processes related to plant life.
CO 3	Develop basic skills to study Botany in detail

CORE COURSE SEM III	
Course code: **BO3CRT03**	
Course: **PHYCOLOGY AND BRYOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To study the evolutionary importance of Algae as progenitors of land plants
CO 2	Understand the unique and general features Algae and Bryophytes and familiarize it
CO 3	To study the external morphology, internal structure and reproduction of different types of Algae and Bryophytes
CO 4	Realize the application of Phycology and bryology in different fields

COMPLEMENTARY COURSE SEM III	
Course code: **BO3CMT03**	
Course: **COMPLEMENTARY III- ANGIOSPERM TAXONOMY AND ECONOMIC BOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint the student with the objectives and components of Taxonomy.
CO 2	Help the student to understand the systems of classification of angiosperms.
CO 3	Help the student to identify the common angiosperm species of Kerala.
CO 4	Familiarize the student with plants of immense economic importance.
CO 5	Develop basic skills to study plant taxonomy in detail

CORE COURSE SEM IV	
Course code: **BO4CRT04**	
Course: **PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the diversity in habits, habitats and organization of various groups of plants
CO 2	To impart an insight into the modern classifications in lower forms of plants.
CO 3	Understand the evolutionary trends in Pteridophytes and Gymnosperms.
CO 4	Study the anatomical variations in vascular plants
CO 5	Understand the significance of Paleobotany and its applications.

COMPLEMENTARY COURSE SEM IV	
Course code: **BO4CMT04**	
Course: **ANATOMY AND APPLIED BOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the different types of tissues

CO 2	Understand the internal structure of different plant organs with reference to their functions
CO 3	Understand the process of normal and anomalous secondary thickening in plants.
CO 4	Know the morphological and anatomical adaptations of plants growing in different habitats.
CO 5	Understand how botanical knowledge could be applied for crop improvement

CORE COURSE SEM V	
Course code: **BO5CRT05**	
Course: **ANATOMY, REPRODUCTIVE BOTANY AND MICROTECHNIQUE**	
On the completion of the course, the students will be able to:	
CO 1	Imparting an insight into the internal structure and reproduction of the most evolved group of plants, the Angiosperm.
CO 2	Understand the individual cells and also tissues simultaneously
CO 3	Understand the structural adaptations in plants growing in different environment.
CO 4	Understand the morphology and development of reproductive parts.
CO 5	Get an insight in to the fruit and seed development.
CO 6	Understand the techniques used to preserve and study plant materials.

CORE COURSE SEM V	
Course code: **BO5CRT06**	
Course: **RESEARCH METHODOLOGY, BIOPHYSICS AND BIOSTATISTICS**	
On the completion of the course, the students will be able to:	
CO 1	To equip the students to conduct independent research and prepare research reports.
CO 2	To make the students acquaint with different tools and techniques used in research work.
CO 3	To equip the students with basic computer skills necessary for conducting research.
CO 4	To enable the students to have enough numerical skills necessary to carry out research.
CO 5	Develop basic skills to study Botany in detail

CORE COURSE SEM V	
Course code: **BO5CRT07**	
Course: **PLANT PHYSIOLOGY AND BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Acquire basic knowledge needed for proper understanding of plant functioning.
CO 2	Familiarize with the basic skills and techniques related to plant physiology.
CO 3	Understand the role, structure and importance of the bio molecules associated with plant life.

CORE COURSE SEM V	
Course code: **BO5CRT08**	
Course: **ENVIRONMENTAL SCIENCE AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint with the significance of Environmental Science and Human rights.
CO 2	Make the students aware about the extent of the total biodiversity and the importance of their conservation.
CO 3	Design novel mechanisms for the sustainable utilization of natural resources.
CO 4	Understand the structure and function of the ecosystems.
CO 5	Understand various kinds of pollution in the environment, their impacts on the ecosystem and their control measures
CO 6	Make the students aware about various environmental laws in India and the role of various movements in the protection of nature and natural resources

OPEN COURSE SEM V	
Course code: **BO5OPT02**	
Course: **HORTICULTURE AND NURSERY MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Understand the importance of horticulture in human welfare.
CO 2	Understand the propagation and cultural practices of useful vegetable, fruit and garden plants.
CO 3	Understand the impact of modern technologies in biology on horticultural plants.
CO 4	Understand the basic concepts of landscaping and garden designing.
CO 5	Inculcate interest in landscaping, gardening and flower and fruit culture.

CORE COURSE SEM VI	
Course code: **BO6CRT09**	
Course: **GENETICS, PLANT BREEDING AND HORTICULTURE**	
On the completion of the course, the students will be able to:	
CO 1	Imparting an insight into the principles of heredity
CO 2	Understand the patterns of inheritance in different organisms
CO 3	Understand the inheritance pattern of nuclear and extra nuclear genes
CO 4	Understand the methods of crop improvement
CO 5	Understand the importance of horticulture in human welfare
CO 6	Develop skill in gardening technique among students

CORE COURSE SEM VI	
Course code: **BO6CRT10**	
Course: **CELL AND MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the ultra-structure and functioning of cell in the sub-microscopic and molecular level.

CO 2	Get an idea of origin, concept of continuity and complexity of life activities
CO 3	Familiarization of life processes.
CO 4	Understand the basic and scientific aspect of diversity
CO 5	Understand the cytological aspects of growth and development
CO 6	Understand DNA as the basis of heredity and variation

CORE COURSE SEM VI	
Course code: **BO6CRT11**	
Course: **ANGIOSPERM MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint with the aims, objectives and significance of taxonomy
CO 2	Identify the common species of plants growing in Kerala and their systematic position.
CO 3	Develop inductive and deductive reasoning ability.
CO 4	Acquaint with the basic technique in the preparation of herbarium.
CO 5	Familiarizing with the plants having immense economic importance.

CORE COURSE SEM VI	
Course code: **BO6CRT12**	
Course: **INDIAN ECONOMY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the current developments in the field of Biotechnology and Bioinformatics
CO 2	Equip the students to carry out plant tissue culture
CO 3	Introduce the vast repositories of biological data knowledge
CO 4	Equip to access and analyze the data available in the databases

CORE COURSE SEM VI	
Course code: **BO6PET02**	
Course: **PLANT GENETIC RESOURCES MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint the student with the history and evolution of crop plants, and their diversity
CO 2	Familiarize the student with the available plant genetic wealth and the measures adopted for the conservation of these resources
CO 3	Help the student to identify the crop plants and their wild relatives.
CO 4	Help the student to explore the potentialities of various underutilized plants to project as the future food prospects
CO 5	Understand the significance of modern technology to locate the distribution of endangered species.

M.Sc BOTANY

CORE COURSE SEM I
Course code: **BY010101**
Course: **MICROBIOLOGY AND PHYCOLOGY**
On the completion of the course, the students will be able to:

CO 1	The student will be able to know the Introduction to microbiology, specifically Bacteria, Bacterial systematics, Culturing of microorganisms
CO 2	To know about Plant–microbe interactions
CO 3	Study details of Viruses

CORE COURSE SEM I	
Course code: **BY010102**	
Course: **MYCOLOGY AND CROP PATHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Study the General introduction and classification of Fungi, Thallus structure and reproduction in Fungi
CO 2	Know the Fungal associations and Physiology of Fungi

CORE COURSE SEM I	
Course code: **BY010103**	
Course: **BRYOLOGY AND PTERIDOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Highlights the Introduction of Bryophytes
CO 2	Ecological significance and economic importance of bryophytes
CO 3	General characters and thallus organization

CORE COURSE SEM I	
Course code: **BY010104**	
Course: **GYMNOSPERMS, PALAEOBOTANY AND EVOLUTION**	
On the completion of the course, the students will be able to:	
CO 1	To study the Introduction, Vegetative and reproductive structures of Gymnosperms
CO 2	Gametophyte development of Gymnosperms
CO 3	Economic importance of Gymnosperms

CORE COURSE SEM II	
Course code: **BY010201**	
Course: **PLANT ANATOMY, DEVELOPMENTAL BIOLOGY AND HORTICULTURE**	
On the completion of the course, the students will be able to:	
CO 1	Provide the Introduction of Anatomy, In detail the Meristem, secondary structure
CO 2	Details of Leaf and Node, Reproductive anatomy and Applied anatomy

CORE COURSE SEM II	
Course code: **BY010202**	
Course: **CELL BIOLOGY, GENETICS AND PLANT BREEDING**	
On the completion of the course, the students will be able to:	
CO 1	Paper provides basic concepts on the functioning of cell and cell to cell communication
CO 2	Students will understand structure and function of different cell organelles

CO 3	Students will be able to understand the cyclic events of cell division and types of cell division.
CO 4	expose the students to cell signalling, its components a general principle of signalling and scaffold of cells - cytoskeleton
CO 5	On covering all classical concepts of Mendelian genetics across these life-forms, students will be exposed to concepts of population genetics.
CO 6	To understand the different types of genetic interaction, incomplete dominance, co dominance, multiple alleles etc.
CO 7	Introduce the fundamental concepts of plant breeding and plant adaptation that are applicable to agricultural and natural systems

CORE COURSE SEM II	
Course code: **BY010203**	
Course: **PLANT PHYSIOLOGY AND BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Transport and Translocation of water and solutes
CO 2	Photosynthesis & Respiration
CO 3	Nitrogen metabolism, Stress physiology, Sensory photobiology, Plant growth regulators

CORE COURSE SEM II	
Course code: **BY010204**	
Course: **MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize students with Molecular Biology which chiefly deals with interactions among various systems of the cell, including those between DNA, RNA and proteins and learning how these are regulated
CO 2	To gain an understanding of chemical and molecular processes that occurs in and between cells. Gene Expression and Control of Gene Expression
CO 3	Repair mechanisms in nucleic acids

CORE COURSE SEM III	
Course code: **BY010301**	
Course: **RESEARCH METHODOLOGY, MICROTECHNIQUE, BIOSTATISTICS AND BIOPHYSICAL INSTRUMENTATION**	
On the completion of the course, the students will be able to:	
CO 1	Introduction, Review of literature
CO 2	Preparation of project report and Dissertation/Thesis, presentation and publication of research outcome

CORE COURSE SEM III	
Course code: **BY010302**	
Course**: BIOTECHNOLOGY, BIOINFORMATICS AND BIONANOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Bioprocess Technology, Plant tissue culture, Genetic engineering
CO 2	Genome editing, Advanced tools and techniques in Biotechnology Genomics

CO 3	Societal concerns with biotechnology
CO 4	Methods, tools and applications of bioinformatics
CO 5	Molecular phylogeny Structural bioinformatics
CO 6	Introduction to nanoparticles and nanotechnology
CO 7	Applications of bio nanotechnology

CORE COURSE SEM III	
Course code: **BY010303**	
Course**: ANGIOSPERM TAXONOMY, ECONOMIC BOTANY AND ETHNOBOTANY**	
On the completion of the course, the students will be able to:	
CO 1	Introduction, Units of classification and Phylogeny of Angiosperms
CO 2	Data sources of taxonomy, Methodology of Identification of plants, Tools of Taxonomy
CO 3	Botanical Nomenclature, Study of angiosperm diversity
CO 4	Economic Botany Ethnobotany A

CORE COURSE SEM IV	
Course code: **BY800401**	
Course**: PLANT TISSUE CULTURE AND MICROBIAL BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Tissue culture regeneration of plants, Somaclonal variation, Embryo and meristem culture
CO 2	Protoplast culture, Production of ploidy variants, In vitro germplasm conservation
CO 3	Production of secondary metabolites, Cell and enzyme technology. Microbial technology
CO 4	Tissue engineering and Stem cell technology. Bioremediation

CORE COURSE SEM IV	
Course code: **BY010402**	
Course**: GENETIC ENGINEERING, GENOME EDITING AND IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Important tools and techniques in gene cloning, Selection and screening of recombinants
CO 2	Gene library, Advanced transgenic technology, Applications of rDNA technology
CO 3	Genome editing, Gene therapy, Protein engineering
CO 4	Biosensors, Immunology

CORE COURSE SEM IV	
Course code: **BY800403**	
Course**: GENOMICS, TRANSCRIPTOMICS, PROTEOMICS AND BIOINFORMATICS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with Genome mapping, Genome sequencing, Genome annotation
CO 2	Understand Comparative genomics, Transcriptomics, Proteomics

CO 3	Study about Bioinformatics
CO 4	Understand the Ethical, legal, and social impact of complete genome analysis

8. DEPARTMENT OF ZOOLOGY

B.sc

CORE COURSE SEM I	
Course code**: ZY1CRT0I**	
CORE COURSE: GENERAL PERSPECTIVES IN SCIENCE & PROTISTAN DIVERSITY	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic philosophy of science, concepts and scope
CO 2	Understand the different levels of biological diversity through the systematic classification
CO 3	Do taxa level identification of animals
CO 4	Appreciate protistan diversity
CO 5	Understand the parasitic forms of lower invertebrates

CORE COURSE SEM I	
Course code**: ZY2CRP01**	
CORE COURSE: GENERAL PERSPECTIVES IN SCIENCE & PROTISTAN DIVERSITY	
On the completion of the course, the students will be able to:	
CO 1	Identify the parts of birds & butterflies using taxa identification techniques.
CO 2	Identify the order/family of insects, fishes & snakes using taxonomic keys.
CO 3	Identify protistans by their generic name and know their general characters.
CO 4	Identify protistans in a pond water sample.

COMPLEMENTARY COURSE SEM I	
Course code**: ZY1CMT01**	
Course**: NON CHORDATE DIVERSITY**	
On the completion of the course, the students will be able to:	
CO 1	To learn the physiological and anatomical peculiarities of some invertebrate phyla through type study
CO 2	To study the distinguishing characters of non-chordates
CO 3	Understand the economic importance of Molluscs.
CO 4	Understand the evolutionary history of Non chordates and learn the unity of life with rich diversity of organisms.
CO 5	To study and understand the concepts-Metamorphosis, regeneration and autotomy
CO 6	To develop an aptitude for understanding nature and its rich bio-diversity.

COMPLEMENTARY COURSE SEM I	
Course code**: ZY1CMT01**	
Course**: PRACTCAL NON-CHORDATE DIVERSITY**	
On the completion of the course, the students will be able to:	
CO 1	Identify the invertebrate fauna
CO 2	Differentiate the physiological and anatomical peculiarities of some invertebrate fauna through practical experiences
CO 3	Appreciate the biota living around them.

COMPLEMENTARY COURSE SEM II	
Course code**: ZY2CRT02**	
Course**: ANIMAL DIVERSITY - NON CHORDATA**	
On the completion of the course, the students will be able to:	
CO 1	Identify the invertebrate fauna
CO 2	Differentiate the physiological and anatomical peculiarities of some invertebrate fauna through practical experiences
CO 3	Appreciate the biota living around them.

CORE COURSE SEM II	
Course code**: ZY2CRT02**	
Course**: ANIMAL DIVERSITY - NON CHORDATA**	
On the completion of the course, the students will be able to:	
CO 1	Appreciate the diversity of life on earth
CO 2	Understand different levels of biological diversity through the systematic classification of invertebrate fauna
CO 3	Do taxa level identification of animals
CO 4	Understand the evolutionary significance of invertebrate fauna
CO 5	Have curiosity on invertebrate around us
CO 6	Understand the parasitic forms of lower invertebrates

CORE COURSE SEM II	
Course code**: ZY2CRT02**	
Course**: ANIMAL DIVERSITY - NON CHORDATA**	
On the completion of the course, the students will be able to:	
CO 1	Appreciate the diversity of life on earth
CO 2	Understand different levels of biological diversity through the systematic classification ofinvertebrate fauna
CO 3	Do taxa level identification of animals
CO 4	Understand the evolutionary significance of invertebrate fauna
CO 5	Have curiosity on invertebrate around us
CO 6	Understand the parasitic forms of lower invertebrates

CORE COURSE SEM II	
Course code**: ZY2CRT02**	
Course **: ANIMAL DIVERSITY - NON CHORDATA PRACTICAL**	
On the completion of the course, the students will be able to:	
CO 1	Make scientific drawings of locally available invertebrate specimens belonging to different phyla.
CO 2	Identify the cross sections of hydra and fasciola.

CO 3	Dissect out the nervous systems of cockroach and prawn.
CO 4	Mount the appendages of prawn and mouth parts of different insects.
CO 5	5 Identify some animals of different phyla by their scientific names.
CO 6	Identify some parasitic organisms and larval forms.

COMPLEMENTARY COURSE SEM II	
Course code**: ZY2CRT02**	
Course**: CHORDATE DIVERSITY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic concepts about chordates.
CO 2	Study and understand the various systems, adaptation and dentition in Mammals
CO 3	To study and understand the Scales, Fins, Arial adaptation and Dental formula.
CO 4	Understand the Classification of various classes of phylum Chordate i.e. Pisces, Amphibians Reptiles, and Aves
CO 5	Understand and study the various systems in Frog and Rabbit and learn the physiological and anatomical peculiarities through type study
CO 6	To stimulate the students' curiosity in vertebrates living associated with them.

COMPLEMENTARY COURSE SEM II	
Course code**: ZY2CRT02**	
Course: **PRACTICAL CHORDATE DIVERSITY**	
On the completion of the course, the students will be able to:	
CO 1	Identify the vertebrate fauna
CO 2	Differentiate the poisonous and non-poisonous snakes
CO 3	Appreciate the biota living around them

CORE COURSE SEM III	
Course code**: ZY2CRT03**	
Course **: ANIMAL DIVERSITY –CHORDATA**	
On the completion of the course, the students will be able to:	
CO 1	To acquire in depth knowledge on the diversity of chordates and their systematic position.
CO 2	To make them aware of the economic importance of some classes.
CO 3	To understand the evolutionary importance of selected chordate groups

CORE COURSE SEM III	
Course code**:**	
Course**: ANIMAL DIVERSITY –CHORDATA PRACTICAL**	
On the completion of the course, the students will be able to:	
CO 1	Understand the various systems of frog
CO 2	Understand the Classification various classes of phylum Chordate
CO 3	To learn to identify different fishes and snakes
CO 4	To learn to make scientific sketch of chordate specimens
CO 5	Study and understand the different types of scales in fishes.

COMPLEMENTARYCOURSE SEM III	
Course code**: ZY3CMT03.**	
Course **: PHYSIOLOGY AND IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To appreciate the correlation between structure and function of organisms
CO 2	To get an overview of health related problems, their origin and treatment
CO 3	To understand the significance and efficiency of immune system
CO 4	To acquire knowledge about the prevention of common diseases
COMPLEMENTARY COURSE SEM III	
Course code**: ZY3CMT03.**	
Course : **PRACTICAL PHYSIOLOGY AND IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To appreciate the correlation between structure and function of organisms
CO 2	Understand health related problems, their origin and treatment.
CO 3	Understand how efficiently our immune system work in our body.
CO 4	Know how to prevent common diseases rather than curing.

CORE COURSE SEM IV	
Course code**: ZY2CRT04**	
Course**: RESEARCH METHODOLOGY, BIOPHYSICS AND BIOSTATISTICS**	
On the completion of the course, the students will be able to:	
CO 1	To familiarise the learner the basic concept of scientific method in research process.
CO 2	To gain knowledge on various research designs.
CO 3	To develop skill in research communication and scientific documentation
CO 4	To create awareness about the laws and ethical values in biology.
CO 5	To equip the students with the basic techniques of animal rearing collection and preservation and to apply statistical methods in biological studies.

CORE COURSE SEM IV	
Course code**: ZY2CRT04**	
Course**: RESEARCH METHODOLOGY, BIOPHYSICS AND BIOSTATISTICS PRACTICAL**	
On the completion of the course, the students will be able to:	
CO 1	Understand the measures of central tendency and dispersion like Computation of arithmetic mean, mode and median.
CO 2	To learn Graphical representation of data. Construction of bar diagrams, Histograms, Pie diagram and Line graphs (MS Excel)
CO 3	Understand the Principle, parts, and its application of Microscopic techniques
CO 4	Understand the principle of analytical instruments
CO 5	Understand the working and principle of Fluorimeter pH Meter, Colorimeter/ Spectrophotometer, Centrifuge

COMPLEMENTARY COURSE SEM IV	
Course code**: ZY2CRT04**	
Course**: APPLIED ZOOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To acquire basic knowledge and skills in applied branches of Zoology
CO 2	To understand the technology for utilizing eco-friendly organisms for beneficial purpose
CO 3	To be able to start self- employment ventures with scientific knowledge to perform profitably and confidently

COMPLEMENTARY COURSE SEM IV	
Course code**: ZY2CRT04**	
Course **- 4 PRACTCAL APPLIED**	
On the completion of the course, the students will be able to:	
CO 1	Acquire basic practical knowledge and skills in applied branches of zoology
CO 2	Understand the technology for utilising eco-friendly organisms around them for beneficial purpose
CO 3	Get self-employment opportunities with scientific knowledge to perform profitably & confidently.

CORE COURSE SEM V	
Course code**: ZY2CRT07**	
CORE COURSE - V11: EVOLUTION, ETHOLOGY & ZOOGEOGRAPHYE	
On the completion of the course, the students will be able to:	
CO 1	To understand the evolution and distribution of organisms
CO 2	To identify the different zoogeographical realms.
CO 3	To analyse the homology and analogy in animals
CO 4	To explain phototaxis and chemotaxis
CO 5	To compare the different types of animal behaviours
CO 6	To study the features and importance of connecting links.

CORE COURSE SEM V	
Course code**: ZY2CRT08**	
Course : **HUMAN PHYSIOLOGY, BIOCHEMISTRY, AND ENDOCRINOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To provide a deep knowledge in biochemistry, physiology and endocrinology
CO 2	Defining and explaining the basic principles of biochemistry useful for biological studies for illustrating different kinds of food, their structure, function and metabolism.
CO 3	Explaining various aspects of physiological activities of animals with special reference to humans
CO 4	To acquire a broad understanding of the hormonal regulation of physiological processes in invertebrates and vertebrates.

CORE COURSE SEM V
Course code**: ZY2CRT08**
Course : **PRACTICAL HUMAN PHYSIOLOGY, BIOCHEMISTRY, AND ENDOCRINOLOGY**

On the completion of the course, the students will be able to:	
CO 1	Make them familiar with hormonal regulation of physiological systems in several invertebrate and vertebrate systems
CO 2	Provide a basic understanding of the experimental methods and designs that can be used for further study and research.
CO 4	Help to analyse the structure and amount of different blood cells ,haemoglobin etc and perform various activities related to physiology using different instruments.

