MIDNAPORE COLLEGE

(AUTONOMOUS)

Reaccredited by NAAC (3rd Cycle) - 2017 :: Grade : A+ :: CGPA-3.60

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Program Outcomes (POs),
Program Specific Outcome (PSOs)
and
Course Outcomes (COs)

BA PROGRAMME

PO: The preamble, objectives, the intended learning along with the rationale to the syllabus of each department paper wise help students to study accordingly. Each B.A Student gains expertise in his/ her respective field and that apart, learns to cope with the social surroundings, commits to social service and is nourished in meaningful way to be the responsible and dedicated citizen. He/ She also learns to judge things with impartiality and develops the creative faculty.

BA ENGLISH

PSO: The Graduates belonging to this Programme in an institution of academic heritage equip themselves with knowledge of English, honoured to be the world language and a window to the world. There is ample scope for them to acquaint themselves with the diverse influential texts of British, American, Classical and Indian writers and enrich their creative and critical faculties. Education is not always an end in itself but a means to an end. Thus, the graduates become accomplished academicians, civil servants etc. and become proficient both in person and profession.

Semester/ Paper	Title	Course Outcome
SEM-I, ENGC-I/101	**British Poetry and Drama - 14th to 17th Century**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on **Anglo-Saxon, Renaissance, Reformation, Elizabethan and Jacobean Age** etc.
SEM-I, ENGC-II/102	**British Poetry and Drama - 17th to 18th Century**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Comedy of Humours, Metaphysical Poetry, Age of Dryden, Cavalier Poetry, Restoration, Neoclassicism, Heroic Poetry, Restoration Comedy, Age of Pope, the rise of Prose and Satire etc.
SEM-II, ENGC-III/201	**British Literature –Long 18th Century**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Glorious Revolution, Augustans, Enlightenment, Rise of the Novel, Periodical Essays etc.
SEM-II, ENGC-IV/202	**British Romantic Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on French Revolution, the American War of Independence, Reason and Imagination, Conception of Nature, Literature and Revolution, the Gothic Novel
SEM-III, ENGC-V/301	**The British Literature – 19th Century**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Utilitarianism, Industrialization and Progress; Victorian Faith and Doubt, 19th Century Novel; Marriage and Sexuality; the Dramatic Monologue etc.

SEM-III, ENGC-VI/302	**The British Literature – Early 20th Century**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Modernism, Symbolist and Imagist Movements; Women's Movement in early 20th Century, The Avant Garde, Psychoanalysis, Stream of Consciousness, World War-I etc.
SEM-III, ENGC-VII/303	**Indian Classical Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on the Indian Epic Tradition, Classical Indian Drama – Theory and Practice, Alankar, Rasa, Dhawni and Natyashastra
SEM-III, SEC I /304	**English Language Teaching**	This course aims at enhancing the English Language teaching proficiency of Undergraduate students in Humanities and preparing them for the academic, social and professional expectations during and after the course. The course will help them find wider job opportunities.
SEM-IV, ENGC-VIII/401	**European Classical Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on the Epic, Comedy and Tragedy in Classical Drama, Catharsis and Mimesis, Satire, Literary Cultures in Augustan Rome
SEM-IV, ENGC- IX/402	**Indian Writing in English**	Indian English Literature: Growth and Development, Its readership, Themes and Contexts of Indian English Novel, Indian English Poetry and Drama, Modernism in Indian English Literature.
SEM-IV, ENGC- X/403	**American Literature**	Growth of American Literature, Transcendentalism, American Dream, Social Realism and the American Novel, Black American Literature, Folklore and the American Novel, Questions of Form in American Poetry etc.
SEM-IV, **SEC II** /404	**Creative Writing Business Communication**	Concepts and Practices of Communication and their applications in the Business World today SWOT Analyses: The Process and Basic Components
SEM-V, ENGC- XI /501	**Popular Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on the Canonical and the Popular, Caste and Gender, Identity Conflict and Education in Children's Literature, the Graphic Novel, Science Fiction, Crime Fiction etc.
SEM-V, ENGC-XII/502	**Women's Writing**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Social Reforms & Women's Rights, Literature and the Woman Question, Feminist Movements and the different waves of feminism, The Confessional Mode in Women's Writing, Black Women's