CORE COURSE SEM V	
Course code**: ZY5CRT05**	
Course**: ENVIRONMENTAL BIOLOGY AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Explain the basic concepts of environmental sciences, ecosystems, natural resources, population environment and society.
CO 2	Aware of natural resources, their protection, conservation, the factors polluting the environment, their impacts and control measures.
CO 3	Explain the basic concepts of toxicology, their impacts on human health and remedial measures.
CO 4	Have a consciousness regarding biodiversity, environmental issues and conservation strategies.
CO 5	Have the real sense of Human rights – its concepts & manifestations

CORE COURSE SEM V	
Course code**:**	
Course **:PRACTICAL ENVIRONMENTAL BIOLOGY & TOXICOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Estimate dissolved oxygen, carbon dioxide and soli organic carbon
CO 2	Identify the marine and fresh planktons
CO 3	Identify the different equipment like Secchi disc, plankton net and sandy shore fauna and rocky shore fauna.

CORE COURSE SEM V	
Course code**: ZY5CRT06**	
Course **:CELL BIOLOGY AND GENETICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the structure and function of the cell and thus the functioning of all living organisms
CO 2	Describe the different cell organelles, their structure and role in living organisms.
CO 3	Have critical thinking, skill and research aptitudes in basic and applied biology
CO 4	Describe the central role of genes and their inheritance in the life of all organisms

CORE COURSE SEM V
Course code**:**
Course: **CELL BIOLOGY AND GENETICS (PRACTICAL)**
On the completion of the course, the students will be able to:

CO 1	To do squash and smear preparations of onion root tip and human blood and to identify different mitotic stages and leucocytes respectively.
CO 2	To identify the permanent stained preparations of different tissues.
CO 3	To prepare temporary and permanent whole mounts.
CO 4	To do genetic problems on Monohybrid, Dihybrid Crosses and Blood group inheritance
CO 5	To distinguish between normal and abnormal human karyotypes
CO 6	To do drosophila sexing
CO 7	To do a squash preparation to demonstrate the presence of bar body in human buccal epithelium.

CORE COURSE SEM VI	
Course code**:**	
OPEN COURSE **:ZY5OPT01 VOCATIONAL ZOOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Have critical thinking skill and research aptitude by getting introduced to the frontier areas of the biological science.
CO 2	To emphasize the central role that biological sciences plays in the life of all organisms.
CO 3	To have an idea about some of the present and future applications of bio-sciences
CO 4	To have basic knowledge and skills in aquarium management, Quail farming, vermicomposting and apiculture for self-employment
CO 5	To understand the different resources available and to have an attitude towards sustainability
CO 6	Give awareness to society about the need for waste management and organic farming

CORE COURSE SEM VI	
Course code**: ZY6CRT09**	
Course **: DEVELOPMENTAL BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To achieve a basic understanding of the experimental methods and designs that can be used for future studies and research
CO 2	To provide the students with the periodic class discussions of current events in science which will benefit them in their future studies in the biological/physiological sciences and health-related fields
CO 3	To contribute to critical societal goal of a scientifically literate citizenry.

CORE COURSE SEM VI	
Course code**: ZY6CRT09**	
PRACTICAL DEVELOPMENTAL BIOLOGY	
On the completion of the course, the students will be able to:	
CO 1	To acquire deeper knowledge about the developmental stages of frog and chick
CO 2	To familiar with different technologies like cloning, amnioscentesis, embryotransfer technology etc.

CORE COURSE SEM VI	
Course code**: ZY6CRT11**	
CORE COURSE XI. BIOTECHNOLOGY, BIOINFORMATICS AND MOLECULAR BIOLOGY	
On the completion of the course, the students will be able to:	
CO 1	Understand the scope, importance and basic concepts of biotechnology, bioinformatics and molecular biology.
CO 2	Understand the tools and techniques in biotechnology and molecular biology.
CO 3	Understand the methods and procedure of animal cell culture and organismal cloning.
CO 4	Understand the applications and potential hazards of Biotechnology
CO 5	Use different biological databases and to use Rasmol for molecular visualisation.
CO 6	Explain gene expression and gene regulation.

CORE COURSE SEM VI	
Course code**:**	
PRACTICAL. BIOTECHNOLOGY, BIOINFORMATICS & MOLECULAR BIOLOGY	
On the completion of the course, the students will be able to:	
CO 1	Identify the different blotting techniques.
CO 2	To retrieve and evaluate the characteristic features of genome and protein sequences from biological databases.
CO 3	To visualize a macromolecule using a bioinformatics tool.
CO 4	To identify and comment on any tissue / Cell organelles/ DNA, DNA replication, RNA different types using models or diagrams

CORE COURSE SEM VI	
Course code**:**	
MICROBIOLOGY AND IMMUNOLOGY (PRACTICAL)	
On the completion of the course, the students will be able to:	
CO 1	To determine the different blood groups
CO 2	To understand the principle and use of instruments used in microbiology
CO 3	Prepare different media of microbial cultures
CO 4	To compare the different culture methods
CO 5	To analyse the role of different organs of the immune system
CO 6	To differentiate bacterial strains

CORE COURSE SEM VI	
Course code**: ZY6CBT04.**	
Elective course**. NUTRITION, HEALTH AND LIFESTYLE MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Have a general concept of health and the parameters that define health and wellness.
CO 2	Understand the principles of nutrition and its role in health.
CO 3	To have an idea on food safety, food laws & regulations.
CO 4	Know and understand life style diseases.

CO 5	To promote an understanding of the value of good life style practices, physical fitness and healthy food habits for life style disease management.

M.Sc ZOOLOGY

CORE COURSE SEM I	
Course code**: ZL010101**	
Course **: PHYLOGENETIC AND TAXONOMIC APPROACHES**	
On the completion of the course, the students will be able to:	
CO 1	Understand the Organization and Life: Homology and Analogy, Diversity of invertebrates, Phylogeny of invertebrates
CO 2	Understand the Origin and development of animals and the Geological time scale
CO 3	To make the students aware for Paleontology i.e. Fossils and its significance.
CO 4	To acquire knowledge on the taxonomic status of various Invertebrate animals and animal groups
CO 5	Understand the Outline classification of Animals: Classification of animals.
CO 6	Understand the Levels of structural organization.
CO 7	Understand the principles and methods of taxonomy

CORE COURSE SEM I	
Course code**: ZL010102**	
Course : **EVOLUTIONARY BIOLOGY AND ETHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic principles and theories of evolution
CO 2	Analyse the evolutionary relationship of different animal taxa
CO 3	Understand the complexity of animal behaviour and its relation to other biological sciences
CO 4	Have research aptitude in the field of behavioural and evolutionary science

CORE COURSE SEM I	
Course code**: ZL010103**	
Course : **BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate an understanding of chemical nature of life and life process.
CO 2	Obtain an idea on structure and functioning of biologically important molecules.
CO 3	Understand the importance of metabolism of bio macromolecules in normal physiology of man.
CO 4	Stay informed about the abnormal metabolism of biomolecules and the resultant diseases.
CO 5	Use current biochemical and molecular techniques to plan and carry out experiments.

CORE COURSE SEM I	
Course code**: ZL010104**	
Course : **BIOSTATISTICS AND RESEARCH METHODOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To understand the concepts of statistics and research methodology and create awareness about the gadgets, tools and accessories of biological research
CO 2	Help students to improve analytical and critical thinking skills through personal problem solving.
CO 3	To enable learners to effectively apply suitable statistical tests in research and equip them to prepare research papers and project proposals.
CO 4	To sensitize students about the ethics involved in research and enable them to come up with innovative research designs.

CORE COURSE SEM II	
Course code**: ZL010201**	
Course **:FIELD ECOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understanding on the basic theories and principles of ecology
CO 2	Learning various natural resources and their management
CO 3	Analysing the human influence on environment and current environmental issues
CO 4	Understanding different types of animal adaptations in varying environments

CORE COURSE SEM II	
Course code**: ZL010202**	
Course **: DEVELOPMENTAL BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To understand the developmental process that lead to establishment of body plan of vertebrates and the corresponding cellular and genetic mechanisms.
CO 2	Attain a basic conceptual knowledge about the principal cellular mechanisms of development
CO 3	To explain the clinical implications of development and the mechanisms intervene in the developmental alterations
CO 4	To expose the learner to the new developments in embryology andits relevance to man.

CORE COURSE SEM II	
Course code**: ZL010203**	
Course **: GENETICS AND BIOINFORMATICS**	
On the completion of the course, the students will be able to:	
CO 1	To get an in-depth understanding on the principles and mechanisms of inheritance
CO 2	To analyse the fine structure and molecular aspects of genetic material
CO 3	To understand the importance of inheritance in Man and congenital diseases

CO 4	To get acquainted with the field of bioinformatics and able to take up bioinformatics studies

CORE COURSE SEM II	
Course code**: ZL010204**	
Course **: MICROBIOLOGY AND BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Getting an over view of the microbial world, its structure and function
CO 2	Familiarizing with the applied aspects of microbiology
CO 3	Understanding the modern biotechnology practices and approaches
CO 4	Knowledge on public policy, biosafety, and intellectual property rights issues related to biotechnology

CORE COURSE SEM II	
Course code**: ZL010105**	
Course **: PRACTICAL 1 ANIMAL DIVERSITY: EVOLUTIONARY, ETHOLOGICAL AND BIOCHEMICAL METHODS & APPROACHES**	
On the completion of the course, the students will be able to:	
CO 1	To enable the students to identify and study about different species of vertebrates and Invertebrates and their phylogenetic, morphological, ecological and pathological significance
CO 2	Enable them to prepare keys and cladograms using appropriate softwares or tools
CO 3	To understand the behaviour and activity pattern of different organisms based on field observation with respect to diurnal and seasonal.
CO 4	To develop the skills in student to do different statistical analysis using various softwares and online tools.

CORE COURSE SEM II	
Course code**: ZY2CT09**	
Course **: BIOPHYSICS, INSTRUMENTATION AND BIOLOGICAL TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Understand the biophysical properties and functioning of life processes
CO 2	Have an idea of the different tools and techniques available for studying biochemical and biophysical nature of life
CO 3	Use the tools and techniques for project work/ research in biology

CORE COURSE SEM II	
Course code**: ZY2CT09**	
Course : **PRACTICAL 2 DIVERSITY OF LIFE: ECOLOGICAL, EMBRYOLOGICAL, HEREDITARY AND MICROBIAL METHODS & APPROACHES**	
On the completion of the course, the students will be able to:	
CO 1	To analyse various quality parameters of soil and water and evaluate their influence of biota
CO 2	To identify various stages of animal development and perform vital staining techniques
CO 3	To apply bioinformatics tool for the analysis and construction of phylogenetic trees
CO 4	To identify abnormal karyotypes and mutants

CO 5	To perform micrometric, microscopic and chromatographic techniques

CORE COURSE SEM III	
Course code**: ZY3CT11**	
Course : **ANIMAL PHYSIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To study and compare the functioning of organ systems across the animal world
CO 2	Understand the comparative functioning of different systems in animals.
CO 3	To acquire deeper knowledge about the fundamental processes and mechanisms that serve and control the various functions of the body
CO 4	To enhance knowledge and appreciation of mammalian physiology.

CORE COURSE SEM III	
Course code**: ZY3CT12**	
Course :**CELL AND MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the structural and functional details of the basic unit of life at the molecular level
CO 2	Understand and explain the basics of cell biology
CO 3	Explain the new developments in molecular biology and its implications in human welfare

CORE COURSE SEM III	
Course code**: ZY3CT14**	
Course **:IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To possess an in depth knowledge and new developments in immunology.
CO 2	To describe the organisation and functioning of the immune system.
CO 3	To give a detailed description of diagnostic tests of diseases.
CO 4	To understand different types of vaccines and their role in human health and well being.

CORE COURSE SEM III	
Course code**: ZY3CP15**	
Course: **PRACTICAL 3: CELL AND MOLECULAR BIOLOGY, MICROBIOLOGY AND BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Do the squash preparations of onion root tip, grasshopper testis and salivary gland of drosophila and to identify the mitotic index, different meiotic stages and giant chromosomes respectively.
CO 2	Prepare microtome sections, spread and do histochemical staining of carbohydrates (PAS), Protein (Bromophenol blue), lipids (Sudan Black) and DNA (Fuelgen stain
CO 3	Understand the methodology for plasmid and genomic DNA isolation
CO 4	Do Sterilization, disinfection and observe safety measures in microbiological laboratory.

CO 5	Prepare different types of culture media and to do different culture techniques
CO 6	Identify microorganisms using different tests and to enumerate microorganisms using haemocytometer and turbidimetry.
CO 7	Perform environmental sample analysis and bacteriological analysis of milk.

CORE COURSE SEM III	
Course code**: ZY3CP16**	
Course **: PRACTICAL 4: ANIMAL PHYSIOLOGY AND IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Ability to explain physiological processes in detail and on an appropriate level.
CO 2	Able to perform different immunological techniques like WIDAL Test, Western Blotting,ELISA, Rocket Immuno electrophoresis etc,
CO 3	Able to analyse different factors affecting enzyme activity and get deep knowledge about the functioning of various hormones and chemicals inside the body.
CO 4	To familiarise with various softwares related to physiology.

CORE COURSE SEM IV	
Course code**: ZY4C ET 01**	
Course **: ENVIRONMENTAL SCIENCE: CONCEPTS AND APPROACHES**	
On the completion of the course, the students will be able to:	
CO 1	To understand various components of environment and their charecteristics in detail and the various phenomena in biosphere.
CO 2	To enable the students to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth.
CO 3	Make them aware about different laws and oraganisations related to biodiversity and conservation.
CO 4	To understand about environmental economics and green economy for the sustainable utilisation of natural resources.

CORE COURSE SEM IV	
Course code**: ZY4C ET02**	
Course **: ENVIRONMENTAL POLLUTION AND TOXICOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To provide a broad and deep understanding on environment and influence of man on environment
CO 2	To equip the students to use various tools and techniques for the study of environment
CO 3	To enable the learner to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth
CO 4	To take up further studies and research in the field

CORE COURSE SEM IV
Course code**: ZY4C EP04**
Course **: ENVIRONMENTAL SCIENCE: PRACTICAL –I**

On the completion of the course, the students will be able to:	
CO 1	Determine the soil texture, moisture content, soil pH, Chloride, Calcium, Magnesium, Potassium and Phosphorous
CO 2	Determine the Calcium Carbonate content of different egg shells.
CO 3	Estimate the primary productivity of different aquatic systems.
CO 4	Identify the different trophic levels from the gut analysis of fish.
CO 5	Understand the biodiversity in Forest/Grass land and Pond/River and to report the species richness, abundance and animal interactions.

CORE COURSE SEM IV	
Course code**: ZY4C EP05**	
Course : **ENVIRONMENMTAL SCIENCE PRACTICAL-II**	
On the completion of the course, the students will be able to:	
CO 1	To analyse the various physico-chemical parameters of water
CO 2	To examine the toxicity of various heavy metals
CO 3	To isolate and enumerate the microorganisms in soil
CO 4	To analyse the microbiological quality of water
CO 5	To elucidate the histo-pathological changes in tissues

9. DEPARTMENT OF ECONOMICS

B.A

CORE COURSE SEM I	
Course code: **EC1CRT01**	
Course: **PERSPECTIVES& METHEDOLOGY OF ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Basic understanding of the different branches of sciences – Introduction to the Social Sciences and different approaches to Social Sciences
CO 2	Understanding the basics of Economics, nature of the subject and its scope and relevance and the basic concepts of Economics
CO 3	Introducing the major schools of thoughts in Economics and the contributions of various schools as well as individuals to the development of subject.
CO 4	Introducing basic themes and concepts of research in Economics – Methodology, the conduct as well as the presentation of findings

CORE COURSE SEM I	
Course code:	
Complementary course (History): **PRINCIPLES OF ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Basic understanding of the scope, relevance and definitions of Economics and its methodology
CO 2	Understanding the basics of Economics, about scarcity and optimum allocation of resources
CO 3	Introducing markets and fundamental notions of economics- demand, supply and equlibrium
CO 4	Introducing fundamental notions of neoclassical economics
CO 5	Introducing laws and concepts in production

CORE COURSE SEM II	
Course code: **EC2CRT02**	
Course: **MICRO ECONOMIC ANALYSIS I**	
On the completion of the course, the students will be able to:	
CO 1	Introduces the basics of microeconomics and discusses the basic economic problems and its solutions. Various and different concepts of microeconomics are introduced to make the further studies easier
CO 2	Introducing Demand and supply analysis and the equilibrium analysis- it imparts more knowledge about the various factors which can influence demand and supply.
CO 3	Introduces the elasticity of demand and supply – its degrees and implications and uses in the economic policy decisions.
CO 4	Discussing the dynamic demand and supply model: explains the cobweb model and demand - forecasting – objectives and methods.
CO 5	Discuss various approaches to consumer behaviour – Cardinal and ordinal – Indifference curve analysis- Hicksian - and Slutsky's approaches -– revealed preference – new approaches to consumer behaviour.
CO 6	Discussions on Production function – isoquants elasticity of factor substitution - laws of returns to scale – economies and diseconomies of scale – empirical production function: Cobb-Douglas production function
CO 7	Introduction to cost concepts - explicit and implicit costs, economic and accounting costs, sunk cost, opportunity cost ,real cost, social cost- traditional theory of costs - short run and long run analysis of costs – envelope curve – modern theory of cost – short run and long run- L-shaped and saucer-shaped cost curves

COMPLEMENTARY COURSE SEM II	
Course code: **HY2CMT03**	
Course: **COMPLEMENTARY II (HISTORY): BASIC ECONOMIC STUDIES**	
On the completion of the course, the students will be able to:	
CO 1	Introduces national income accounting and its various concepts
CO 2	Introducing various concepts in public economics
CO 3	Introduces financial system with special reference to India
CO 4	Discussing the various aspects of Indian Economy

CORE COURSE SEM III	
Course code: **EC3CRT03**	
Course: **MICRO ECONOMIC ANALYSIS II**	
On the completion of the course, the students will be able to:	
CO 1	To analyse situations using economic concepts and use those concepts to examine specific questions
CO 2	To evaluate consumer and firms' behavior and to analyze different types of market structures
CO 3	To apply economic tools to evaluate economic policies

CORE COURSE SEM III
Course code: **EC3CRT04**
Course: **ECONOMICS OF GROWTH AND DEVELOPMENT**

On the completion of the course, the students will be able to:	
CO 1	Analytically distinguish different concepts of growth and development
CO 2	Evaluate multidimensional understanding of development as well as poverty
CO 3	Teach various approaches of development
CO 4	Assess theories, factors and determinants of development
CO 5	Analyse human resource development and various dimensions about it
CO 6	Analyse issues of population, ageing, gender, as well as theories in it

COMPLEMENTARY COURSE SEM III	
Course code: **PS3CMT01**	
Course: **COMPLEMENTARY III- AN INTRODUCTION TO POLITICAL SCIENCE**	
On the completion of the course, the students will be able to:	
CO 1	Develop a basic understanding of the nature and definitions of political science and to evaluate its scope as a discipline
CO 2	Briefly analyse the features of different types of traditional and modern approaches to the study of the discipline
CO 3	Investigate State as an essential concept in Political Science, its elements and theories of origin. Evaluate the impact of globalization on State
CO 4	Examine the key concepts of liberty, equality, law and justice
CO 5	Analyse the major political ideologies- Liberalism, Marxism, Gandhism and Fascism
CO 6	Acquaint with the characteristics and types of democracy and various forms of government

CORE COURSE SEM IV	
Course code: **EC4CRT05**	
Course: **MACRO ECONOMICS I**	
On the completion of the course, the students will be able to:	
CO 1	Detailed understanding of Micro Economics and Macro Economics and the relevance of its separate analysis and discussions about Macro statics and macro dynamics-circular flow of economic activity in a two sector economy-
CO 2	Understanding in details about the national income analysis, various national income concepts and its measurement and difficulties
CO 3	Introducing Classical Macro Economics, its core features and discussions about the determination of output, employment, price and rate of interest determination.
CO 4	Understanding Keynesian Revolution and the basic concepts of Macroeconomics as explained by J M Keynes, who provided a well-defined frame work for Macroeconomics
CO 5	Introducing the Orthodox Keynesian Models – Two Sector – Three Sector – Four Sector Models
CO 6	Introducing the Neo Classical Synthesis and The IS-LM analysis – Two Sector Model

CORE COURSE SEM IV	
Course code: **EC4CRT06**	
Course: **PUBLIC ECONOMOICS**	
On the completion of the course, the students will be able to:	
CO 1	Create understanding in various concepts and theories in public economics; public goods and private goods and role of state
CO 2	Analyse various concepts in public revenue including the most recent taxation and concepts in budget
CO 3	Evaluate concepts and theories in public expenditure
CO 4	Evaluate concepts and classification of public debt
CO 5	Create critical understanding of various concepts and issues in federal finance

COMPLEMENTARY COURSE SEM IV	
Course code: **PS3CMT05**	
Course: **COMPLEMENTARY IV: INDIAN CONSTITUTION - SOCIAL ISSUES IN INDIA**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint students with the genesis of the Constitution of India, role of the Constituent Assembly, salient features of the state structures and institutions
CO 2	Detailed understanding of pillars of Indian Constitution- Preamble, Fundamental Rights, Fundamental Duties and Directive Principles of State Policy
CO 3	Familiarise the learners with the actual working of the federal structure of the Indian polity
CO 4	Introduce the key features of India's democracy as entailed in the Constitution- decentralization, judicial review, judicial activism
CO 5	Understand the powers and functions of the organs of the government- Indian Parliament, the President, Prime Minister and the Indian Judiciary
CO 6	Discuss the major socio-political issues prevalent in India- Casteism, Communalism, Terrorism, Regionalism, Naxalism

CORE COURSE SEM V	
Course code: **EC5CRT07**	
Course: **QUANTITATIVE TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Develop a basic understanding of the meaning, definitions and scope of the subject matter of Environmental Economics
CO 2	Briefly study the different types of Energy and Sources, Energy crisis.
CO 3	Learn about the biodiversity, ecosystems, linkages and species.
CO 4	Comprehend the different types of pollution, legislations pertaining to its control, Deforestation and world Conferences on Environment. Population and Environment.
CORE COURSE SEM V	
Course code: **EC5CRT08**	
Course: **MACRO ECONOMICS II**	
On the completion of the course, the students will be able to:	

CO 1	Clear understanding about the various theories of Consumption Function and its importance and implications
CO 2	To get acquainted with various post Keynesian theories of Investment and its implications
CO 3	To have a very clear understanding about the demand for money and supply of money
CO 4	To have a pure understanding about Inflation and its various theories
CO 5	Better understanding about Unemployment and its types and about Okun's law
CO 6	Introducing Inflation Unemployment relationship through Phillips curve and its various modifications – Stagflation
CO 7	Introduction to Trade Cycle

OPEN COURSE SEM V	
Course code: **EC5OPT01**	
Course: **FUNDAMENTALS OF ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Introduce foundational concepts in economics
CO 2	Introduce state and public economics concepts
CO 3	Understanding financial system and foreign trade in the Indian context
CO 4	Comprehend Indian economy
CO 5	Introduce foundational concepts in economics

CORE COURSE SEM V	
Course code: **EC5CRT09**	
Course: **ENVIRONMENTAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Develop a basic understanding of the meaning, definitions and scope of the subject matter of Environmental Economics
CO 2	Briefly study the different types of Energy and Sources, Energy crisis.
CO 3	Learn about the biodiversity, ecosystems, linkages and species.
CO 4	Comprehend the different types of pollution, legislations pertaining to its control, Deforestation and world Conferences on Environment. Population and Environment.
CO 5	To understand the various human right regimes, evolution and History.
CO 6	Acquaint with the covenants of Human rights, Indian perspectives on Human Rights.

CORE COURSE SEM V	
Course code: **EC5CRT10**	
Course: **INTRODUCTORY ECONOMETRICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand econometrics and regression
CO 2	Assess basic concepts in regression like PRF, SRF ,OLS
CO 3	Understand Hypothesis testing
CO 4	Assess multiple regression
CO 5	Evaluate violation of CLRM assumptions, its consequences and remedies

CORE COURSE SEM VI	
Course code: **EC6CRT11**	
Course: **QUANTITATIVE METHODS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the basic concepts in statistics
CO 2	Use the proper methods to collect data, employ the correct analyses, and effectively present the results
CO 3	Understand the statistical process behind how discoveries are made in science, decisions are arrived at based on data and predictions are made
CO 4	Critically assess the quality of analysis whenever the students are exposed to
CO 5	Provide the skills and knowledge necessary to enable the students to perform statistical processes competently

CORE COURSE SEM VI	
Course code: **EC6CRT12**	
Course: **INTERNATIONAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	To gain deep knowledge about the basic principles that tend to govern the flow of trade in goods and services at the global level
CO 2	To learn about various theories of trade
CO 3	To learn about the impact of globalization and Indian economy's relationship with other economies.
CO 4	To comprehend the worldly institutions and their role in present global economy

CORE COURSE SEM VI	
Course code: **EC6CRT13**	
Course: **MONEY & FINANACIAL MARKETS**	
On the completion of the course, the students will be able to:	
CO 1	Assess financial system and the various concepts of money
CO 2	Evaluate the role of RBI and its monetary policy
CO 3	Evaluate commercial banking in India with special reference to digital banking
CO 4	Analyse money market
CO 5	Assess capital market

CORE COURSE SEM VI	
Course code: **EC6CRT14**	
Course: **INDIAN ECONOMY**	
On the completion of the course, the students will be able to:	
CO 1	Develop a basic understanding of the basic features of Indian economy
CO 2	Study the structural changes taking place in the economy
CO 3	Learn about the impact of globalization and Indian economy's relationship with other economies.
CO 4	Comprehend concepts like disinvestment, Missing women, Demographic dividend, Migration etc.

CO 5	Analyse the transition taking place in the economy
CO 6	To understand the major problems like poverty, unemployment, inequality

CORE COURSE SEM VI	
Course code: **EG6CBT03**	
Course: **HISTORY OF ECONOMIC THOUGHT**	
On the completion of the course, the students will be able to:	
CO 1	Learn about the evolution of methodological economic thought & An overview of absolutism, relativism, rhetorical and post rhetorical, falsification, logical positivism, naturalism, supernaturalism and utopian socialism.
CO 2	Recollecting the major economic contributions of pre Adamite economic thought- ancient, Greek & Roman, mercantilism and physiocracy.
CO 3	Discussing classical economic thought: Adam Smith, Thomas Malthus, David Ricardo, J.B Say, J.S.Mill, Jeremy Bentham. And also learn Sismondi, Friedrich list and Karl Marx along with them
CO 4	Introducing and understanding marginal revolution, neo classical, Keynesian, monetarism, new classical, supply side & new Keynesian economic thought
CO 5	Understanding various economic contributions of Indian economic thought- kautilya, Dadabhai Naoroji, Gandhi,D.R.Gadgil, C.N Vakil, P.R.Brahmananda, K.N.Raj, P.C.Mahalanobis, V.K.R.V.Rao, A.K.Sen

M.A ECONOMICS

CORE COURSE SEM I	
Course code: **EC010101**	
Course: **MICROECONOMICS - I**	
On the completion of the course, the students will be able to:	
CO 1	To equip the students themselves in a comprehensive manner with the various aspects of the traditional Microeconomic theory as well as the latest developments in this field
CO 2	To understand the applications of theories in analyzing current economic problems and to develop the ability to synthesize knowledge
CO 3	To provide a good understanding and base to the students in applying the concepts and methods of microeconomics in the practical field
CO 4	Helps students to equip with the knowledge and skill in effective decision making under uncertain market situations
CO 5	To acquire skills in allocating scarce resources among alternative uses
CO 6	To understand the emergence of different organizational structures of the firm

CORE COURSE SEM I	
Course code: **EC010102**	
Course: **MACROECONOMICS -I**	
On the completion of the course, the students will be able to:	
CO 1	Refreshing and recollecting Classical: Labour Market-Employment and Output-Say's Law- Interest Rate-Quantity Theory of Money: Neutrality of Money and Classical Dichotomy.

CO 2	Understanding Keynesian Fixed Price Models: Keynesian Cross Model
CO 3	Introducing IS-LM analysis -Three Sector model
CO 4	Understanding Keynesian Flexible Price Model: AD-AS Framework-Policy Implications-Multiplier: T and G-Multiplier, Balanced Budget Multiplier-Built-in-Stabilizers-Ricardian Equivalence.
CO 5	Discussing and Understanding Labour Market: Classical versus Keynes -Keynes Effect and Real Balance Effect
CO 6	Detailing Inflation: Inflationary Gap-Demand-Pull and Cost-Push Inflation-Phillips Curve: Lipsey's excess-demand model - The Samuelson-Solow modification of the Phillips curve- Tobin's views on Phillips curve- Strategies to control inflation.
CO 7	Familiarising Neo-Keynesian Analysis (Disequilibrium Models): Walrasian Vs. Keynesian Models. Effective Demand and Notional Demand ---Incompatibility of Walras Law and Neoclassical Synthesis of Keynes's General Theory- Disequilibrium models of Robert Clower-Leijonhufvud's, Barro-Grossman and Malinvaud.
CO8	Introducing Monetarism and Discussing the historical development of Monetarism
CO9	Discussing Demand for money analysis and supply of money analysis.
CO10	Discussing Consumption functions and theories of Consumption function
CO11	Introducing Investment function and its theories

CORE COURSE SEM I	
Course code: **EC010103**	
Course: **DEVELOPMENT ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Assess the concepts of economic development, growth, development gap and sustainable development along with its measurements behind environmental issues and problems and policies designed to address them
CO 2	Evaluate different theories of underdevelopment
CO 3	Analytically distinguish different theories of development and growth
CO 4	Distinguish the different approaches to development
CO 5	Assess critical issues in development process
CORE COURSE SEM I	
Course code: **EC010104**	
Course: **INDIAN ECONOMY -I**	
On the completion of the course, the students will be able to:	
CO 1	Evaluate the evolution of industrial growth; prospects and issues and the latest developments in industrial sector
CO 2	Comprehend evolution of service sector growth in India- prospects and issues
CO 3	Evaluate the infrastructure and social infrastructure of Indian economy
CO 4	Analyse the evolution of foreign trade in India
CO 5	Evaluate the recent status with regard to trade and assess issues

CORE COURSE SEM II
Course code: **EC010201**
Course: **MICROECONOMICS - II**

On the completion of the course, the students will be able to:	
CO 1	Helps to gain a sound understanding of advanced microeconomic theory.
CO 2	To equip students to analyze contemporary economics issues and to create new models to explain the behavior of individuals, firms, and markets, and to evaluate economic policies.
CO 3	to acquaint the student with decision making in the context of market interdependence, complexity, uncertainty and informational asymmetry
CO 4	Helps students to equip with the knowledge and skill in effective decision making under uncertain market situations
CO 5	To give insights into developments in the areas of general equilibrium and welfare economics
CO 6	To enable the student to apply microeconomic principles in the areas of industrial organization, exchange, and welfare.

CORE COURSE SEM II	
Course code: **EC010202**	
Course: **MACROECONOMICS -II**	
On the completion of the course, the students will be able to:	
CO 1	Understanding in detail the New Classical Macroeconomics – its features and policy implications for further applications
CO 2	Explaining the Real Business Cycle and its features and implications
CO 3	Detailing Supply side school and its core features and its applications
CO 4	Familiarising, understanding and applying New Keynesian principles
CO 5	Introducing the strands of Post Keynesian Economics and its core features
CO 6	Detailing and understanding the implications of Trade Cycles and its features, types and recent developments
CO 7	Introducing The Great Recession of 2008

CORE COURSE SEM II	
Course code: **EC010203**	
Course: **PUBLIC ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Develop an understanding of the role of Government, market failures and Fiscal policies on stabilization.
CO 2	Briefly study the features of different types of public goods, externalities and Theories.
CO 3	Learn about the Public Choice Theory and voting Mechanisms.
CO 4	Understand and analyze the theories and practice pf taxation and public expenditures.
CO 5	Analyze the major types of budgets. Preparation of tehj budget, public Debt of the government, theories of debt.
CO 6	Acquaint with the characteristics and nature of the Indian Ifiscal federalism and the Centre-state financial relations.

CORE COURSE SEM II
Course code: **EC010204**
Course: **INDIAN ECONOMY- II**
On the completion of the course, the students will be able to:

CO 1	Evaluate demographic changes in India w.r.t. policies, labour market, migration, social securities and employment trends
CO 2	Distinguish various poverty measurement indices and its extent and assess the status of food security and nutrition , inequality and regional imbalances in India
CO 3	Assess the Fiscal situation in India, evolution and latest reforms
CO 4	Evaluate issues facing Indian economy like black money, demonetisation, global economic crisis
CO 5	Analyse the financial sector reforms in India

CORE COURSE SEM III	
Course code: **EC010301**	
Course**: INTERNATIONAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Refreshing and recollecting and discussing the major theories of International trade and its basic concepts
CO 2	Introducing and Understanding the neo classical theories of International Trade
CO 3	Introducing IS-LM analysis -Three Sector model
CO 4	Understanding the modern theories of International trade

CORE COURSE SEM III	
Course code: **EC010302**	
Course**: ECONOMETRICS -1**	
On the completion of the course, the students will be able to:	
CO 1	To learn how to estimate a general class of parametric models or semiparametric models
CO 2	To learn how to conduct testing and draw inference, given the data
CO 3	To understand the problems encountered in estimation and inference in the context of the single-equation linear regression model
CO 4	To acquaint students with econometric techniques that are widely used in empirical work in Economics and other related disciplines
CO 5	To expose students to the art of performing estimation, analyzing and interpretation of the estimated econometric model
CO 6	To help in interpreting computer output for the estimation and testing of econometric relationships

CORE COURSE SEM III	
Course code: **EC010303**	
Course**: HETERODOX ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Assess Heterodox Economics and its core features
CO 2	Apply the Micro–Macro link in Heterodox Economics
CO 3	Evaluate the role of Institutions, Money, Trade and Economic Growth in Heterodox framework.
CO 4	Analytically distinguish alternative views, schools of thought and perspectives on economy
CO 5	Assess various concepts on value, production and distribution according to different heterodox thinkers

CORE COURSE SEM III	
Course code: **EC010304**	
Course**: ENVIRONMENT ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Examines the economics behind environmental issues and problems and policies designed to address them
CO 2	Provides different perspectives on Environment and Development/Growth and the environmental issues
CO 3	Focuses on welfare economics of environmental problems and the preservation policies
CO 4	Provides an overview of economic *valuation* methods for *environmental* goods, justifies the allocation of limited resources between competing uses.
CO 5	Familiarizes the concept of Sustainable development, rules, indicators, models and the notion of Eco economy
CO 6	Analyze the various environmental accounting measures and the major global and national institutional governance mechanism

CORE COURSE SEM III	
Course code: **EC010305**	
Course**: KERALA ECONOMY**	
On the completion of the course, the students will be able to:	
CO 1	Giving a general introduction to Kerala economy, growth and development in an evolutionary framework
CO 2	Assess the different sectors of Kerala economy
CO 3	Evaluate the demographic prospects and issues in Kerala economy
CO 4	Assess social issues like poverty, inequality, gender and environment in Kerala
CORE COURSE SEM IV	
Course code: **EC010401**	
Course**: INTERNATIONAL FINANCE**	
On the completion of the course, the students will be able to:	
CO 1	Refreshing and recollecting and discussing Exchange rate, Exchange market, Exchange rate determination, Theories of exchange rate, important players. Exchange rate determination in India
CO 2	Introducing and Understanding Balance of Payment, its theories and implications and also the Balance of payment crisis, India faced in 1919
CO 3	Introducing and discussing open economy Macro models – Swan diagram- Mundell Fleming model - Impossibility Trinity
CO 4	Understanding the Resource Movements, Currency Crisis and International Financial Institutions

CORE COURSE SEM IV
Course code: **EC010402**
Course**: ECONOMETRICS -II**
On the completion of the course, the students will be able to:

CO 1	To get an introduction to time series methods in econometrics covering aspects of the trend behavior, detrending mechanisms, and their properties, unit root theory, cointegrated system approaches, realized volatility and, model selection
CO 2	To equip the students with advanced theory of econometrics and relevant applications of the methods
CO 3	To acquaint the students with advanced techniques in time-series and panel-data analysis as well as implementation of theory through software applications to gear them towards execution of independent research projects
CO 4	To introduce students to basic modelling techniques in the analysis of cross-section, panel and time series economic data; to provide students with sufficient econometric training to read the applied literature in core journals which use these standard techniques

CORE COURSE SEM IV	
Course code: **EC800401**	
Course**: AGRICULTURAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Assess agricultural sector in the process of economic development
CO 2	Evaluate the role of the agricultural sector in aggregated (macro) growth and development theories, including the recent endogenous growth theories is reviewed.
CO 3	Analyse relevant concepts and principles of Agricultural Economics.
CO 4	Assessing the problems of the farm management in order to make contributions to the prosperity of villages
CO 5	Evaluate Indian agriculture

CORE COURSE SEM IV	
Course code: **EC800402**	
Course**: INDUSTRIAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	Develop a basic understanding of the meaning, definitions and scope of the subject matter of Industrial Economics and forms of Organization.
CO 2	Briefly study the features of different types of firm sizes, theories on the growth of the firm.
CO 3	Learn about the market structure, Product Differentiation, entry, exit, location, innovations, Theories.
CO 4	Comprehend the key pricing objectives and methods, SCP Approach.
CO 5	Analyse the major types of Integration, Mergers and Acquisitions in the industrial sector. Investment Decisions, Productivity Project Evaluation Methods.
CO 6	Acquaint with the characteristics and nature of the Indian Industrial Sector, Policies, Issues.

CORE COURSE SEM IV
Course code: **EC800403**
Course**: LABOUR ECONOMICS**
On the completion of the course, the students will be able to:

CO 1	Allow students to see the interrelationship of the major forces at work shaping labour market behaviour and exposes them to its theoretical as well as empirical issues
CO 2	Emphasizes the power of microeconomic and macroeconomic reasoning to answer important economic questions
CO 3	Impart knowledge about dimensions of labour supply and analyze various aspects of labour supply behaviour and the impact of welfare on it
CO 4	Comprehend the determinants of demand for labour both in the short run and long run. Identify the impact of various global economic phenomena on labour demand
CO 5	Introduce the determination of wage in different market forms and analyzes how the compensation of workers can be structured to create incentives for greater productivity
CO 6	Analyze the goals, major activities, and overall effects of unions in the context of economic theory and the primary activities of the collective bargaining process
CO 7	Concerned with the causes of unemployment and how various government policies affect the level of unemployment.

10. DEPARTMENT OF PSYCHOLOGY

B.Sc

CORE COURSE SEM I	
Course code: **PY1CRT01**	
Course: **FOUNDATIONS AND METHODS OF PSYCHOLOGY (CORE)**	
On the completion of the course, the students will be able to:	
CO 1	Generate interest in psychology
CO 2	Understand the basics of various perspectives in psychology
CO 3	Appreciate the psychological processes behind behaviour
CO 4	Develop critical thinking ability of students

COMPLEMENTARY COURSE SEM I	
Course code: **PY1CMT02**	
Complementary course (Zoology): **BODY SYSTEMS AND BEHAVIOUR(COMPLEMENTARYI)**	
On the completion of the course, the students will be able to:	
CO 1	Understand the biological foundations of behaviour

COMPLEMENTARY COURSE SEM I	
Course code: **ST1CMT21**	
Complementary course (Statistics): **BASIC STATISTICS (COMPLEMENTARY II)**	
On the completion of the course, the students will be able to:	
CO 1	Inculcate in students the need and importance of statistics in Psychology, define and use the basic terminology of statistics and to get them equipped with different statistical presentation of data.
CO 2	Explain the statistical concept of census and sampling. Analyse and compare different Sampling methods

CO 3	Calculate and interpret the various measures of central tendency

CORE COURSE SEM II	
Course code: **PY2CRT04**	
Course: **BASIC COGNITIVE PROCESSES (CORE)**	
On the completion of the course, the students will be able to:	
CO 1	Improve meta cognitive abilities
CO 2	Apply memory techniques to improve academic performance.
CO 3	Understand psychological processes that contribute to individual differences.

COMPLEMENTARY COURSE SEM II	
Course code: **PY2CMT05**	
Course: **BIOLOGICAL BASIS OF BEHAVIOUR (COMPLEMENTARY I)**	
On the completion of the course, the students will be able to:	
CO 1	To enable students to understand the influence of physiological system in human behaviour

COMPLEMENTARY COURSE SEM II	
Course code: **ST2CMT22**	
Course**: STATISTICAL TOOLS (COMPLEMENTARY II)**	
On the completion of the course, the students will be able to:	
CO 1	Calculate and interpret the various measures of dispersion
CO 2	To acquire the knowledge about the characteristics of a distribution such as moments, skewness and kurtosis.
CO 3	To understand the concept of scatter diagram, Differentiate the ideas between correlation and regression, Identification of the regression lines.

CORE COURSE SEM III	
Course code: **PY3CRT07**	
Course: **LIVING IN THE SOCIAL WORLD (CORE)**	
On the completion of the course, the students will be able to:	
CO 1	To understand the psychological processes behind human behaviour in a social setting living
CO 2	Explain the psychological aspects of various social phenomena(Understand the psychological aspects of various social issues in the society and the nation)
CO 3	Implication of social psychology in everyday

COMPLEMENTARY COURSE SEM III	
Course code: **PY3CMT08**	
Course: **NEUROPHYSIOLOGY OF BEHAVIOUR- PAPER III (COMPLEMENTARY I)**	
On the completion of the course, the students will be able to:	
CO 1	To help students understand brain behaviour relationship

COMPLEMENTARY COURSE SEM III	
Course code: **ST3CMT23**	
Course: **PROBABILITY AND PROBABILITY DISTRIBUTIONS (COMPLEMENTARY II)**	
On the completion of the course, the students will be able to:	
CO 1	Define the basic rules and concepts of probability, Solve the problems in probability
CO 2	Explain the concepts of random variables. Differentiate the ideas between discrete and continuous random variables. Analyse the discrete random variable using p.d.f, c.d.f, expectation, mean, variance
CO 3	To understand the applications of Binomial and Normal distributions in day to day life and psychological problems.

PRACTICALS SEM III	
Course code**:** **PY3 P01**	
Course: **PSYCHOLOGY PRACTICALS-I**	
On the completion of the course, the students will be able to:	
CO 1	To introduce the basic concepts of experimental psychology.
CO 2	To facilitate comprehension of the theoretical concepts through experiments
CO 3	To develop awareness of psychological instruments and techniques.
CO 4	To provide basic training in planning and conducting experiments

CORE COURSE SEM IV	
Course code: **PY4CRT10**	
Course: **SOCIAL INTERACTIONS AND HUMAN BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To understand the psychological processes behind human behaviour in a social setting
CO 2	Explain the psychological aspects of various social phenomena (Understand the psychological aspect of various social issues in the society and the nation)
CO 3	Implication of social psychology in everyday living
CO 4	To help the students to get an understanding on measuring human behaviour

COMPLEMENTARY COURSE SEM IV	
Course code: **PY4CMT11**	
Course: **BIOPHYSIOLOGY OF BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To help students to understand the branch of psycho-neuroimmunology
CO 2	To understand the physiological basis of basic processes

COMPLEMENTARY COURSE SEM IV
Course code**:** **ST4CMT24**
Course: **STATISTICAL INFERENCE**
On the completion of the course, the students will be able to:

CO 1	Explain the concepts of Testing of Hypotheses. Hypothesize various advanced statistical techniques for modelling and exploring practical situations.
CO2	Solve the problems related to Testing of Hypotheses (large sample test)
CO3	Solve the problems related to Testing of Hypotheses (small sample test)

PRACTICALS SEM IV	
Course code: **PY4 P02**	
Course**: PSYCHOLOGY PRACTICALS-II**	
On the completion of the course, the students will be able to:	
CO 1	To study experimentally the sensory experience and perceptual processes
CO 2	Experimentally prove how our perceptual process differs and affect our cognitive processes
CO 3	To observe and study the social psychological phenomenon in everyday life situations.

CORE COURSE SEM V	
Course code: **PY5CRT13**	
Course: **ABNORMAL BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To acquaint the students with the history and meaning of abnormal behaviour
CO 2	To develop in them awareness about classification systems
CO 3	To acquaint the students with the basic minor and major disorders
CO 4	To have an understanding regarding the causal patterns and treatment of disorders

CORE COURSE SEM V	
Course code: **PY5CRT 14**	
Course: **FOUNDATIONS OF ORGANIZATIONAL BEHAVIOR**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize and learn concept of human organizations and behaviour in organizations.
CO 2	To introduce topics like Leadership, Motivation, Power, Conflict, Negotiation, in organizations
CO 3	To learn strategies to Manage organizations more effectively.

CORE COURSE SEM V	
Course code: **PY5CRT 15**	
Course: **ENVIRONMENTAL PSYCHOLOGY AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Encourage students to do research, investigate how and why things happen, and make their own decisions about complex environmental issues by developing and enhancing critical and creative thinking skills. It helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.

CO 2	Understand how their decisions and actions affect the environment, build knowledge and skills necessary to address complex environmental issues, as well as ways to take action that can keep our environment healthy and sustainable for the future. It encourages character building, and develop positive attitudes and values.
CO 3	Develop a sense of awareness among the students about the environment and its various problems and to help the students in realizing the interrelationship between man and the environment and helps to protect the nature and natural resources.
CO 4	Acquire the basic knowledge about the environment and the social norms that provide unity with environmental characteristics and create a positive attitude about the environment.
CO 5	Acquaint students with the nature and basic concepts of environmental psychology
CO 6	Synthesize diverse information relevant to human-environment relationships in the context of environmental psychology

OPEN COURSE SEM V	
Course code: **PY5OP2**	
Course**: LIFE SKILLS DEVELOPMENT**	
On the completion of the course, the students will be able to:	
CO 1	Develop abilities for adaptive and positive behaviour, that enables individuals to deal effectively with the demands and challenges of everyday life.
CO 2	Form the foundation of life skills education for the promotion of mental well being, and healthy interaction and behaviour.
CO 3	Enable students to translate knowledge, attitudes and values into actual abilities – ie., what to do and how to do it.
CO 4	Contribute to students' perception of self efficacy, self confidence and self esteem.

PRACTICAL SEM V	
Course code: **PY5 P01**	
Course: **EXPERIMENTAL PSYCHOLOGY (Practical)**	
On the completion of the course, the students will be able to:	
CO 1	To develop scientific and experimental attitudes in the student.
CO 2	To facilitate comprehension of the theoretical concepts through experiments
CO 3	To develop the skills of observation and scientific reporting in psychology
CO 4	To provide basic training in planning and conducting a psychological experiment

CORE COURSE SEM VI	
Course code: **PY6CRT16**	
Course**: PSYCHOLOGY OF MALADAPTIVE BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To encourage the students to know the causal pattern and the different therapeutic techniques in the management of personality, somatic symptom and dissociative disorders

CO 2	To acquaint the students with the symptoms of childhood disorders, substance dependence and neurocognitive disorders

CORE COURSE SEM VI	
Course code: **PSY6 CRT17**	
Course: **MANAGING BEHAVIOR IN ORGANIZATION**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize and learn concept of human organizations and behaviour in organizations.
CO 2	To introduce topics like Leadership, Motivation, Power, Conflict, Negotiation in organizations and to learn strategies to Manage organizations more effectively.
CORE COURSE SEM VI	
Course code: **PY6CRT18**	
Course: **CHILD DEVELOPMENT**	
On the completion of the course, the students will be able to:	
CO 1	To understand the process and nature of child development
CO 2	To create and inspire interest in observing the process of child development
CO 3	To learn to relate the observation to current theories of child development

CORE COURSE SEM VI	
Course code: **PY6CB01**	
Course: **THEORY AND PRACTICE OF COUNSELLING**	
On the completion of the course, the students will be able to:	
CO 1	To understand the process and technique of counselling
CO 2	To differentiate the various approaches to counselling
CO 3	To be aware of the assumptions and issues of counselling applications

PRACTICAL SEM VI	
Course code: **PY6 P02**	
Course: **PSYCHOLOGICAL ASSESSMENT(Practical)**	
On the completion of the course, the students will be able to:	
CO 1	Develop the ability to understand self and others.
CO 2	Familiarize with psychological instruments and tools
CO 3	Generate interest in the analysis of psychological data
CO 4	Develop the skills of testing and scientific reporting in psychology
CO 5	Generate interest in working in the community with a psychological outlook

M.SC PSYCHOLOGY

CORE COURSE SEM I
Course code: **PY010101**
Course: **COGNITIVE PSYCHOLOGY**
On the completion of the course, the students will be able to:

CO 1	To understand history of scientific Psychology and contributions of prominent scientists.
CO 2	To be able to design a psychological experiment.
CO 3	To enhance the theoretical and conceptual understanding of cognitive process
CO 4	To apply the concepts of cognitive processes to everyday life.

CORE COURSE SEM I	
Course code: **PY010102**	
Course: **PERSONALITY AND PERSONAL DEVELOPMENT**	
On the completion of the course, the students will be able to:	
CO 1	To understand the concept of personality & personal development
CO 2	To analyze the characteristics of a psychologically healthy individual
CO 3	To apply the study of personality to personal development

CORE COURSE SEM I	
Course code: **PY010103**	
Course: **CLINICAL PSYCHOPATHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To help students to understand clinical features, etiology and management of different types of abnormal behaviour
CO 2	To equip students to take case histories and diagnose
CO 3	To train students to form psychopathology formulation

CORE COURSE SEM I	
Course code: **PY010104**	
Course: **PSYCHOMETRY**	
On the completion of the course, the students will be able to:	
CO 1	Provide foundation on the basics of Psychological testing
CO 2	Equip students in constructing psychological tests
CO 3	Equip students to understand the chief characteristics of tests
CO 4	Develop skills in analyzing decisions and applying tests

CORE COURSE SEM I	
Course code**: PY010105**	
Course: **PSYCHOLOGICAL ASSESSMENT (PRACTICAL)**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize students to psychological tests those assess cognitive functions
CO 2	Apply theoretical knowledge in practice
CO 3	Enhance the professional skills of the student

CORE COURSE SEM II
Course code: **PY010201**
Course: **PSYCHOLOGY OF INTELLIGENCE, LEARNING, MOTIVATION AND EMOTION**

On the completion of the course, the students will be able to:	
CO 1	Explain different theoretical approaches to intelligence, learning, motivation and emotion
CO 2	Analyze the role of experimentation and theory building in understanding human behavior.
CO 3	Student will be able to apply emotion, learning and motivational concepts to explain personal experiences.

CORE COURSE SEM II	
Course code: **PY010202**	
Course: **HEALTH PSYCHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To understand the role of psychology in health and wellbeing
CO 2	To understand stress and coping strategies, prevent illness and promote good health
CO 3	To investigate the biopsychosocial correlates of illness from Health Psychologist's perspective
CORE COURSE SEM II	
Course code: **PY010203**	
Course: **RESEARCH METHODOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To provide foundation on the basics of research methods in Psychology
CO 2	To sensitize students on the importance of scientific research and ethical issues

CORE COURSE SEM II	
Course code: **PY010204**	
Course: **POSITIVE PSYCHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To develop an understanding of the key concepts, approaches and researches in the field of positive psychology
CO 2	To understand the applications of positive psychology concepts at every Stage of human development
CO 3	To develop an understanding of the implications of the science and application of positive psychology to biological, cognitive, interpersonal and emotional outcomes

CORE COURSE SEM II	
Course code: **PY010205**	
Course: **FIELD WORK (PRACTICAL)**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize students to psychological tests
CO 2	To apply theoretical knowledge in practice
CO 3	To enhance the professional skills of the student

CORE COURSE SEM III
Course code: **PY010301**
Course**: NEUROPSYCHOLOGY**
On the completion of the course, the students will be able to:

CO 1	To enable the students to understand the basics of functional aspect of brain
CO 2	To understand the brain – behavior relationship
CO 3	To understand localization of psychological processes and functions

CORE COURSE SEM III	
Course code: **PY010302**	
Course**: COUNSELLING PSYCHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To understand the techniques used in major facets of counselling
CO 2	To describe the role and functions of counsellors in a variety of settings
CO 3	To conduct training programs in the community level
CORE COURSE SEM III	
Course code: **PY010303**	
Course**: COGNITIVE AND BEHAVIOURALLY ORIENTED THERAPIES**	
On the completion of the course, the students will be able to:	
CO 1	To understand the role of learning in the geneses of adaptive and maladaptive behaviour
CO 2	To apply learning principles in everyday life.
CO 3	Student will be able to carry out functional behaviour analysis.
CO 4	Student will be able to recommend and apply suitable behaviour modification techniques for children and adult maladaptive behaviours

CORE COURSE SEM III	
Course code: **PY800301**	
Course**: CLINICAL PSYCHOLOGY AND ASSESSMENT**	
On the completion of the course, the students will be able to:	
CO 1	To provide an understanding about the field of clinical psychology
CO 2	To explain the role of clinical psychologist
CO 3	To describe different types of psychological assessment

CORE COURSE SEM III	
Course code: **PY810301**	
Course**: PSYCHOLOGY IN CLASSROOM**	
On the completion of the course, the students will be able to:	
CO 1	Understand students and class room functioning
CO 2	Analyze different approaches in Education
CO 3	Explore the scope of school counselling
CO 4	Understand the different ways to motivate students in classroom
CORE COURSE SEM IV	
Course code: **PY010401**	
Course**: CONTEMPORARY SOCIAL ISSUES AND ROLE OF PSYCHOLOGY IN SOCIAL ENGINEERING**	
On the completion of the course, the students will be able to:	
CO 1	To be understand and analyse social origin of personal problems.
CO 2	To develop critical thinking and perspective taking skills to understand and explain human rights violations.
CO 3	Apply psychological and principles methods to facilitate social change.

CORE COURSE SEM IV	
Course code: **PY010402**	
Course**: TRAINING PROGRAMS FOR MENTAL HEALTH PROMOTION**	
On the completion of the course, the students will be able to:	
CO 1	To understand the significance of mental health promotion
CO 2	To develop public speaking skills
CO 3	To design and execute intervention and training programs

CORE COURSE SEM IV	
Course code: **PY800402**	
Course**: PSYCHOTHERAPY**	
On the completion of the course, the students will be able to:	
CO 1	To introduce students to different types of psychotherapy
CO 2	To familiarize them with different techniques of psychotherapy
CORE COURSE SEM IV	
Course code: **PY800403**	
Course**: SPECIALIZATIONS IN CLINICAL PSYCHOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To orient the student to the scope of clinical psychology
CO 2	To describe role of clinical psychology in promotion of mental health
CO 3	To understand the interface between clinical psychology and law

Course code: **PY810402**	
Course**: PSYCHOLOGY OF DIFFERENTLY ABLED**	
On the completion of the course, the students will be able to:	
CO 1	To understand children who are differently abled
CO 2	To identify the risk factors and causal factors of disabilities
CO 3	To explore and understand the different remediation and rehabilitation process involved in the field of such disability

11. DEPARTMENT OF COMPUTER SCIENCE

COMPLEMENTARY COURSE SEM I	
Course Code: **EL1CMT05**	
Course Name: **COMPUTER FUNDAMENTALS AND BASICS OF PC HARDWARE**	
On the completion of the course, the students will be able to:	
CO1	Get Introduced to computers, different generations and classifications of computers
CO2	Get acquainted with Computer Hardware
CO3	Understand different expansion slots, serial and parallel ports, USB etc
CO4	Learn about different input devices like keyboard, mouse, trackball, light pen etc
CO5	Learn about different output devices like monitor, printer etc
CO6	Understand the concept of memory and its various types i.e primary memory and secondary memory

CORE COURSE SEM I	
Course Code: **CS1CRT01**	
Course Name: **METHODOLOGY OF PROGRAMMING AND C LANGUAGE**	
On the completion of the course, the students will be able to	
CO1	To introduce the concepts of : programming, programming languages, language translators, algorithm, flowchart, pseudocode testing and debugging.
CO2	To introduce the basics of programming in C language
CO3	To familiarize with input output operations in C and to understand control structures
CO4	To understand various derived data types in C
CO5	To understand modular programming, dynamicity in C and user defined data types in C

COMPLEMENTARY COURSE SEM I	
Course Code: **EL1CMT06**	
Course Name: **DIGITAL ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO1	Idea about different types of codes
CO2	Working of logic gates inside a computer
CO3	Simplification of logic equations to minimize circuit
CO4	Combinational logic systems and sequential logic systems
CO5	Basic building blocks of memory
CO6	Working of counters and sequential circuits

CORE COURSE SEM II	
Course Code: **CS2CRT04**	
Course Name: **COMPUTER ORGANIZATION AND ARCHITECTURE (CORE)**	
On the completion of the course, the students will be able to:	
CO1	Interpret the functional architecture of computing systems
CO2	Understand the basics of hardwired and micro-programmed control of the CPU
CO3	Explain addressing modes, instruction formats and program control statements
CO4	Distinguish the organization of various parts of a system memory hierarchy
CO5	Describe basic concept of parallel computing
CO6	Describe fundamentals concepts of pipeline and vector processing

CORE COURSE SEM II	
Course Code: **CS2CRT06**	
Course Name: **OBJECT ORIENTED PROGRAMMING USING C++**	
On the completion of the course, the students will be able to:	
CO1	Thorough idea about object oriented programming concepts
CO2	Class, object relationships
CO3	Different types of functions and reusability of code
CO4	Memory manipulation
CO5	Thorough idea about object- oriented programming concepts

COMPLEMENTARY COURSE SEM II	
Course Code: **CS2CRT03**	
Course Name: **DATA COMMUNICATION**	
On the completion of the course, the students will be able to:	
CO1	To understand the basic characteristics of signals and data.
CO2	To understand different transmission media
CO3	To understand digital transmission techniques
CO4	To understand analog transmission techniques
CO5	To familiarize with switching techniques in data communication

COMPLEMENTARY COURSE SEM III	
Course Code: **ST3CMT01**	
Course Name: **STATISTICAL METHODS AND PROBABILITY THEORY**	
On the completion of the course, the students will be able to:	
CO1	To understand different aspects of data, and its collection
CO2	To understand Central tendency and Dispersion
CO3	To understand the basics of probability
CO4	To understand different standard probability distribution

COMPLEMENTARY COURSE SEM III	
Course Code: **EL3CMT08**	
Course Name: **NETWORKING FUNDAMENTALS**	
On the completion of the course, the students will be able to:	
CO1	Understanding the basics concept of Computer Network
CO2	Get to know about the functions of different layers of the Network model and focus on Data link layer functions
CO3	Learn about the data link layer functions and Networking Addressing system
CO4	Understand the Network Layer functions and Transport Layer protocols
CO5	Get acquainted with Congestion Control techniques and Application Layer Protocols.

CORE COURSE SEM III	
Course Code: **CS3CRT09**	
Course Name: **DATA STRUCTURES USING C++ (CORE)**	
On the completion of the course, the students will be able to:	
CO1	Select appropriate data structures as applied to specified problem definition.
CO2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3	Students will be able to implement Linear and Non-Linear data structures.
CO4	Implement appropriate sorting/searching technique for given problem.
CO5	Design advance data structure using Non-Linear data structure.

CORE COURSE SEM III	
Course Code: **CS3CRT06**	
Course Name: **DATABASE MANAGEMENT SYSTEM(CORE)**	
On the completion of the course, the students will be able to:	
CO1	To have a broad understanding of database concepts and database management system
CO2	To have a high-level understanding of major DBMS components and their functions
CO3	Will be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model
CO4	Will be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
CO5	Will be able to improve the database design by normalization
CO6	Will be able to know about indexing structures
CO7	Will be aware of database security and authorization methods and also the desirable properties of transaction

CORE COURSE SEM III	
Course Code: **CC3CRT02**	
Course Name: **SYSTEM ANALYSIS AND DESIGN**	
On the completion of the course, the students will be able to:	
CO1	Information systems and tools for analysis and design of them
CO2	Different cycles in development of systems, analyze, Design, develop and operate
CO3	Maintenance and up gradation

CORE COURSE SEM IV	
Course Code: **CS4CRT10**	
Course Name: **LINUX ADMINSTRATION**	
On the completion of the course, the students will be able to:	
CO1	Introduce the Linux Operating System – architecture, features and basic commands
CO2	Learn the essential Linux commands
CO3	Will be able to develop Shell Programs
CO4	Get acquainted with different System Administration commands in Linux
CO5	Will be able to use different filter commands in Linux
CO6	Understand different servers – DHCP, DNS, squid, Apache, Telnet, FTP, Samba

CORE COURSE SEM IV	
Course Code: **CS4CRT12**	
Course Name: **COMPUTER AIDED OPTIMIZATION TECHNIQUES (CORE)**	
On the completion of the course, the students will be able to:	
CO1	Understand the essential features and scope of optimization techniques - Learn properties of objective function and formalization of optimization problem.

CO2	Be able to model engineering minima/maxima problems as optimization problems.
CO3	Learn numerical methods to find optimum point and value of a function - Learn to solve the LPP
CO4	Learn to solve transportation problems and assignment problems. - Apply in real life situations
CO5	Design, implementation, and analysis of computational experiments.

CORE COURSE SEM IV	
Course Code: **EL4CMT09**	
Course Name: **MICROPROCESSORS AND ASSEMBLY LANGUAGE PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO1	About a computer processor
CO2	Types and features of each and advantages
CO3	Program the processor directly
CO4	How new processors are developed and their necessities

CORE COURSE SEM IV	
Course Code: **CS4CRT13**	
Course Name: **WEB PROGRAMMING USING PHP(CORE)**	
On the completion of the course, the students will be able to:	
CO1	To introduce the fundamentals of Internet, and the principles of web design and to develop basic websites using HTML
CO2	To style the content created using HTML by Cascading Style Sheets and so to build web pages with validation using Java Script objects and by applying different event handling mechanisms
CO3	To develop dynamic web pages using PHP and MySQL

CORE COURSE SEM V	
Course Code: **CS5CRT13**	
Course Name: **IT AND ENVIRONMENT**	
On the completion of the course, the students will be able to:	
CO1	Understand the basic concepts of Internet and multidisciplinary nature of environment studies
CO2	Understand about the impact of IT in E-learning and describe the tools used in teaching and learning. Explain about the various Learning management Systems
CO3	Describe IT industry in terms of new opportunities and threats (Software piracy, cyber crime) and possible solutions (cyber laws). Understand the various health issues associated with the usage of computers and guidelines of proper usage
CO4	Get acquainted about E-waste problems and E-waste management
CO5	Will get to know about the history of Human Rights and the basics of UDHR – International Human Rights documents
CO6	Explain United Nation System and the committees involved in various aspects of Human Rights

CO7	Get acquainted with Human Rights in India and the functions of National Human Rights commission and State Human Rights Commission

CORE COURSE SEM V	
Course Code: **CS5CRT14**	
Course Name: **JAVA PROGRAMMING USING LINUX**	
On the completion of the course, the students will be able to:	
CO1	Clear cut idea about new generation object oriented language.
CO2	Application and webpage program developments
CO3	Audio and graphics processing
CO4	Development of an application software

CORE COURSE SEM V	
Course Code: **CS5CRT17**	
Course Name: **COMPUTER SECURITY (CORE)**	
On the completion of the course, the students will be able to:	
CO1	Good understanding of the concepts and foundations of computer security, and identify vulnerabilities of IT systems.
CO2	Learn concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques.
CO3	Understand the basic security tools to enhance system security and can develop basic security enhancements in stand-alone applications
CO4	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack
CO5	Able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.

CORE COURSE SEM V	
Course Code: **CS5CRT1**	
Course Name: **SYSTEM SOFTWARE AND OPERATING SYSTEM(CORE)**	
On the completion of the course, the students will be able to:	
CO1	To learn the fundamentals of system software, compiler ,assembler and macros
CO2	To learn Compiler in detail. Its phases. Also to learn linkers and loaders
CO3	To understand the working of OS as a resource manager, file system manager, process manager, memory manager and I/O manager
CO4	To learn the mechanisms of OS to handle processes , synchronization and their communication and various issues in Inter Process Communication (IPC).
CO5	To learn the mechanisms involved in memory management , deadlocks handling, file management.

OPEN COURSE SEM V	
Course code: **CS5OPT06**	
Course: **COMPUTER FUNDAMENTALS, INTERNET & MS OFFICE (OPEN COURSE)**	
On the completion of the course, the students will be able to:	
CO 1	To understand the fundamentals of computers
CO 2	To understand Internet and protocols used for communication in internet
CO 3	To understand Microsoft Word application
CO 4	To understand the spreadsheet application MS Excel
CO 5	To understand Microsoft PowerPoint Application

CORE COURSE SEM VI	
Course Code: **CC6CBT01**	
Course Name: **PYTHON AND LATEX**	
On the completion of the course, the students will be able to:	
CO1	Get introduced to Python programming Language
CO2	Understand the control flow and data structures
CO3	Understand Python functions – built in and user defined function
CO4	Get acquainted with Files and User I/O
CO5	Understand the basics of LaTeX

CORE COURSE SEM VI	
Course Code: **CS6CRT19**	
Course Name: **BIG DATA ANALYTICS**	
On the completion of the course, the students will be able to:	
CO1	To understand the big data platform
CO2	To understand stream processing and various algorithms used
CO3	To understand the big data managing framework Hadoop
CO4	To familiarize with Hadoop environment
CO5	To understand application of big data using Pig and Hive

CORE COURSE SEM VI	
Course Code: **CS6CRT18**	
Course Name: **COMPUTER GRAPHICS (CORE)**	
On the completion of the course, the students will be able to:	
CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics
CO2	To learn the basic principles of 3- dimensional computer graphics.
CO3	Provides an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
CO4	Provides an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
CO5	To implement various algorithms to Line drawing, circle drawing, scan convert the basic geometrical primitives, transformations, area filling, clipping.
CO6	To describe the importance of viewing and projections.

CO7	To define the fundamentals of animation, virtual reality and its related technologies.

12. DEPARTMENT OF PHYSICAL EDUCATION

Bachelor Of Sports Management

CORE COURSE SEM I	
Course code: **SM1CMT01**	
Course: **ECONOMICS OF SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Analyze the demand for sports, the market power of teams, the use of price discrimination and the establishment of anti-trust laws in sports.
CO 2	Understand the role of sports leagues and league structure in professional sports.
CO 3	Describe and compare the tools that are used to promote competitive balance.
CO 4	Evaluate whether professional sports teams create economic benefits to justify government subsidies.
CO 5	Identify the costs and benefits of intercollegiate sports to a university, and explain why colleges might want to support athletics even if they are not profitable.

CORE COURSE SEM I	
Course code: **SM1CRT01**	
Course: **SOCIOLOGY OF SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the historical, social and cultural development of sport over time.
CO 2	Understand sports and physical activities as social and cultural phenomena.
CO 3	Use basic sociological theories and concepts in order to examine how sports influences human social life and the various meanings sports takes depending on space and time.
CO 4	Understand the relationship between sports and several social issues and ideologies, such as, deviance, violence, social class, race, gender, etc.
CO 5	Understand the relationship between sports and other social institutions and spheres of social and cultural life, such as, family, education, media, politics.

CORE COURSE SEM I	
Course code: **SM1CRT03**	
Course **: FUNDAMENTALS OF SPORTS SCIENCES**	
On the completion of the course, the students will be able to:	
CO 1	Define, distinguish, and assess physiological aspects relevant to the effect of exercise on human functioning and performance.
CO 2	Have a brief understanding of theoretical foundation of the physiological, biomechanical, and other sciences that influence human performance in athletic settings.

CO 3	Understand various sciences related to the sports coaching and performance.
CO 4	Demonstrate the basics of science related to injuries management in game situation

CORE COURSE SEM I	
Course code **SM1CRT02**	
Course: **PRINCIPLES AND PRACTICES OF SPORTS MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Define sport management and discuss its international significance
CO 2	Understand concepts associated with sport, management and Sport Management
CO 3	Describe the nature and scope of professional opportunities within the field and explain the functions performed by sports managers
CO 4	Explain the importance of developing a professional perspective
CO 5	Demonstrate an understanding of various theories as they apply to management, leadership and organizational behaviour
CO 6	Identify and evaluate major challenges confronting the sport industry.

CORE COURSE SEM I	
Course code: **EN2CCT01**	
Course: **FINE TUNE YOUR ENGLISH**	
On the completion of the course, the students will be able to:	
CO 1	Understand the sentence as the basic unit and writes effectively
CO 2	Understand the parts of speech in language and its application
CO 3	Understand the rules of subject-verb agreement and common concord errors in language
CO 4	Understand the word formation techniques
CO 5	Understand contextual usage of words
CO 6	Understand vocabulary related to body and its usage
CO 7	Understand practical use of language.

CORE COURSE SEM II	
Course code: **SM2CRT05**	
Course**: FUNDAMENTALS OF SPORTS MARKETING**	
On the completion of the course, the students will be able to:	
CO 1	Understand the sports marketing environment and trends influencing marketers.
CO 2	Explain how marketing concepts related to the marketing mix (product, price, place and promotion) apply to sports-related settings.
CO 3	Able identify and use or implement the marketing research resources necessary to successfully evaluate the viability of a target market segment or any other aspect of the marketing mix
CO 4	Able to understand the personal selling process and demonstrate an ability to apply the personal selling process to a sports setting

CORE COURSE SEM II
Course code: **SM2CRT06**
Course: **SPORTS GOVERNANCE AND POLICIES**
On the completion of the course, the students will be able to:

CO 1	Understand, identify and contextualise the principles of governance and how an organisation develops strategic goals as part of a robust system of governance that fits the particular circumstances of the applicable sport.
CO 2	Identify the broad conceptual principles of governance and policy development and how those principles might be applied on an operational level.
CO 3	Critically evaluate the mechanisms and benchmarks an organisation and its board can utilise as part of its organisational structure to ensure best practice.
CO 4	Demonstrate a critical understanding of policy development, implementation and methods for monitoring and assessing policy effectiveness.
CO 5	Identify the steps involved in policy development for sporting organisations including how the board of an organisation complies with its legal and regulatory obligations and ultimately ensures that it is acting in the best interests of the organisation members.

CORE COURSE SEM II	
Course code: **SM2CMT02**	
Course: **FITNESS MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Concrete understanding about fitness components
CO 2	Attains the competency to execute health screening
CO 3	Achieve expertise in prescribing exercise
CO 4	Understands the role of fitness in injury prevention and management.
CO 5	Develops stress coping strategy for professional athletes

CORE COURSE SEM II	
Course code: **SM2CRT04**	
Course: **HUMAN RESOURCE MANAGEMENT IN SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the concept of human resource management and to understand its relevance in organizations.
CO 2	Acquire necessary skill set for application of various HR issues
CO 3	Analyze the strategic issues and strategies required to select and develop manpower resources.
CO 4	Able to integrate the knowledge of HR concepts to take correct business decisions.

CORE COURSE SEM II	
Course code: **EN2CCT03**	
Course: **ISSUES THAT MATTER**	
On the completion of the course, the students will be able to:	
CO 1	Develop a more circumspect and informed vision of future
CO 2	Connect their theoretical learning to current development in the world and relate to real life experiences
CO 3	Exhibit their critical thinking skills and interpret the issues from

	diverse angles
CO 4	Acquire communication skills to write imaginatively, carefully and accurately
CO 5	Employ reasoning skills to discriminate and form informed opinions on relevant issues

CORE COURSE SEM III	
Course code: **SM3CRT10**	
Course: **SPORTS MARKETING STRATEGY**	
On the completion of the course, the students will be able to:	
CO 1	Explain how marketing concepts related to the marketing mix (product, price, place and promotion) apply to sports-related settings
CO 2	Identify characteristics related to sports marketing promotion mix and recommend promotional strategies for the marketing of sports organizations
CO 3	Develop and present a proposal for the sponsorship of a sports-related sponsorship property (e.g., league, team, or athlete)

COMPLEMENTARY COURSE SEM III	
Course code: **SM3CRT07**	
Course: **ORGANISATIONAL BEHAVIOUR IN SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.
CO 2	Demonstrate the applicability of analysing the complexities associated with management of individual behaviour in the organization.
CO 3	Analyse the complexities associated with management of the group behaviour in the organization.
CO 4	Demonstrate how the organizational behaviour can integrate in understanding the motivation behind behaviour of people in the organization.

CORE COURSE SEM III	
Course code: **SM3CRT11**	
Course: **RESEARCH METHODOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	After completion of the course students will be able to:
CO 2	Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
CO 3	Have basic knowledge on qualitative research techniques
CO 4	Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis.
CO 5	Know to Summarize the various research literature
CO 6	Understand and apply the basics of statistics in research
CO 7	Organize the samples and sampling techniques which is relevant to the study.
CO8	Apply the systematic methods in writing research thesis

COMPLEMENTARY COURSE SEM III	
Course code: **SM3CRT07**	
Course: **ORGANISATIONAL BEHAVIOUR IN SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.
CO 2	Demonstrate the applicability of analysing the complexities associated with management of individual behaviour in the organization.
CO 3	Analyse the complexities associated with management of the group behaviour in the organization.
CO 4	Demonstrate how the organizational behaviour can integrate in understanding the motivation behind behaviour of people in the organization.

CORE COURSE SEM III	
Course code: **SM3CRT08**	
Course: **OPERATIONS MANAGEMENT IN SPORTS -I**	
On the completion of the course, the students will be able to:	
CO 1	Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.
CO 2	Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.
CO 3	Develop aggregate capacity plans and MPS in operation environments.
CO 4	Plan and implement suitable materials handling principles and practices in the operations.
CO 5	Plan and implement suitable quality control measures in Quality Circles to TQM.

CORE COURSE SEM IV	
Course code: **SM4CRT14**	
Course: **SCOUTING & ATHLETE MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Aware of the opportunities for first time involvement in sports.
CO 2	Understand the process of active start to play.
CO 3	Evaluate the appropriate abilities of the athlete.
CO 4	Understand the process of scouting and talent management
CO 5	Aware of the various aspects of contract negotiation and formulation.
CO 6	Understanding of the challenges faced by athletes throughout their careers
CO 7	Evaluate the ideal support and solutions offered to elite athletes by the sports organisations and stakeholders

CORE COURSE SEM IV	
Course code **SM4CRT15**	
Course: **STRATEGIC MANAGEMENT OF SPORTS FACILITIES**	
On the completion of the course, the students will be able to:	
CO 1	Define the basic concepts related to sport facility management.
CO 2	Evaluate establishment of sport facilities.

CO 3	Analyse marketing and sales processes.
CO 4	Evaluate event management in sport facilities.
CO 5	Evaluate risk management concept in sport facilities.
CO 6	Define the basic concepts of field and material information in sport facilities
CO 7	Describe the operation of venues and events including staffing, box office management, security, concessions, and maintenance.
CO8	Explain the legal issues facing event and facility management including the risk management process.

CORE COURSE SEM IV	
Course code: **SM4CRT16**	
Course: **OPERATION MANAGEMENT IN SPORTS - II**	
On the completion of the course, the students will be able to:	
CO 1	Define the basic concepts related to store management and its operation
CO 2	Develop the idea of keeping checklist, housekeeping, cash management and store security
CO 3	Able to develop entrepreneurship in sports product
CO 4	Able to Plan and implement suitable quality control measures in Quality Circles to TQM.
CO 5	Understand the basic of store auditing
CO 6	Understand the idea of project planning and project management

CORE COURSE SEM IV	
Course code: **SM4CRT12**	
Course: **TECHNOLOGY IN SPORTS AND EMERGING TRENDS**	
On the completion of the course, the students will be able to:	
CO 1	Show the ability to use relevant prerequisites to solve the task.
CO 2	Interpret data sheets and technical manuals.
CO 3	Use resource persons to acquire searched information.
CO 4	Orally present a technical product and discuss the work.
CO 5	Critically analysis of various business venture.

CORE COURSE SEM IV	
Course code: **SM4OJP01**	
Course: **SUMMER TRAINING REPORT -OJT**	
On the completion of the course, the students will be able to:	
CO 1	To make students understand the different job opportunities in sports industry
CO 2	Understand the sports Management industry in detail and give them an in hand experience
CO 3	Demonstrate their ability to work in different capacities with diverse population
CO 4	Demonstrate networking, negotiating, learning and Team building skills
CO 5	Develop professional behaviours under the guidance of a professional team

CORE COURSE SEM V	
Course code: **SM5CRT19**	
Course: **SPORTS LAW**	
On the completion of the course, the students will be able to:	
CO 1	Evaluate identified personal core values and differentiate between ethics and law whilst considering cultural differences and universal ethics
CO 2	Restate and employ basic contractual principles in the sport context
CO 3	Explain ownership structures and concepts of intellectual property
CO 4	Assess risks and mitigation strategies to reduce threats to sports integrity.
CO 5	Report identified risks that impacts sport organisations and participants
CO 6	Examine human rights, diversity, and inclusion issues in sport from a legal, sport, and business perspective.
CO 7	Recognise and explain the key legal and ethical principles and ideas which underpin and influence the regulation of sport and how they manifest in practice.

CORE COURSE SEM V	
Course code: **SM5CRT18**	
Course: **SPORTS EVENT MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Demonstrate an understanding of the process of organising major sports events.
CO 2	Develop the skills for effective bidding for events.
CO 3	Demonstrate a thorough understanding of the logistical details relevant to organising major sports events.
CO 4	Understand the various possibilities of generating sponsorship for the event.
CO 5	Develop and implement a risk management plan.
CO 6	Effectively evaluate a major sports event.
CO 7	Understand every details of event day checklist implementation.

CORE COURSE SEM V	
Course code: **SM5CRT17**	
Course: **BUSINESS COMMUNICATION IN SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	To participate in an online learning environment successfully by developing the implication-based understanding of Paraphrasing, deciphering instructions, interpreting guidelines, discussion boards & Referencing Styles.
CO 2	To demonstrate his/her ability to write error free while making an optimum use of correct Business Vocabulary & Grammar.
CO 3	To distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization.
CO 4	To draft effective business correspondence with brevity and clarity.
CO 5	To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

CO 6	To demonstrate his verbal and non-verbal communication ability through presentations

CORE COURSE SEM V	
Course code: **SM5CRT20**	
Course: **SPORTS PUBLIC RELATION**	
On the completion of the course, the students will be able to:	
CO 1	Establish introductory knowledge of the business of sport, media and public relation
CO 2	Be able to understand distinguish differences in various sport events with respect to media coverage
CO 3	Be able to understand the importance and effective crisis communication strategies
CO 4	Identify, analyze, and discuss ethical issues faced in sport media
CO 5	Develop a clear understanding of the day-to-day responsibilities of sports public relations professionals.
CO 6	Gain exposure to professionals in the field.
CO 7	Illustrate the structure of PR and event agencies

CORE COURSE SEM V	
Course code: **SM5CRT21**	
Course: **ENVIRONMENTAL STUDIES & HUMAN RIGHTS IN SPORTS**	
On the completion of the course, the students will be able to:	
CO 1	Developing and implementing models for sport compatible with nature and the environment
CO 2	Holding environment-related competitions in sports
CO 3	Putting in place the necessary structures for ensuring adequate and high quality environmental education
CO 4	To help students understand the concept of sustainable development

CORE COURSE SEM VI	
Course code: **SM6CRP01**	
Course: **ENRICHMENT COURSES**	
On the completion of the course, the students will be able to:	
CO 1	To make students understand the different job opportunities in sports industry.
CO 2	Understand the sports Management industry in detail and give them an in hand experience in different fields of sports.
CO 3	Demonstrate their ability to work in different capacities with diverse population.
CO 4	Demonstrate networking, negotiating, learning and Team building skills.
CO 5	Develop professional behaviours under the guidance of a professional team.

CORE COURSE SEM VI
Course code**: SM6PRP01**
Course: **SUMMER INTERNSHIP PROJECT**
On the completion of the course, the students will be able to:

CO 1	To make students understand the different job opportunities in sports industry
CO 2	Understand the sports Management industry in detail and give them an in hand experience
CO 3	Demonstrate their ability to work in different capacities with diverse population
CO 4	Demonstrate networking, negotiating, learning and Team building skills
CO 5	Develop professional behaviours under the guidance of a professional team

13. DEPARTMENT OF COMMERCE

CORE COURSE SEM I	
Course code: **CO1CRT01**	
Course**: DIMENSIONS AND METHODOLOGY OF BUSINESS STUDIES**	
On the completion of the course, the students will be able to:	
CO 1	Understand business and its role in society, to comprehend the business environment and various dimensions
CO 2	Have an understanding of development of business in Indian economy
CO 3	Familiar technology integration in business
CO 4	Have an understanding of business ethics and CSR
CO 5	Introduce the importance and fundamentals of business research
CO 6	Understand business and its role in society, to comprehend the business environment and various dimensions

CORE COURSE SEM I	
Course code**: CO1CRT02**	
Course: **FINANCIAL ACCOUNTING 1**	
On the completion of the course, the students will be able to:	
CO 1	Equip the students with the skill of preparing financial statements
CO 2	Familiar the accounting of incomplete records
CO 3	Preparation of royalty accounts
CO 4	Have an understanding of preparation of consignment accounts
CO 5	Equip the students with the skill of preparing farm accounts

CORE COURSE SEM I	
Course code: **CO1CRT03**	
Course**: CORPORATE REGULATIONS AND ADMINISTRATION**	
On the completion of the course, the students will be able to:	
CO 1	Know about the concept of company and types of companies
CO 2	Know company law in India and its formation
CO 3	Know the use of prospectus in a company and provision for share capital and its issue
CO 4	Know the modes of acquiring membership and meetings
CO 5	Describe the meaning and modes of winding up in a company

CORE COURSE SEM I
Course code: **CO1CMT01**

Course**: BANKING AND INSURANCE**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize the students with basic concepts and oracies of banking
CO 2	Make them aware of various bank innovations and reforms
CO 3	Know the relationship between banker and customer and different types of accounts
CO 4	Make the students various principles and provision regarding insurance
CO 5	Know more about types of insurance

CORE COURSE SEM II	
Course code: **CO2CRT04**	
Course**: FINANCIAL ACCOUNTING 2**	
On the completion of the course, the students will be able to:	
CO 1	Make students aware about hire purchase accounting
CO 2	Familiar with basic concept and practise of branch account
CO 3	Acquaint students with the preparation of departmental accounts
CO 4	Know about the dissolution of partnership firm
CO 5	Know the application of important accounting standards

CORE COURSE SEM II	
Course code: **CO2CRT05**	
Course**: BUSINESS REGULATORY FRAMEWORK**	
On the completion of the course, the students will be able to:	
CO 1	Make the students familiar with the legal frame work of business
CO 2	Understand provisions of special contract
CO 3	Make them aware of law of agency
CO 4	Explain the sale of goods act

CORE COURSE SEM II	
Course code: **CO2CRT06**	
Course: **BUSINESS MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize students with concept and principles of management
CO 2	Make aware about planning and its process
CO 3	Understand the concept organising and its elements
CO 4	Identify concept of control and direction
CO 5	Familiarize with management techniques
CORE COURSE SEM II	
Course code: **CO2CMT02**	
Course: **PRINCIPLES OF BUSINESS DECISIONS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the students with the concepts and principles underlying business decision making
CO 2	Make students aware about demand theory
CO 3	Explain the concept production analysis
CO 4	Analyse the cost output relationship in the firm
CO 5	Know about pricing in different markets

CORE COURSE SEM III	
Course code: **CO3CRT07**	
Course: **CORPORATE ACCOUNTS I**	
On the completion of the course, the students will be able to:	
CO 1	Familiar with accounting for shares
CO 2	Know about underwriting
CO 3	Prepare final accounts of joint stock companies
CO 4	Prepare investment accounts
CO 5	Aware about calculation of insurance claim

CORE COURSE SEM III	
Course code: **CO3CRT08**	
Course: **QUANTITATIVE TECHNIQUES FOR BUSINESS- 1**	
On the completion of the course, the students will be able to:	
CO 1	Make the students understand the role of statistics and quantitative techniques in business
CO 2	Prepare the students for conducting statistical surveys
CO 3	Familiar with variable data analysis 1& 2
CO 4	Recognize interpolation and extrapolation

CORE COURSE SEM III	
Course code**: CO3CRT09**	
Course: **FINANCIAL MARKETS AND OPERATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the students with financial markets and its concepts
CO 2	Make aware of primary market and its functions
CO 3	Make aware of secondary market and its functions
CO 4	Create awareness on mutual funds
CO 5	Create awareness on derivatives

CORE COURSE SEM III	
Course code**: CO3CRT10**	
Course: **MARKETING MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Familiar with basic concept of marketing
CO 2	Identify product mix and plc
CO 3	Understand the pricing decisions
CO 4	Make aware of logistics
CO 5	Make aware of recent trends in marketing

OPTIONAL CORE COURSE SEM III	
Course code: **CO3OCT01**	
Course: **FINANCE AND TAXATION-GOODS AND SERVICES TAX**	
On the completion of the course, the students will be able to:	
CO 1	Give the students a general understanding of the GST law in the country
CO 2	Make students aware of levy and collection of taxes
CO 3	Know about registration procedure of GST

CO 4	Aware about assessment and its types
CO 5	Familiar with appellate authorities

CORE COURSE SEM IV	
Course code: **CO4CRT11**	
Course: **CORPORATE ACCOUNTS II**	
On the completion of the course, the students will be able to:	
CO 1	Equip the students with the preparation of financial statements of insurance companies
CO 2	Equip the students with the preparation of financial statements of banking companies
CO 3	Understand the accounting procedure for internal reconstruction
CO 4	Understand the accounting procedure for external reconstruction
CO 5	Understand the accounting procedure for liquidation of companies

CORE COURSE SEM IV	
Course code: **CO4CRT12**	
Course: **QUANTITATIVE TECHNIQUES FOR BUSINESS- II**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the concept of correlation and its concepts
CO 2	Familiarize with the concept of regression and its concepts
CO 3	Make aware of index numbers and its calculation
CO 4	Know about time series and its applications
CO 5	Have an understanding of the fundamentals of theory of probability

CORE COURSE SEM IV	
Course code: **CO4CRT13**	
Course: **ENTREPRENEURSHIP DEVELOPMENT AND PROJECT MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Develop entrepreneurial spirit among students
CO 2	Aware about types of entrepreneurs and role of MSME
CO 3	Make aware of project and its cycles
CO 4	Enable the students to prepare projects
CO 5	Mould young minds to take up challenges and become employer than seeking employment and to make them aware of the opportunities and support for entrepreneurship in India
OPTIONAL CORE COURSE SEM IV	
Course code: **CO4OCT01**	
Course: **FINANCE AND TAXATION- FINANCIAL SERVICES**	
On the completion of the course, the students will be able to:	
CO 1	Provide the students with an overall idea of financial services available in the country
CO 2	Create awareness about venture capital and securitisation in India
CO 3	Create awareness about leasing and factoring and its process
CO 4	Know about the need of credit rating
CO 5	Familiarize with mergers and acquisitions

CORE COURSE SEM V	
Course code: **CO5CRT14**	
Course: **COST ACCOUNTING - 1**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the students with cost concepts and to make the students learn the fundamentals of cost accounting as a separate system of accounting.
CO 2	Make students aware of cost and material cost control
CO 3	Make students aware of cost and labour cost control
CO 4	Identify overheads
CO 5	Prepare cost sheets

CORE COURSE SEM V	
Course code: **CO5CRT15**	
Course: **ENVIRONMENT MANAGEMENT AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Create awareness regarding natural resources, environmental aspects and its prospectus
CO 2	Make students aware of conservation of resources, social issues and environment
CO 3	Familiarize with recent developments
CO 4	Equip the students with ria
CO 5	Define and explain human rights and applicability

CORE COURSE SEM V (MODEL 1)	
Course code: **CO5CRT16**	
Course: **FINANCIAL MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the students with the functional areas and principles of financial management.
CO 2	Familiarise students with financing decisions
CO 3	Make students aware of investment decisions
CO 4	Know more about working capital
CO 5	Make an idea of dividend and its distribution

CORE COURSE SEM V (MODEL 2)	
Course code: **CO5CMT07**	
Course: **E COMMERCE**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic and emerging topics in e-commerce
CO 2	Discuss e-commerce from an enterprise point of view and think strategically about the role of it for an organization's competitive position
CO 3	Familiarise with e payment system
CO 4	Have an understanding about e commerce security
CO 5	Have an understanding about setting up of e commerce business

OPTIONAL CORE COURSE SEM V	
Course code: **CO5OCT01**	
Course: **INCOME TAX 1**	
On the completion of the course, the students will be able to:	
CO 1	Familiarise the students with income tax act 1961
CO 2	Enable the students to identify incidence of tax
CO 3	Compute income from salary
CO 4	Compute income from house property
CO 5	Compute profit and gains of business and profession

CORE COURSE SEM VI	
Course code**: CO6CRT17**	
Course: **COST ACCOUNTING - 2**	
On the completion of the course, the students will be able to:	
CO 1	Acquaint the students with different methods and techniques of costing. and to enable the students to identify the methods and techniques applicable for different types of industries.
CO 2	Make aware of operating costing
CO 3	Make aware of process costing
CO 4	Make aware of marginal costing
CO 5	Make aware of budgetary control

CORE COURSE SEM VI	
Course code: **CO6CRT18**	
Course: **ADVERTISEMENT AND SALES MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Aware of the strategy, concept and methods of advertising
CO 2	Aware of the media of advertisement
CO 3	Develop advertisement research
CO 4	Create an awareness of the strategy, concept and methods of sales promotion.
CO 5	Familiarise the students about personal selling

COMPLEMENTARY COURSE SEM VI (MODEL 1)	
Course code: **CO6CRT19**	
Course: **AUDITING AND ASSURANCE**	
On the completion of the course, the students will be able to:	
CO 1	Enable the students to understand the duties and responsibilities of auditors and to undertake the work of auditing.
CO 2	Familiarise the students with audit documentation and evidence
CO 3	Make students aware about internal control
CO 4	Familiarise the students with the audit of limited companies
CO 5	Enable the students to understand special audit and investigation

CORE COURSE SEM VI
Course code: **CO6CRT20**
Course: **MANAGEMENT ACCOUNTING**

On the completion of the course, the students will be able to:	
CO 1	Make students aware about the term management accounting
CO 2	Acquaint the students with management accounting techniques for the analysis and interpretation of financial statements and to study the basic framework of financial reporting.
CO 3	Know about various ratios and its calculation
CO 4	Know about the need for fund flow statement
CO 5	Prepare cash flow statement

COMPLEMENTARY COURSE SEM VI (MODEL 2)	
Course code: **CO6CMT09**	
Course: **FINANCE AND TAXATION INCOME TAX- ASSESSMENT AND PLANNING**	
On the completion of the course, the students will be able to:	
CO 1	Compute income of AOP and BOI
CO 2	Compute income of cooperative society
CO 3	Compute income of HUF
CO 4	Assess the income of companies
CO 5	Make students aware of tax planning

OPTIONAL CORE COURSE SEM VI	
Course code: **CO6OCT01**	
Course: **FINANCE AND TAXATION- INCOME TAX- II**	
On the completion of the course, the students will be able to:	
CO 1	Compute income from capital gain
CO 2	Compute income under the head income from other sources
CO 3	Understand deductions under 80c to 80 u
CO 4	Have an understanding of determination of total income and tax payable and to get an overview regarding returns to be filed by an individual and also assessment procedure
CO 5	Aware about income tax authorities

14. DEPARTMENT OF BIOSCIENCES

BSc. Biological Techniques and Specimen Preparation

CORE COURSE SEM I	
Course code: **ZB1CRT01**	
Course **: INTRODUCTION TO BIOLOGICAL SCIENCES**	
On the completion of the course, the students will be able to:	
CO 1	Develop a scientific mind, culture and work habits
CO 2	Emphasize the role of biological sciences in the life of all living organisms.
CO 3	Acquire knowledge about the evolutionary history of the earth
CO 4	Acquire knowledge of the structure and functions of biomolecules
CO 5	Introduce the applications of biological sciences

CORE COURSE SEM I
Course code: **ZB1CRT02**

Course **: COLLECTION AND PRESERVATION OF BIOLOGICAL SPECIMEN 1 (plants)**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the student to some of the collection and preservation of plant specimens
CO 2	Develop critical thinking skill and research aptitude among students, by introducing the frontier areas of the biological science

CORE COURSE SEM I	
Course code:	
Course **: BIOCHEMISTRY-1**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the student basic principle of different types of chemical interactions in biological systems
CO 2	An understanding of the basics of membrane biochemistry
CO 3	Importance of biochemistry of blood
CO 4	Have a basic understanding of biochemical separation techniques
CO 5	Introduce the student basic principle of different types of chemical interactions in biological systems
CO 6	An understanding of the basics of membrane biochemistry,
CO 7	Importance of biochemistry of blood
CO 8	To have a basic understanding of biochemical separation techniques

CORE COURSE SEM I	
Course code:	
Course **: COMPLEMENTARY ZOOLOGY-NON CHORDATE DIVERSITY**	
On the completion of the course, the students will be able to:	
CO 1	Study the scientific classification
CO 2	Learn the physiological and anatomical peculiarities of some invertebrate phyla through type study
CO 3	Learn the unity of life with rich diversity of organism & evolutionary Significance of certain invertebrate
CO 4	Stimulate the curiosity of Students in the biota living

CORE COURSE SEM II	
Course code: **ZB2CRT04**	
Course **: GENERAL BIOLOGICAL TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Impart a knowledge and understanding of biological experimental techniques, in
CO 2	Including practical laboratory skills
CO 3	Familiarize with the basic tools and techniques of scientific study with emphasis on biological sciences
CO 4	Introduce the fundamentals of microbiological techniques

CORE COURSE SEM II
Course code: **ZB2CRT05**
Course **: TEACHING LABORATORY TECHNIQUES**

On the completion of the course, the students will be able to:	
CO 1	Impart a knowledge and understanding of biological experimental techniques, including practical laboratory skills
CO 2	Learn about laboratory techniques, water, soil and air analyses

CORE COURSE SEM II	
Course code: **ZB2CRT06**	
Course **: FOOD MICROBIOLOGY AND BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Make aware of different useful microorganisms, their role in food processing and preservation
CO 2	Understand the factors and predict microorganisms, which can cause food spoilage
CO 3	Be aware of various food adulterants in food industry
CO 4	Give a brief outline of food production through biotechnology

CORE COURSE SEM II	
Course code:	
Course **: BIOCHEMISTRY-2 -BIOMOLECULES**	
On the completion of the course, the students will be able to:	
CO 1	Understand concepts of life and biochemistry associated with monosaccharides and their biologically important polymers. Constituent units, linkage between them to form biopolymers Carbohydrates; their structure, function and chemistry
CO 2	Understand concepts of life and biochemistry associated with lipids and their biologically important derivatives. Lipids; their structure, function and chemistry
CO 3	Understand concepts of life and biochemistry associated with amino acids and their biologically important polymers. Constituent units, linkage between them to form proteins.; their structure, function and chemistry
CO 4	Understand concepts of life and biochemistry associated with nucleotides and their biologically important polymers. Constituent units, linkage between them to form biopolymers DNA, RNA; their structure, function and chemistry

COMPLEMENTARY COURSE SEM II	
Course code:	
Course : **COMPLEMENTARY ZOOLOGY -2**	
On the completion of the course, the students will be able to:	
CO 1	Make the student observe the diversity in chordates and their systematic positions
CO 2	Make students aware of the economic importance of some vertebrates
CO 3	Learn the physiological and anatomical peculiarities of some vertebrate's species through type study.
CO 4	Stimulate student's curiosity in vertebrates living associated with them

CORE COURSE SEM III	
Course code: **ZB3CRT07**	
Course Name : **PHYSIOLOGY WITH CLINICAL CORRELATION**	
On the completion of the course, the students will be able to:	
CO 1	Inspire the students in learning the frontier areas of biological sciences
CO 2	Appreciate the correlation between structure and function of organisms
CO 3	Make them aware of the different body systems and the need for maintaining good health through appropriate life style

CORE COURSE SEM III	
Course code: **ZB3CRT08**	
Course Name: **CLINICAL CHEMISTRY AND CLINICAL MICROBIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce different life style diseases
CO 2	Understand the functions of various organs and their clinical assessment
CO 3	Understand the routine biochemical tests
CO 4	Make them aware of pathogens, their origin, and treatment
CO 5	Understand diagnostic methods of various diseases

CORE COURSE SEM III	
Course code: **ZB3CRT09**	
Course : **TISSUE CULTURE AND GENE MANIPULATION**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the student concepts of Recombinant DNA technology
CO 2	Learn the theory of gene cloning
CO 3	Learn plant tissue culture techniques
CO 4	Introduce the student to the theory and applications of techniques in Biotechnology
CO 5	Learn animal cell culture

CORE COURSE SEM III	
Course code:	
Coruse : **BIOCHEMISTRY-3 ENZYMOLOGY AND METABOLISM**	
On the completion of the course, the students will be able to:	
CO 1	introduce the student- basics of enzyme catalysis
CO 2	To introduce the student- basics major pathways of carbohydrate
CO 3	Introduce the student the basics of major pathways of protein
CO 4	Introduce the student the basics of major pathways of lipid metabolism

COMPLEMENTARY COURSE SEM III
Course code:
Course : **ZOOLOGY -3 - PHYSIOLOGY AND IMMUNOLOGY**
On the completion of the course, the students will be able to:

CO 1	Appreciate the correlation between structure and function of organisms
CO 2	Create awareness of the health related problems, their origin and treatment
CO 3	Understand how efficiently our immune system work in our body
CO 4	Acquire knowledge about preventing common diseases rather than curing
CO 5	Understand the experimental methods and designs that Can be used for further study and research
CO 6	Deep knowledge in biochemistry, physiology and endocrinology

CORE COURSE SEM IV	
Course code: **ZB4CRT10**	
Course : **RADIOLOGY AND ADVANCED INSTRUMENTATION TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Understand the types of radiations and its effects on biological systems
CO 2	Understand some of the radiological techniques and its applications
CO 3	Develop an awareness about the harmful effects of radiation
CO 4	Introduce the student to newer techniques in microscopy
CO 5	Introduce the student to chromatographic techniques and electrophoretic techniques

CORE COURSE SEM IV	
Course code: **ZB4CRT11**	
Course: **ENTREPRENEURSHIP DEVELOPMENT AND MARKETING**	
On the completion of the course, the students will be able to:	
CO 1	Understand different types Financial Institutions, Financing procedures and incentives, assets, Liabilities
CO 2	Familiarize the steps to Entrepreneurship, objectives, process and different Planning techniques.
CO 3	Develop an understanding of a project its classification and stages of Project

CORE COURSE SEM IV	
Course code: **ZY4CRT04**	
Course:	
On the completion of the course, the students will be able to:	
CO 1	Familiarize the learner the basic concept of scientific method in research process
CO 2	Have a knowledge on various research designs
CO 3	Develop skill in research communication and scientific documentation
CO 4	Create awareness about the laws and ethical values in biology
CO 5	Apply statistical methods in biological studies
CO 6	Understand the basic techniques of animal rearing collection and preservation

COMPLEMENTARY COURSE SEM IV	
Course code:	
Course: **BIOCHEMISTRY-NUTRITIONAL AND CLINICAL BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Explain the nutritional importance of vitamins and minerals
CO 2	Explain the clinical significance of organ-based function tests and describe the biochemical basis of some important metabolic disorders

COMPLEMENTARY COURSE SEM IV	
Course code:	
Course: **APPLIED ZOOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Acquire basic knowledge and skills in applied branches of zoology
CO 2	Understand the technology for utilizing eco-friendly organisms around them for beneficial purpose
CO 3	Equip the students for self-employment opportunities with scientific knowledge to perform profitably & confidently.
CO 4	Provide consultancy and organize extension activities
CO 5	Learn the basic principle involved in the culturing and breeding of organism

COMPLEMENTARY COURSE SEM V	
Course code: **ZY5CRT05**	
Course : **ENVIRONMENTAL BIOLOGY & HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Impart basic knowledge on ecosystems and their functioning
CO 2	Learn about various types of anthropogenic pressures on ecosystem, related degradation and management measure
CO 3	Create awareness about disasters, prevention and mitigation measures
CO 4	Create the real sense of human rights its concepts and manifestations

COMPLEMENTARY COURSE SEM V	
Course code: **ZY5CRT06**	
Course : **CELL BIOLOGY & GENETICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the structure and function of the cell
CO 2	Study different cell organelles, their structure and role in living organisms
CO 3	Develop critical thinking, skill and research aptitudes in Genetics
CO 4	Develop critical thinking, skill and research aptitudes in Genetics

COMPLEMENTARY COURSE SEM V
Course code: **ZY5CRT07**
Course : **EVOLUTION, ETHOLOGY & ZOOGEOGRAPHY**

On the completion of the course, the students will be able to:	
CO 1	Acquire knowledge about the evolutionary history -living and non living
CO 2	Acquire basic understanding about evolution concept and theories
CO 3	Acquire knowledge about the basic concept of behaviour
CO 4	Study the distribution of animals on earth its pattern evolution and causative factors
CO 5	Impart basic knowledge on animal behavioural patterns and their role.

COMPLEMENTARY COURSE SEM V	
Course code: **ZY5CRT08**	
Course : **HUMAN PHYSIOLOGY, BIOCHEMISTRY & ENDOCRINOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To provide deep knowledge in biochemistry, Physiology and endocrinology
CO 2	To define and explain the basic principles of biochemistry useful for biological studies for illustrating different kinds of food, their structure, function and metabolism
CO 3	To explain various aspects of physiological activities of animals with special reference to humans
CO 4	To acquire a broad understanding of the hormonal regulation of physiological process in in vertibrates and vertibrates
CO 5	To get familiar with hormonal regulation of physiological systems in several invertebrate and vertibrate systems
CO 6	To provide basic understanding of the experimental methods and designs that can be used for further study and research

COMPLEMENTARY COURSE SEM V	
Course code: **ZY5OPT02- 2**	
Course : **PUBLIC HEALTH AND NUTRITION**	
On the completion of the course, the students will be able to:	
CO 1	Inculcate a general awareness among the students regarding the real sense of health.
CO 2	Understand the role of balanced diet in maintaining health
CO 3	Motivate them to practice yoga and meditation in day-to-day life.

COMPLEMENTARY COURSE SEM V	
Course code: **ZY6CRT09**	
Course : **DEVELOPMENTAL BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Achieve a basic understanding of the experimental methods and designs that can be used for future studies and research in learning the frontier areas of biological sciences
CO 2	Provide the students with the periodic class discussions of current events in science which will benefit them in their future studies in the biological/physiological sciences and health-related fields
CO 3	Contribute to critical societal goal of a scientifically literate citizenry

COMPLEMENTARY COURSE SEM V	
Course code: **ZY6CRT10**	
Course: **MICROBIOLOGY & IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Know History and scope of microbiology
CO 2	Identify and understand Morphology and fine structure of bacteria, virus etc.
CO 3	To know basics of immunology
CO 4	Know immune organs
CO 5	Identify importance of immune responses and vaccines

COMPLEMENTARY COURSE SEM V	
Course code: **ZY6CRT11**	
Course : **BIOTECHNOLOGY, BIOINFORMATICS AND MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic principles and practices of biotechnology
CO 2	Gain knowledge about the various tools, techniques and steps involved in recombinant DNA technology
CO 3	Familiarize different screening methods and techniques involved in biotechnology
CO 4	Learn the fundamentals of Animal cell culture
CO 5	Understand various applications and potential hazards of Biotechnological inventions and its patenting
CO 6	Introduce the basic concepts of Bioinformatics and Genomics
CO 7	Familiarized with the structural and functional organization of genome

COMPLEMENTARY COURSE SEM V	
Course code: **ZY6CRT12**	
Course : **OCCUPATIONAL ZOOLOGY (AQUACULTURE, APICULTURE, VERMICULTURE & QUAIL FARMING)**	
On the completion of the course, the students will be able to:	
CO 1	Equip the students with self-employment capabilities
CO 2	Provide scientific knowledge of profitable farming
CO 3	Make an awareness of cottage industries
CO 4	Learn the basic principle involved in the culturing and breeding of organism
CO 5	Give awareness to society about need for waste management
CO 6	Acquire basic knowledge and skills in applied branches of zoology

ELECTIVE COURSE SEM V	
Course code: **ZY6CBT04**	
Course **NUTRITION, HEALTH & LIFE STYLE MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Provide students with a general concept of health and the parameters that define health and wellness.
CO 2	Understand principles of nutrition and its role in health.

CO 3	Familiarize the students regarding food safety, food laws & regulations.
CO 4	Provide knowledge and understanding regarding life style diseases
CO 5	Promote an understanding of the value of good life style practices, physical fitness and healthy food habits for life style disease management

M.Sc BIOTECHNOLOGY

CORE COURSE SEM I	
Course code: **BT020101**	
Course **: GENERAL BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the fundamental concepts of biochemistry and integrating their functions in the composition of cells to maintain life w.r.f to Carbohydrates
CO 2	Introduce the fundamental concepts of biochemistry and integrating their functions to cell composition, cell signaling helping to maintain life w.r.f to the different types of lipids and compounds derived from them
CO 3	Integrate fundamental concepts of protein biochemistry, learn specific structure function relationship in globular and fibrous proteins and merge these concepts for use as molecular data, bioinformatics & evolutionary relationships
CO 4	Introduce concepts in nutrient biochemistry with deep insight into the structure, chemistry, function and deficiency diseases associated with fat soluble and water soluble vitamins
CO 5	Introduce the fundamental biochemical structure and functions of DNA & RNA. To study and learn the chemistry ,functions and diseases involved in the mechanism of action of important hormones

CORE COURSE SEM I	
Course code: **BT020101**	
Course **: GENERAL BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the fundamental concepts of biochemistry and integrating their functions in the composition of cells to maintain life w.r.f to Carbohydrates
CO 2	Introduce the fundamental concepts of biochemistry and integrating their functions to cell composition, cell signaling helping to maintain life w.r.f to the different types of lipids and compounds derived from them
CO 3	Integrate fundamental concepts of protein biochemistry, learn specific structure function relationship in globular and fibrous proteins and merge these concepts for use as molecular data, bioinformatics & evolutionary relationships
CO 4	Introduce concepts in nutrient biochemistry with deep insight into the structure, chemistry, function and deficiency diseases associated with fat soluble and water soluble vitamins
CO 5	Introduce the fundamental biochemical structure and functions of DNA & RNA. To study and learn the chemistry ,functions and diseases involved in the mechanism of action of important hormones

CORE COURSE SEM I	
Course code: **BT020102**	
Course **: CELL BIOLOGY AND GENETICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand how the cell is equipped with machineries to conduct activities as the basic structural and functional unit of life.
CO 2	Understand how the cell is equipped with machineries to conduct activities as the basic structural and functional unit of life.
CO 3	Understand the structural features of cell organelles/machineries. The functional mechanisms of cellular phenomena
CO 4	Understand the fundamental principles of heredity and deviations from mendelian behavior
CO 5	Understand the effect of mutations and mutational analysis. Principles of behavioural and population genetics

CORE COURSE SEM I	
Course code: **BT020103**	
Course**: INSTRUMENTATION AND BIOSTATISTICS**	
On the completion of the course, the students will be able to:	
CO 1	The techniques used in the visualization of cellular components and macromolecules
CO 2	Analytical techniques used in detection and quantification of biological compounds and the separation techniques used in biology.
CO 3	The application of statistical principles in biological studies
CO 4	The research methodology and documentation

CORE COURSE SEM I	
Course code: **BT020104**	
Course**: BIOPHYSICS AND BIOINFORMATICS**	
On the completion of the course, the students will be able to:	
CO 1	Study the bioenergetics of cell
CO 2	Understand the basic architecture of macromolecules
CO 3	study the interaction between macromolecules and to understand advanced instrumentation technique
CO 4	Study role of bioinformatics in biological data storage
CO 5	Study applications of bioinformatic tools in analyzing biological data

CORE COURSE SEM II	
Course code: **BT020201**	
Course : **MICROBIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Acquire knowledge on the fundamentals of microbiology
CO 2	Microbial grouping and its taxonomical significance
CO 3	Know about the importance of maintaining aseptic conditions in the microbiology laboratory
CO 4	Cultivation and identification of microorganisms in the laboratory
CO 5	Perform all basic staining techniques for microscopical observation
CO 6	Learn about the types and the action of antibiotic

CO 7	Study about plasmids and gene transfer mechanisms, also to understand about mutations
CO 8	Study about Microbial metabolism and molecular processes

CORE COURSE SEM II	
Course code: **BT020202**	
Course : **IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce cells and organs associated with immune system. The details of immune system functioning
CO 2	Gain basic knowledge of analytical techniques based on immunological reactions
CO 3	Understand structure and functioning of antibodies, hybridoma technology, Antibody engineering, cytokines, complement activation pathways
CO 4	Learn immunology of Transplantation immunology, blood transfusion reactions, Tumor immunology, recent approaches to tumor immune prophylaxis
CO 5	Understand the after effects of defects in immune system

CORE COURSE SEM II	
Course code: **BT020203**	
Course : **MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the structural and functional organization of genome
CO 2	Learn the molecular biology of DNA replication, transcription, translation and post translational modification
CO 3	Study the regulation of gene function and associated phenomena
CO 4	Understand the concepts Human Genome Project
CO 5	Learn the molecular mechanism of differentiation

CORE COURSE SEM II	
Course code: **BT020204**	
Course : **ENZYMOLOGY AND METABOLISM**	
On the completion of the course, the students will be able to:	
CO 1	Introduce concepts of Metabolism associated with Carbohydrates and to utilize understanding concepts in Carbohydrate Metabolism in Bioinformatics
CO 2	Understand the process of cellular respiration, photosynthesis and concepts of energy generation and utilization
CO 3	Introduce concepts of Metabolism associated with lipids and to utilize understanding concepts in Lipid Metabolism in Bioinformatics
CO 4	Introduce concepts of Metabolism associated with Nucleic Acids and to utilize these understanding concepts for research
CO 5	Introduce concepts of Enzymology and utilize this knowledge for basis of understanding biological data in Bioinformatics and for paving way in research on Inborn Errors of Metabolism & Bioinformatics

CORE COURSE SEM III	
Course code: **BT020301**	
Course : **BIOPROCESS TECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Learn to screen microbial strains from different samples
CO 2	Study the types of Bioprocess and standard lab practices
CO 3	Studying about Bioreactor designing and control.
CO 4	Study the principles underlying Fermentation Process and downstream processing and its applications
CO 5	Learn about important microbial industrial production processes
CO 6	Integrate scientific and technological knowledge on the use of bioprocesses for industrial products

CORE COURSE SEM III	
Course code: **BT020302**	
Course : **RECOMBINANT DNA TECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the major historical events in the development of rDNA technology. Isolation of genetic material from different sources
CO 2	Learn about the various tools used in r DNA technology- DNA manipulating enzymes understand the construction of genomic and cDNA library
CO 3	Understand the basic requirements to perform genetic experiments-CLONING vectors
CO 4	Understand the techniques involved in the preparation and introduction of rDNA to the host
CO 5	Understand the methods of selection of recombinants and analysis of cloned genes expression of recombinant protein in prokaryotes and eukaryotes
CO 6	Understand the advanced techniques involved in the in genetic engineering
CO 7	Understand the application of rDNA technology and regulations in carrying out r DNA experiments
CO 8	Understand the regulations in carrying out rDNA experiments

CORE COURSE SEM III	
Course code: **BT020303**	
Course : **ENVIRONMENTAL BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the fundamental concept and biodegradation of Xenobiotic compounds
CO 2	Understand the role of biotechnology in environmental applications
CO 3	Study the degradation of recalcitrant compounds by biological agents
CO 4	Familiarize different treatment technologies involved in the processing of solid and liquid waste
CO 5	Learn the applications and fundamentals of microbial ecology in Environment biotechnology
CO 6	Study the Alternate green energy sources and green technologies

CORE COURSE SEM III	
Course code: **BT020304**	
Course Name : **PLANT AND ANIMAL BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the fundamental requirements and design of lab to carry out plant and animal cell culture experiments
CO 2	Understand the basics of different culture methods used in Animal and Plant tissue culture
CO 3	Study the different approaches and techniques involved in creating recombinant plant and animals
CO 4	Learn the applications and demerits of genetic modification in plants and animals
CO 5	Study the biotechnology in crop improvement and to know the practical application of plant molecular biology

CORE COURSE SEM III	
Course code: **BT020304**	
Course : **PLANT AND ANIMAL BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarize with the fundamental requirements and design of lab to carry out plant and animal cell culture experiments
CO 2	Understand the basics of different culture methods used in Animal and Plant tissue culture
CO 3	Study the different approaches and techniques involved in creating recombinant plant and animals
CO 4	Learn the applications and demerits of genetic modification in plants and animals
CO 5	Study the biotechnology in crop improvement and to know the practical application of plant molecular biology

CORE COURSE SEM IV	
Course code: **BT840401**	
Course : **PHYSIOLOGY AND BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Students become familiar with the functional significance of organ systems
CO 2	Understand the Role of plant metabolic pathways and their steps.
CO 3	Know the Applications of biotechnology in human cell and organ culture

CORE COURSE SEM IV	
Course code: **BT840402**	
Course : **MICROBIAL FOOD TECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Students become familiar with the functional significance of organ systems To understand the significance and activities of microorganisms in various food and role of intrinsic and extrinsic factors on microbial growth in foods leading to spoilage

CO 2	Understand the Role of plant metabolic pathways and their steps. The role of microbial fermentation in food production and factors affecting it
CO 3	Study the different types of microorganisms in various foods and their activities Know the Applications of biotechnology in human cell and organ culture
CO 4	To understand the principles underlying the preservation methods
CO 5	Recognize and describe the characteristics of important food borne pathogens
CO 6	Understand of the basis of food safety regulations and discuss the rationale for the use of standard methods and procedures for the microbiological analysis of food.
CO 7	Genetically Engineered Foods -To study the role of biotechnology in food production and modification

CORE COURSE SEM IV	
Course code: **BT840403**	
Course : **IPR AND BIOTECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Familiarized with the fundamentals of Intellectual property and its different forms
CO 2	Understand the National and international approaches to protect the IPR.
CO 3	Learn the guidelines for biosafety
CO 4	Study different GM crops and organism and their global status
CO 5	Emphasis on the ethical issues related to GM crops and organism
CO 6	Understand the ethical and legal implications of Human genome project, genetic testing, stem cell research and patenting of gene and microbes

M.SC BIOINFORMATICS

CORE COURSE SEM I	
Course code: **BT010101**	
Course : **FUNDAMENTALS OF CELL BIOLOGY AND BIOCHEMISTRY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the fundamental concepts of Cell Biology and the molecular mechanisms involved in functioning of cells to maintain life. Cell structure, aspects, pathways in cell division, cancer & apoptosis
CO 2	Integrate fundamental concepts of biochemistry and bimolecular functions for maintaining life. To merge these concepts for use as Molecular Data in Bioinformatics
CO 3	Study the signaling pathways involved in cell to cell communications that eventually result in growth, survival, reproduction and existence of organisms
CO 4	Introduce research concepts in Cell Biology & Biochemistry and interpret how Bioinformatics can be used as a solution for investigating in biological research
CO 5	Apply statistical logic in programming languages aiding life science research.

CORE COURSE SEM I	
Course code: **BT010102**	
Course : **INTRODUCTION TO GENETICS AND MOLECULAR BIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the basics of Genetics & Molecular Biology
CO 2	Relate the basic knowledge in Genetics & Molecular Biology and see how it can be applied through Bioinformatics perspective
CO 3	Introduce the scope of Genetics & Molecular Biology in frontiers of Life Science
CO 4	Understand basic steps in gene expression
CO 5	Understand general ways of gene regulation in both prokaryotes and eukaryotes

CORE COURSE SEM I	
Course code: **BT010103**	
Course : **FUNDAMENTALS OF APPLIED MATHEMATICS AND BIOSTATISTICS**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the basic Mathematical concepts
CO 2	Introduce the basic Statistics
CO 3	Apply the mathematical and statistical concepts in developing bioinformatics tools applied in life science research
CO 4	Apply mathematical logic in programming languages aiding life science research
CO 5	Apply statistical logic in programming languages aiding life science research.

CORE COURSE SEM I	
Course code: **BT010104**	
Course : **INTRODUCTION TO COMPUTING AND BIOINFORMATICS**	
On the completion of the course, the students will be able to:	
CO 1	Basics of working of a computer in the modern era
CO 2	Teach basics of C programming language
CO 3	Understand programming logic
CO 4	Understand string handling
CO 5	Deep knowledge on functions and their applications
CO 6	Understand advanced programming constructs in C
CO 7	Introduce Bioinformatics, its scope, importance and outreach
CO 8	To learn to design basic webpages

CORE COURSE SEM II
Course code: **BT010201**
Course : **METABOLISM & ENZYMOLOGY**
On the completion of the course, the students will be able to:

CO 1	Introduce concepts of Metabolism associated with Carbohydrates and to utilize understanding concepts in Carbohydrate Metabolism in Bioinformatics
CO 2	Understand the process of cellular respiration , photosynthesis and concepts of energy generation and utilization
CO 3	Introduce concepts of Metabolism associated with lipids and to utilize understanding concepts in Lipid Metabolism in Bioinformatics
CO 4	Introduce concepts of Metabolism associated with Nucleic Acids and to utilize these understanding concepts for research
CO 5	Introduce concepts of Enzymology and utilize this knowledge for basis of understanding biological data in Bioinformatics and for paving way in research on Inborn Errors of Metabolism & Bioinformatics

CORE COURSE SEM II	
Course code: **BT010202**	
Course : **GENERAL MICROBIOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To introduce the concepts of Microbiology
CO 2	To introduce the research areas in Microbiology and see how they can be manipulated using Bioinformatics
CO 3	To understand basic sterilization techniques, Antibiotics mode of action, drug resistance among bacteria
CO 4	To introduce pathogenic microorganisms, their modes of infection, diagnosis and care
CO 5	To introduce basic concepts of gene cloning

CORE COURSE SEM II	
Course code: **BT010203**	
Course : **GENOMICS**	
On the completion of the course, the students will be able to:	
CO 1	To introduce the concept of genome and its classification
CO 2	To effectively understand the nature and sequences of genome
CO 3	To devise and extrapolate understanding of genomic data into analytical knowledge
CO 4	To develop appreciation on the applications of genomics techniques

CORE COURSE SEM II	
Course code: **BT010204**	
Course : **BIOINFORMATICS & PERL**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic concepts of bioinformatics
CO 2	To understand the concept of evolutionary analysis
CO 3	Basic Perl programming constructs
CO 4	Advanced Perl
CO 5	Understand Bioperl-beginner level
CO 6	Utilization of Bioinformatics tools and databases fr retrieving, analyzing, understanding and managing biological data

CORE COURSE SEM III	
Course code: **BT010301**	
Course : **IMMUNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	To introduce the basic concepts of Immunology
CO 2	To acknowledge the scope of immune mechanism in life science research.
CO 3	To understand and compare difference between B cell and T cell development, maturation, activation. To study different means of immuno modulation
CO 4	To understand clinical aspects of immunology
CO 5	To integrate the scope of Bioinformatics tools in better understanding of Immunological approaches

CORE COURSE SEM III	
Course code: **BT010302**	
Course : **PROTEOMICS & CADD**	
On the completion of the course, the students will be able to:	
CO 1	To introduce basic concepts in Proteomics and their role in Life Science Research
CO 2	To introduce concepts in Computer Aided Drug Design and molecular Modeling
CO 3	To signify the role of computational drug discovery methods by providing knowledge on various tools in Bioinformatics
CO 4	To develop appreciation about proteomics and CADD techniques

CORE COURSE SEM III	
Course code: **BT010303**	
Course : **DATABASE CONCEPTS & BIOLOGICAL DATABASES**	
On the completion of the course, the students will be able to:	
CO 1	To teach concepts in developing & creating databases
CO 2	To introduce programming languages and applying them to create databases
CO 3	To comprehensively understand biological databases
CO 4	To develop appreciation about the role of databases in biological research

CORE COURSE SEM III	
Course code: **BT010304**	
Course : **ADVANCED BIOINFORMATICS & LINUX OPERATING SYSTEM**	
On the completion of the course, the students will be able to:	
CO 1	To teach advanced topics in Bioinformatics
CO 2	To introduce Free Software; Linux Operation System and working in a command line environment
CO 3	To introduce the concepts of Machine learning and their application in Bioinformatics

CORE COURSE SEM IV	
Course code: **BT800401**	
Course : **GENETIC ENGINEERING & IPR**	
On the completion of the course, the students will be able to:	
CO 1	To introduce the basic concepts of Genetic Engineering Techniques
CO 2	To understand the concepts in IPR.
CO 3	To understand the concepts in bioethics
CO 4	To effectively signify the relevance of applications in Genetic Engineering in today's industry

CORE COURSE SEM IV	
Course code: **BT800402**	
Course : **BIO PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO 1	To teach R programming language and its application in scientific and commercial domain
CO 2	To teach R programming language and its application in scientific and commercial domain
CO 3	To learn and to apply languages of Python & Biopython in Bioinformatics
CO 4	To learn and to apply Scilab in Bioinformatics Data Analysis
CO 5	To understand the application of Soft computing techniques in Bioinformatics

CORE COURSE SEM IV	
Course code: **BT800403**	
Course : **DATA MINING IN BIOINFORMATICS**	
On the completion of the course, the students will be able to:	
CO 1	To introduce to concepts of Data Mining
CO 2	To utilize data mining techniques and enhance its application in acquiring Biological Data
CO 3	To teach large scale biological data analysis using Bioinformatics Software
CO 4	To develop appreciation on the applications of data mining

15. DEPARTMENT OF MCA

CORE COURSE SEM I	
Course code: **MCA 101**	
Course : **MATHEMATICAL & STATISTICAL FOUNDATION FOR COMPUTER APPLICATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basics of Set theory, Relations and Functions and their application in the Computer Science field
CO 2	Apply the Rules of Inference to solve applied problems
CO 3	Be familiar with the basic concepts of Probability Theory and Sampling Techniques
CO 4	Design a Probability model/ test of significance to solve a real-world problem.

CORE COURSE SEM I	
Course code: **MCA 102**	
Course : **DIGITAL LOGIC & COMPUTER ORGANIZATION**	
On the completion of the course, the students will be able to:	
CO 1	To do arithmetic operations on binary and understand different binary codes used in communication
CO 2	At the end of the course, students will be able to perform the analysis and design of various digital electronic circuits
CO 3	Students will be able to understand the internal organization of computers, memory units
CO 4	Students will get knowledge about advanced computer architecture

CORE COURSE SEM I	
Course code: **MCA 103**	
Course : **STRUCTURED PROGRAMMING IN C**	
On the completion of the course, the students will be able to:	
CO 1	Having a deep knowledge in application-oriented C programming features
CO 2	Able to solve problems and implement it using various programming constructs.
CO 3	Identify the significance of C language as a very strong programming foundation.

CORE COURSE SEM I	
Course code: **MCA 104**	
Course**: SOFTWARE ENGINEERING AND OBJECT ORIENTED MODELING**	
On the completion of the course, the students will be able to:	
CO 1	Get basic insights into the need and importance of software engineering
CO 2	Get familiar with the activities in different phases of software engineering
CO 3	Participants will get familiarized with then basics of UML tools used for object oriented modeling

CORE COURSE SEM I	
Course code: **MCA 105**	
Course **: DATABASE TECHNOLOGY AND NOSQL**	
On the completion of the course, the students will be able to:	
CO 1	Describe the architecture and functioning of Database Management Systems.
CO 2	Apply the principles of data modeling using Entity Relationship and develop a good database design.
CO 3	Create and maintain a relational database using SQL and its advanced features.
CO 4	Apply Normalization techniques to normalize a database
CO 5	llustrate the techniques for controlling the consequences of concurrent data access and crash recovery.

CO 6	Describes how aggregates manifest themselves in data models in NoSQL

CORE COURSE SEM I	
Course code: **MCA 106**	
Course **: DATABASE TECHNOLOGY LAB (MYSQL & MONGODB)**	
On the completion of the course, the students will be able to:	
CO 1	Create and alter table structures using MySQL
CO 2	Formulate queries to perform Insert, update and delete, select and rollback operations in a database
CO 3	Build subqueries to extract rows from processed data
CO 4	Create and manipulate collections in Mongodb and perform various operations.
CO 5	Design and implement a database for a given problem domain

CORE COURSE SEM I	
Course code: **MCA 107**	
Course **: SOFTWARE DEVELOPMENT LAB- I(C PROGRAMMING)**	
On the completion of the course, the students will be able to:	
CO 1	Select and model data using primitive and structured types.
CO 2	Construct programs that demonstrate effective use of C features including arrays, structures & Pointers
CO 3	Handle various sorting and searching techniques.
CO 4	Create and manipulate Files using various file handling functions.
CO 5	Design and implement an application for a given problem domain

CORE COURSE SEM I	
Course code: **MCA 108**	
Course **: EMPLOYABILITY SKILL TRAINING-PHASE 1**	
On the completion of the course, the students will be able to:	
CO 1	Do self-assessment of strengths and weaknesses; identify what is lacking for a better personality and improve on it.
CO 2	Solve Quantitative, Verbal and Logical Reasoning and Comprehension problems in IT recruitment drives and other competitive exams
CO 3	Organize and write an effective Cover Letter and Resume

CORE COURSE SEM II	
Course code: **MCA CT 201**	
Course **: OPTIMIZATION TECHNIQUES FOR COMPUTER APPLICATIONS**	
On the completion of the course, the students will be able to:	
CO 1	May get basic insights into Applications of Operations Research in Managerial Decision Making
CO 2	Will get familiar with Scientific Tools and Models in OR for analysing the Business.
CO 3	Will be able to understand the basics of Decision Science

CORE COURSE SEM II	
Course code: **MCA CT 202**	
Course **: DATA STRUCTURES AND ALGORITHM ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Have deep knowledge about the organization of data structures, Arrays, Linked Lists, Stacks, Queues, Trees and Graphs.
CO 2	Be able to select the appropriate data structures for solving the given problem
CO 3	Be familiar with different sorting and searching methods and their features.
CO 4	Know the various algorithm design strategies and their applications. Thus will be able to choose
CO 5	The more suitable method for the given scenario.
CO 6	Know how to analyze the performance of devised algorithms using different analysis methods
CORE COURSE SEM II	
Course code: **MCA CT 203**	
Course **: COMPUTER NETWORKING WITH TCP/IP**	
On the completion of the course, the students will be able to:	
CO 1	Understand about basic computer network terminologies.
CO 2	Enumerate the layers of the OSI model and TCP/IP model and can explain the function(s) of each layer
CO 3	Understand about subnetting and routing mechanisms
CO 4	Identify the different protocols in TCP/IP and how they help in Internet communication.

CORE COURSE SEM II	
Course code: **MCA CT 204**	
Course **: DATA SCIENCE & BIG DATA ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	May get basic insights into Applications of Big Data concepts.
CO 2	Will get familiar with Scientific Tools and Models in Data Science.
CO 3	Will be able to understand the basics of Different tools used in Big Data Analysis.

CORE COURSE SEM II	
Course code: **MCA CT 205**	
Course **: OBJECT ORIENTED LAB(JAVA LAB)**	
On the completion of the course, the students will be able to:	
CO 1	The student will be able to understand the applications of Object Oriented Programming concepts
CO 2	The students will illustrate the package concept and handling error mechanism in java
CO 3	The students will be able to understand GUI programming through database connectivity

CORE COURSE SEM II	
Course code: **MCA CT 206**	
Course **: SOFTWARE DEVELOPMENT LAB-II (PHP)**	
On the completion of the course, the students will be able to:	
CO 1	Define the basic fundamentals of PHP
CO 2	Understand the concept of Semantic web and web hosting
CO 3	Differentiate between client-side validation and server-side validation
CO 4	Apply Oops concepts in PHP
CO 5	Create database and establish connection using PHP
CO 6	Develop web applications using advanced PHP frameworks

CORE COURSE SEM II	
Course code: **MCA CT 207**	
Course **: DATA STRUCTURES LAB USING C**	
On the completion of the course, the students will be able to:	
CO 1	Implement linear and non-linear data structures
CO 2	Apply data structures such as stack, queue, linked lists and tree to solve various computing problems.
CO 3	Implement different searching and sorting techniques

CORE COURSE SEM III	
Course code: **MCA CT 301**	
Course**: MACHINE LEARNING TECHNIQUES**	
On the completion of the course, the students will be able to:	
CO 1	Recognize the characteristics of machine learning that make it useful to real-world problems.
CO 2	Programme Structure & Syllabus MCA 2020
CO 3	Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
CO 4	Understand how to use feature extraction and classification techniques
CO 5	Understand how to use clustering techniques.
CO 6	Understand the concepts of NN and how to build a model using ANN

CORE COURSE SEM III	
Course code: **MCA CT 302**	
Course **: CYBER FORENSICS**	
On the completion of the course, the students will be able to:	
CO 1	Get a basic idea in Computer forensics
CO 2	Understand the importance of a systematic procedure for investigation of data found on various digital media
CO 3	Understand the various forms of computer crimes
CO 4	Understand the limitations imposed by cyber laws.

CORE COURSE SEM III
Course code: **MCA CT 303 ET1**
Course **: ARTIFICIAL INTELLIGENCE**

On the completion of the course, the students will be able to:	
CO 1	Explore the importance and relevance of AI in various fields & to understand about the basic theory of problem solving paradigm
CO 2	To be familiar with searching strategies applied in artificial intelligence.
CO 3	Enumerate the Knowledge representation using Rule based Algorithms and Reasoning
CO 4	Introduce the ongoing research and application of Artificial Intelligence in different fields like Natural language processing, Expert systems and robotics.
CORE COURSE SEM III	
Course code: **MCA CT 304 ET1**	
Course **: CLOUD COMPUTING**	
On the completion of the course, the students will be able to:	
CO 1	Understand the fundamental concepts of Cloud Computing, cloud infrastructure and working of different service models and cloud deployment models.
CO 2	Understand cloud architecture and Cloud virtualisation
CO 3	Aware about Data storage in cloud and about different cloud computing services.
CO 4	Aware about the Security in cloud computing and different cloud computing tools.
CO 5	Understand the cloud platforms used in industry, Clouds computing applications future directions and trends.

CORE COURSE SEM III	
Course code: **MCA CT 305 ET1**	
Course **: PYTHON PROGRAMMING FOR DATA SCIENCE**	
On the completion of the course, the students will be able to:	
CO 1	Will get the programming skills required to develop python application programs.
CO 2	Will be able to develop web applications using the django framework.
CO 3	Will learn Data handling using python.

CORE COURSE SEM III	
Course code: **MCA CT 306 ET1**	
Course **: ADVANCE OPERATING SYSTEM LAB USING LINUX**	
On the completion of the course, the students will be able to:	
CO 1	Run various Linux commands on a standard LINUX Operating system (Ubuntu flavour of the Linux
CO 2	Operating system is preferred
CO 3	Manage Files and directories in Linux operating system familiarize process creation, scheduling task and work with networking utilities
CO 4	Master the basics of Linux administration
CO 5	Acquire the shell script writing skills.

CORE COURSE SEM III	
Course code: **MCA CT 307 ET1**	
Course **: MINI PROJECT**	
On the completion of the course, the students will be able to:	
CO 1	Practice acquired knowledge within the chosen area of technology for project development.
CO 2	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach
CO 3	Reproduce, improve and refine technical aspects for engineering projects
CO 4	Work as an individual/ team in the development of technical projects
CO 5	Communicate and report effectively project related activities and findings

CORE COURSE SEM III	
Course code: **MCA CT 308 ET1**	
Course **: EMPLOYABILITY SKILL TRAINING-PHASE 2**	
On the completion of the course, the students will be able to:	
CO 1	Understand all aspects of communication and its effect on giving and receiving information.
CO 2	Identify his/her analytical and lateral thinking, constructive argument capabilities, clarity of thoughts and capability to hold a discussion with a group.
CO 3	Understand the purpose of professional interviews
CO 4	Articulate the importance of self-preparation.
CO 5	Students are able to practice their interviewing skills in an environment similar to an actual interview

CORE COURSE SEM IV	
Course code: **MCA CS 401 Seminar**	
Course **: EMPLOYABILITY SKILL TRAINING-PHASE 2**	
On the completion of the course, the students will be able to:	
CO 1	Provide insight knowledge in the selected topic of the seminar.
CO 2	Helps to improve analytical skills.
CO 3	To develop interest towards research in the field of Computer Science and its application areas.
CO 4	Improves communication and presentation skills
CO 5	Helps to nurture critical thinking skills.
CO 6	Improves comprehensive writing skills

CORE COURSE SEM IV	
Course code: **MCA CP 402**	
Course **: PROJECT**	
On the completion of the course, the students will be able to:	
CO 1	Apply Systems Development Life Cycle (SDLC) models to identify, analyse and evaluate system requirements
CO 2	Design the system by constructing various design diagrams consisting of UML's, DFD's, flow charts, state diagrams etc

CO 3	Acquire knowledge on the implementation of various software tools in the design process.
CO 4	Develop Code to provide a solution to the problem
CO 5	Prepare the documentation and reports of the projects.
CO 6	Propose future scope and further enhancement of the system
CO 7	Develop presentation and communication skills

CORE COURSE SEM IV	
Course code: **MCA CV 403**	
Course **: COURSE VIVA**	
On the completion of the course, the students will be able to:	
CO 1	To know the importance of each subject and its contribution towards knowledge
CO 2	Evaluate and justify their level of knowledge after the MCA Programme
CO 3	To throw light on the students regarding their areas of interest and the areas

16. DEPARTMENT OF MBA

CORE COURSE SEM I	
Course code:	
Course **: MANAGEMENT CONCEPTS & ORGANIZATIONAL BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To provide the participants conceptual framework in Management functions and practices
CO 2	To provide basic insights into Individual and Group Behaviour in Organisations
CO 3	To introduce framework of Organisation Structure, Climate

CORE COURSE SEM I	
Course code:	
Course **: BUSINESS COMMUNICATION**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants with the basics of business communication
CO 2	To make the participants appreciate the application of these concepts in business environment
CO 3	To sensitize the participants to non-verbal communication and effective utilization of the same

CORE COURSE SEM I	
Course code:	
Cours**: MANAGERIAL ECONOMICS**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants concepts and techniques in Economics
CO 2	To make the participants appreciate the applications of core concepts in economics for managerial decision making
CO 3	To sensitize the participants how economic environment affects Organizations

CORE COURSE SEM I	
Course code:	
Course **: ACCOUNTING FOR MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	This basic course aims to introduce the nature and purpose of financial statements in relation to decision making
CO 2	The course aims to develop the ability to understand a basic accounting system; to record, classify, and summarize financial data
CO 3	To sensitize the participants about different types of accounting used for decision Making

CORE COURSE SEM I	
Course code:	
Course **: QUANTITATIVE METHODS**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants with Mathematical and Statistical techniques applied in Management
CO 2	To familiarize the students to solve statistical problems for summarizing, analysing, and interpreting Data
CO 3	To impart fundamentals of Hypothesis Testing

CORE COURSE SEM I	
Course code:	
Course **: LEGAL ENVIRONMENT OF BUSINESS**	
On the completion of the course, the students will be able to:	
CO 1	To provide the participants basic framework of Laws applicable to Business
CO 2	To provide basic insights into provisions of business laws
CO 3	To sensitize the participants legal framework required for starting a Business

CORE COURSE SEM I	
Course code:	
Course **: ENVIRONMENTAL MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants framework of Natural Environment and Importance of Protection of Natural Resources
CO 2	To make the participants aware about pollution and waste management
CO 3	To sensitize the participants about Business Environment framework

CORE COURSE SEM II	
Course code:	
Course **: HUMAN RESOURCE MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To provide participants a synthesized framework of Human Resources theory & practice
CO 2	To impart practical insights into HR Practices in Organisations
CO 3	Learn to align HR Systems with the Strategic Business Objectives of a Firm

CORE COURSE SEM II	
Course code:	
Course **: MANAGEMENT SCIENCE**	
On the completion of the course, the students will be able to:	
CO 1	To Familiarize the participants with the scope and applications of Operations Research in Managerial decision making
CO 2	To impart basic insights to students about use of various Scientific Tools and Models in OR for Business Analysis
CO 3	To provide basic insights into Decision Science and Decision Environment

CORE COURSE SEM II	
Course code:	
Course **: FINANCIAL MANAGEMEN**T	
On the completion of the course, the students will be able to:	
CO 1	Introduce Objectives and Functions of Financial Management, its importance, its applications in business
CO 2	Understand the relationship of Financial Management with the business environment and the role of Financial Manager.

CORE COURSE SEM II	
Course code:	
Course **: MARKETING MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Introduce the key business function of Marketing with modern realities
CO 2	Provide the participants conceptual framework of Marketing
CO 3	Impart key insights into the practical aspects of Marketing in different type of Organisations

CORE COURSE SEM II	
Course code:	
Course: **BUSINESS RESEARCH METHODS**	
On the completion of the course, the students will be able to:	
CO 1	Prepare for projects through providing basic aspects of Research Methodology
CO 2	Make the participants familiar with different phases of Research
CO 3	Equip the participants basic insights into Data Analysis and Report Writing

CORE COURSE SEM II	
Course code:	
Course **: ENTREPRENEURSHIP DEVELOPMENT**	
On the completion of the course, the students will be able to:	
CO 1	Provide the Participants basic understanding about the Role and Significance of Entrepreneurship in an economy
CO 2	Instil a Spirit of Entrepreneurship among the Student Participants
CO 3	Make the Participants aware about the Management of Small and Medium Enterprises

CORE COURSE SEM II	
Course code:	
Course**: MANAGEMENT INFORMATION SYSTEM & CYBER SECURITY**	
On the completion of the course, the students will be able to:	
CO 1	Understand the Importance of Information System in Business
CO 2	Make the participants familiarize with the Information Technologies and Methods used for effective Decision making in an organization.
CO 3	Understand the security and ethical issues in Information systems.

CORE COURSE SEM II	
Course code:	
Course **: OPERATIONS MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	Provide basic understanding of the Production / Operations Management Function in Organizations
CO 2	Make the participants aware of the quality tools in Operations Management
CO 3	Sensitize the participants about the current Operations Management Process and strategies followed in India and abroad.

CORE COURSE SEM III	
Course code:	
Course **: BIG DATA AND BUSINESS ANALYTICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand what business analytics, why it is used, and by whom
CO 2	Understand the key concepts of business analytics and its practical application in decision making
CO 3	Apply relevant analytics tools and techniques to solve real world business problem

CORE COURSE SEM III	
Course code:	
Course **: BUSINESS ETHICS AND CORPORATE GOVERNANCE**	
On the completion of the course, the students will be able to:	
CO 1	introduce ethics as an important component in business administration
CO 2	provide the participants the relevance and role of Indian Practices in Business.

CO 3	discuss and analyse relevant case studies related to Indian Ethos and values from the business world

CORE COURSE SEM III	
Course code:	
Course **: MANAGEMENT OF BANKS & FINANCIAL INSTITUTIONS**	
On the completion of the course, the students will be able to:	
CO 1	To acquaint the students with concepts of banks and financial institutions
CO 2	To familiarize various techniques of managing banks and financial institutions

CORE COURSE SEM III	
Course code:	
Course **: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To have an in depth knowledge of the theory as well as practice of investment decision making
CO 2	To Know the theory and practice of portfolio management

CORE COURSE SEM III	
Course code:	
Course**: RETAIL BUSINESS MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To introduce concepts and practices in retail business management
CO 2	Demonstrate an understanding of how retailers develop a retail mix to build a sustainable competitive advantage
CO 3	To sensitize the participants about store management perspectives

CORE COURSE SEM III	
Course code:	
Course **: SALES MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To develop an understanding and appreciation of the sales process in organisations
CO 2	To provide practical insights into personal selling process and its managerial aspects
CO 3	To provide insights into sales administration
CO 4	To provide skills related to selling of different goods and services

CORE COURSE SEM III	
Course code:	
Course**: TRAINING AND DEVELOPMENT**	
On the completion of the course, the students will be able to:	
CO 1	To provide key insights into the HR function of training and development
CO 2	To import conceptual base with respect to different types of training and development programmes
CO 3	To discuss training and development practices in industries

CORE COURSE SEM III	
Course code:	
Course**: PERFORMANCE AND TALENT MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To apprise the participants about the importance of Performance Management in Organizations and impart an understanding of the process of managing performance to achieve the organization's current and future objectives.
CO 2	To give insights on how to identify, integrate & retain talent in an organization to deliver high performance

CORE COURSE SEM III	
Course code:	
Course **: GLOBAL TRADE PRACTICES**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants concepts of international trade
CO 2	To familiarize the participants on India's foreign trade and policies
CO 3	To introduce participants about Indian government role in fostering international trade in India.

CORE COURSE SEM III	
Course code:	
Course**: INTERNATIONAL MARKETING**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants basic concepts of International Marketing.
CO 2	To familiarize the participants on factors deciding International Product and its Pricing
CO 3	To familiarize the participants basic concepts of various International Promotional Strategies

CORE COURSE SEM IV	
Course code:	
Course **: STRATEGIC MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To expose students to various concepts and perspectives in the field of strategic management.
CO 2	To help participants develop skills for applying these concepts in various contexts to solve business problems
CO 3	To enable to students to use traditional and contemporary analytical tools of strategic management

CORE COURSE SEM IV	
Course code:	
Course **: INTERNATIONAL FINANCE AND FOREX MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To understand the significance of international financial management and operational aspects of foreign exchange markets
CO 2	To develop knowledge, capability and skill necessary for making sound investment and financial decisions for a multinational firm
CO 3	To define and measure forex risks and to identify risk management strategies

CORE COURSE SEM IV	
Course code:	
Course **: MANAGEMENT OF FINANCIAL SERVICES**	
On the completion of the course, the students will be able to:	
CO 1	To give an appreciation and understanding of the fundamentals of financial services industry in India
CO 2	To give an insight into the impact of financial services industry in the overall financial system

CORE COURSE SEM IV	
Course code:	
Course **: AGRI BUSINESS & RURAL MARKETING**	
On the completion of the course, the students will be able to:	
CO 1	The participants will understand the relevance of consumer behaviour in marketing
CO 2	The participants will have conceptual and practical knowledge on factors affecting buyer behaviour
CO 3	The students may understand Indian scenario on consumer behaviour and its trends

CORE COURSE SEM IV	
Course code:	
Course **: CONSUMER BEHAVIOUR**	
On the completion of the course, the students will be able to:	
CO 1	To sensitize the participants about the role and importance of consumer behaviour in marketing process
CO 2	To study the impact of environmental and individual influence on buyer behaviour
CO 3	To discuss about consumer behaviour in Indian context

CORE COURSE SEM IV	
Course code:	
Course **: COUNSELLING SKILLS FOR MANAGERS**	
On the completion of the course, the students will be able to:	
CO 1	To provide a clear understanding about the concepts, methods, techniques and issues involved in counselling as a HR function
CO 2	To impart basic skills in counselling to the participants

CORE COURSE SEM IV	
Course code:	
Course**: MENTORING, COACHING & MANAGEMENT CONSULTING**	
On the completion of the course, the students will be able to:	
CO 1	To give insights into the Art and science of Mentoring, coaching and consulting
CO 2	The participants will understand the problems in Global Human Resources Management

CORE COURSE SEM IV	
Course code:	
Course **: INTERNATIONAL LOGISTICS & SUPPLY CHAIN MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To provide an introduction on concepts and relevance of logistics and supplychain management in international trade.
CO 2	To familiarize the participants concepts of various modes of transport and warehousing of merchandise goods.
CO 3	To familiarize the participants concepts of supply chain drivers.

CORE COURSE SEM IV	
Course code:	
Course **: INTERNATIONAL ECONOMICS ORGANIZATIONS**	
On the completion of the course, the students will be able to:	
CO 1	To provide an introduction on relevance of international economic organizations
CO 2	To provide an introduction on important international trade agreements and economic integration
CO 3	To familiarize the participants on important regional trade blocs and its impact on India's global trade.
CORE COURSE SEM IV	
Course code:	
Course **: INDUSTRIAL SAFETY & OCCUPATIONAL HEALTH**	
On the completion of the course, the students will be able to:	
CO 1	To provide the students a basic understanding of industrial safety, hygiene and occupational health
CO 2	To provide conceptual knowledge to the various aspects of industrial hygiene and occupational health that would enable them to appreciate and motivate them to make the work place a better place for all employees
CO 3	To plan and execute productivity improvement initiatives through reduction in human error and improvement in safety.

CORE COURSE SEM IV	
Course code:	
Course **: MATERIALS & PURCHASE MANAGEMENT**	
On the completion of the course, the students will be able to:	
CO 1	To familiarize the participants concepts and techniques of materials management

CO 2	Provide an understanding to the advanced concepts and practices in purchasing and material planning.

17. DEPARTMENT OF ELECTRONICS & COMPUTER MAINTENANCE

B.Sc

CORE COURSE SEM I	
Course code: **EL1CRT01**	
Course: **BASIC ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the characteristics and properties of electric and magnetic fields. Understanding different electronics Theorems & their equivalent circuits.
CO 2	Comprehend the mathematical expression for voltages and currents in RL, RC and RLC circuits to find the transient response of inductor and capacitor in dc circuits.
CO 3	Analyze the concept with the working principles of forward and reverse bias characteristics.
CO 4	Discriminate the principle, construction and operation of BJTs, FETs and MOSFETs.
CO 5	To acquire the knowledge about the characteristics and working principles of semiconductor power electronics

CORE COURSE SEM I	
Course code: **EL1CRT02**	
Course : **METHODOLOGY OF SCIENCE**	
On the completion of the course, the students will be able to:	
CO 1	Understand the history, process and philiosophy of science and the contributions of Early India
CO 2	Understand the contributions from middle ages to science
CO 3	Analyse the contributions made by Newton and other scientists and how it led to improvements in various fields
CO 4	Analyse the philosophy of science and to compare the different reasoning techniques
CO 5	Understand the early communication techniques used and how the advancement in electronics has led to improvements in science and technology

CORE COURSE SEM I	
Course code: **EM1CRT01**	
Course : **C PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO 1	Differentiating programming languages and system software. Describe the concept of algorithms and flowcharts. Understand the fundamentals of C programming.
CO 2	Understand basic data types, different input/output functions and basic statements of C.
CO 3	Analyse how to use arrays, strings, functions, structure, and union.
CO 4	Brief introduction to pointers, file management and pre-processor statements in C

COMPLEMENTARY COURSE SEM I	
Course code: **MM1CMT01**	
Course: **PARTIAL DIFFERENTIAL ,MATRICES,TRIGONOMETRY AND NUMERICALMETHODS**	
On the completion of the course, the students will be able to:	
CO 1	Differentiate between ordinary differentiation and Partial Differentiation and solve problems related to such derivatives , functions of several variables and solve problems using chain rule
CO 2	Study about elementary transformation of matrix and its applications
CO 3	Understand about hyperbolic functions and summation of infinite series
CO 4	Understand about numerical methods for finding approximate root of transcendental and algebraic equations

CORE COURSE SEM II	
Course code: **EL1CRT03**	
Course: **ELECTRONIC CIRCUITS**	
On the completion of the course, the students will be able to:	
CO 1	Ability to design and analyze simple rectifiers and voltage regulators using diodes
CO 2	To study different biasing techniques to operate transistor, FET,MOSFET and operational amplifier in different modes
CO 3	Know the benefits of feedback in amplifier.
CO 4	Compare and classify oscillators. Know about different power amplifier circuits, their design and use in electronics and communication circuits.
CO 5	Design and experiment with various wave shaping circuits.

CORE COURSE SEM II	
Course code: **EL1CRT05**	
Course**: DIGITAL ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	To Identify different type of number system and understand the basic logical operation of a Flip-flop
CO 2	Understand the concept of Boolean algebra and its application using K-map
CO 3	Identify different type of TTL logic families and its Transfer characteristics
CO 4	To acquire knowledge about different type of encoder- decoder converter and its application with different logic circuits
CO 5	Understand the working logical operation of different flip-flops and its application in a shift register.
CO 6	Learn to design an asynchronous/synchronous up/down counter

COMPLEMENTRY COURSE SEM II	
Course code: **MM2CMT01**	
Course: **INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Apply the concept and principles of integral calculus to find volumes, areas of surface of revolution, arc length of a curve
CO 2	Differentiate between double and triple integral and study the applications of these integrals
CO 3	Understand about ordinary differential equation and solve problems related to differential equations
CO 4	Differentiate between partial and ordinary differential equations solve linear equations of first order by using Languages method

CORE COURSE SEM III	
Course code: **EL3CRT06**	
Course: **ANALOG COMMUNICATION**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic concepts of the analog communication systems.
CO 2	Acquaint with formulate the SSB modulation
CO 3	Acquaint with formulate the frequency modulation and angle modulation signals
CO 4	Evaluate modulation index, bandwidth power requirements and generation FM
CO 5	Understanding various receiver circuits.

CORE COURSE SEM III	
Course code: **EL3CRT07**	
Course: **ANALOG ICS & APPLICATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Have a better understanding of Integrated Circuits its classifications, development, operational ranges, Manufactures. How to read and interpret a datasheet. Device identification.
CO 2	Understand the internals of operational amplifiers, its parameters and its different open loop configurations.
CO 3	Learn how to use the operational Amplifier with feed back and its parameter values with feedback. Different configurations used and its applications with feedback.
CO 4	Apply the skills to design different type of oscillators. Use of specific type of Chips.
CO 5	Learn to design different type of power supply regulators, both fixed and variable regulators. Learn to use different type of IC's used for a specified operations.

CORE COURSE SEM III	
Course code: **EM3CRT02**	
Course: **MICROPROCESSOR ARCHITECTURE, PROGRAMMING AND APPLICATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Describe the architecture and basic interfacing concepts of 8085.

CO 2	Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
CO 3	Illustrate counters, time delays, stack, and subroutines.
CO 4	Understand the concepts of interrupts and serial I/O

CORE COURSE SEM III	
Course code: **EM3CRT03**	
Course: **OPERATING SYSTEM CONCEPTS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the operating system functions and its structure
CO 2	Understand process management, CPU scheduling and deadlock.
CO 3	Understand different memory management functions
CO 4	Describe the file system handling methods of an operating system

COMPLEMENTARY COURSE SEM III	
Course code: **MM3CMT01**	
Course: **VECTOR CALCULUS, ANALYTIC GEOMETRY AND ABSTRACT ALGEBRA**	
On the completion of the course, the students will be able to:	
CO 1	Understand about vector valued function and Apply the concept and principles of vector calculus to find curvature, arc length, normal vectors of a curve
CO 2	Study integration in vector field and problems based on Greens theorem, stokes theorem and divergence theorem
CO 3	Differentiate between polar coordinates and Cartesian coordinates and understand about conic sections
CO 4	Study about Abstract algebra and understand about group, cyclic group, group of permutation and homomorphism

CORE COURSE SEM IV	
Course code: **EL4CRT12**	
Course: **DIGITAL COMMUNICATION**	
On the completion of the course, the students will be able to:	
CO 1	Understand the concepts of Information theory and different line coding techniques
CO 2	Analyze the generation and detection of different pulse modulation techniques
CO 3	Understand the generation and detection of different digital bandpass modulation techniques
CO 4	Describe the concepts of spread spectrum modulation and the types of spreading used
CO 5	Explain the basic concepts of Mobile Computing techniques

CORE COURSE SEM IV	
Course code: **EL4CRT21**	
Course: **INSTRUMENTATION ELECTRONICS**	
On the completion of the course, the students will be able to:	
CO 1	Recognize the evolution and history of units and standards in Measurements.
CO 2	Identify the various parameters that are measurable in electronic instrumentation.
CO 3	Describe the working principle, selection criteria and applications of various transducers used in measurement systems.
CO 4	Develop an understanding the concept ADC, DAC blocks required for data conversion.
CO 5	Understand construction, working principle and types of oscilloscopes.
CO 6	Comprehend different types of signal generators and analyzers, control system their construction and operation.
CO 7	Familiarization with different signal acquisition modalities in ECG, EEG etc.

CORE COURSE SEM IV	
Course code: **EM4CRT04**	
Course: **FUNDAMENTALS OF COMPUTERS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic functional units of a computer and their operational concepts .Understand the register transfer concept, memory operations, arithmetic operation and executing an instruction.
CO 2	Understand the basic concept of Interrupts and handling of interrupt using multiple ports
CO 3	Understands the basic components and working of a Hard disk drive and learn the different data encoding method used in a Hard disk drive
CO 4	Understand the memory organization concepts and identify the different methods to improve memory performance.

COMPLEMENTARY COURSE SEM IV	
Course code: **MM4CMT01**	
Course: **FOURIER SERIES, LAPLACE TRANSFORM AND COMPLEX ANALYSIS**	
On the completion of the course, the students will be able to:	
CO 1	Understand about Fourier series and Legendre polynomial
CO 2	Study Laplace Transform and inverse Laplace Transform
CO 3	Understand about complex numbers and functions
CO 4	Differentiate between Cauchys integral theorem and Cauchys formula

CORE COURSE SEM V	
Course code: **EL5CRT14**	
Course: **MICROCONTROLLERS AND APPLICATIONS**	
On the completion of the course, the students will be able to:	
CO 1	Have a better understanding of the Architecture, Pin diagram and functions of 8051 microcontroller.
CO 2	Learn different Addressing modes and Instructions of 8051.
CO 3	Learn how to write programs using Assembly language and C in 8051
CO 4	Learn How to use Timer/ Counter, Communicating using Serial port and the use of different Interrupts.
CO 5	Learn how to interface devices with 8051

CORE COURSE SEM V	
Course code: **EL5CRT15**	
Course: **ENVIRONMENTAL AWARENESS, E-WASTE MANAGEMENT AND HUMAN RIGHTS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the multidisciplinary nature of environmental studies and the different types of natural resources and ecosystems
CO 2	Analyze about the biodiversity, methods to conserve biodiversity and the different types of environmental pollution
CO 3	Explain about E-waste and the different hazardous substances present in E-waste
CO 4	Understand the different technologies to recycle the E-waste
CO 5	Describe about human rights, the different initiatives taken by UN for securing human rights and human rights in the Indian constitution

CORE COURSE SEM V	
Course code: **EM5CRT05**	
Course: **PC MAINTENANCE AND TROUBLESHOOTING**	
On the completion of the course, the students will be able to:	
CO 1	To acquire the knowledge about the various input and output components and their working principles
CO 2	Understand and explain the basic concepts associated with the motherboard and its components
CO 3	Learn about BIOS and related operations and features. Also understand about the memory associated with a computer.
CO 4	To study about various storage devices and their operations
CO 5	Understanding the fundamentals of hardware problems and troubleshooting methods.

OPEN COURSE SEM V	
Course code: **EM5OPT02**	
Course: **INFORMATION TECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Understanding the basics of computer hardware, software and computer networks.

CO 2	Get an idea about various Internet access methods and rules for using cyber world.
CO 3	Understanding the cyber ethics, and threats.
CO 4	Study different applications of IT.

CORE COURSE SEM VI	
Course code: **EL6CRT18**	
Course: **COMPUTER NETWORKS**	
On the completion of the course, the students will be able to:	
CO 1	Understand the basic concepts of data communication and layered architecture of OSI and TCP/IP model
CO 2	Analyze the characteristics and switching techniques used in physical layer and media
CO 3	Understand the different data link control techniques used
CO 4	Explain logical addressing, and protocols of the network layer, describe different routing methods.
CO 5	Brief introduction of transport layer and application layer functions and their protocols, introduction to secure communication of messages.

CORE COURSE SEM VI	
Course code: **EM6CRT06**	
Course: **INTEL 8086 MICROPROCESSOR AND PROGRAMMING**	
On the completion of the course, the students will be able to:	
CO 1	Description about the architecture ad organization of microprocessor 8086.List and describe memory and modes of operation, addressing modes and interrupts.
CO 2	Understand Debug commands and 8086 programming concepts
CO 3	Understand the need and handling of interrupts in 8086
CO 4	Description about the architecture ad organization of advanced microprocessors

COMPLEMENTARY COURSE SEM VI	
Course code: **EM6CRT07**	
Course: **ENTREPRENEURSHIP DEVELOPMENT AND MARKETING**	
On the completion of the course, the students will be able to:	
CO 1	Understand accounts and different terms used in accounting.
CO 2	Understanding different acts like, Factories Act and its provisions, Sale of goods Act, Partnership Act, Income Tax Act, Sales Tax Act, Excise Rules-Goods, Consumer Protection Act, Right to Information Act
CO 3	Understand the different Need, Scope and Characteristics of Entrepreneurship, STED, Marketing Survey Techniques, Project Formulation, Report, Development, CPM, PERT, SSI, creativity, innovation, SWOT analysis. Packaging, Advertising, Costing and Pricing, Business Ethics, Quality Control, Marketing Research.
CO 4	Understand the underlying principles of Plant Layout, Licensing and Business Environment

CHOICE BASED COURSE SEM VI	
Course code: **EM6CBT01**	
Course: **IC TECHNOLOGY**	
On the completion of the course, the students will be able to:	
CO 1	Differentiate between IC families and their manufacturing processes.
CO 2	Understand the basic steps of fabrication. Learn the basics theory of Crystal Growth and Wafer Preparation.
CO 3	Study the Epitaxy, Diffusion, Oxidation, Lithography and Etching.
CO 4	Analyze and model the MOS transistor circuit, down to physical level considering parasitic components.