		Writing, Third World Feminism, Eco-Feminism etc.
SEM-V,DSC: Paper – I/503	**Literature of the Indian Diaspora**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Globalization, Diaspora – Meaning, Context and Various facets of Diaspora, Home away from Home, Nostalgia, Literature and Identity, Alienation, New Medium, Postcolonial Literature and Indian Diaspora.
SEM-V,DSC: Paper – II/504	**British Literature –Post World War**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Modernism and Postmodernism, Britishness after 1960s, Literature and Counter Cultures, Existentialism, Angry Young Man's generation etc.
SEM-VI, ENGC- XIII /601	**Modern European Drama**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Politics, Social Change and the stage, Text and Performance, European Drama: Realism and Beyond, Tragedy and Heroism in Modern European Drama, The Theatre of the Absurd
SEM-VI, ENGC- XIV /602	**Postcolonial Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Decolonization, Globalization, Literature and Identity Politics, Race and Gender, Postcolonial Literature; Colonialism and Post-colonialism.
SEM-VI,DSC: Paper – III/603	**Literature and Cinema**	The students will have sound knowledge on the language of Film, its Signs and syntax and be acquainted with the World Movies. This apart, they will know about Media and Multimedia and adaptation of plays like Shakespeare's Romeo and Juliet.
SEM-VI,DSC: Paper – IV/604	**Partition Literature**	The students will be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on Colonialism, Nationalism, and the Partition; Communalism and Violence during partition; Homelessness and Exile; Women in the Partition.

BA GENERIC PROGRAMME

PO: The students of other departments are opting for general electric courses along with their regular core papers. They are made ready to equip themselves for competitive examinations of the State and the Nation. The subject helps them to enrich their vocabulary and skill in language speaking and writing through regular classes and teaching texts and introducing them with the basic rules of grammatical items and comprehensions.

BA GENERIC

PSO: the students acquaint themselves with the important Indian and British texts both in prose and verse and also enrich themselves in their depth in Grammer and knowledge about their social surroundings which help them to make them prepared for several competitions for job management.

Semester/ Paper	Title	Course Outcome
SEM-I, GE- I	**Academic Writing and Composition**	Knowledge about British and Indian texts in prose and verse and improvement of skill in comprehension.
SEM-II, GE- II	**Literature, Language and Linguistics**	Knowledge about language and communication and acquaintance with phonetics (Overview of Articulation, Consonants of English, Vowel, Sounds of English)
SEM-III, GE- I	**Academic Writing and Composition**	Knowledge about British and Indian texts in prose and verse and improvement of skill in comprehension.
SEM-IV, GE- II	**Literature, Language and Linguistics**	Knowledge about language and communication and acquaintance with phonetics (Overview of Articulation, Consonants of English, Vowel, Sounds of English)

BA GENERAL

PSO: the students acquaint themselves with the important Indian and British texts both in prose and verse and also enrich themselves in their depth in Grammar and knowledge about their social surroundings which help them to make them prepared for several competitions for job management.

Semester/ Paper	Title	Course Outcome
English (A1)	**Unseen (application oriented topics)**	Students grow knowledge in application oriented topics like Exchange of Greeting, In The Post Office, Buying Dresses, At The Bank, At The Travel Agency, At an International Airport etc.
English (A2)	**Prose, Poetry, & Story and Comprehension**	Command on English language through reading texts and gaining skill of writing, letters, preparing CV and making reports.
Ability Enhancement Compulsory Course (AECC)	**MIL Communication English for Arts & Science**	Enhances the English Language Proficiency of Undergraduate students in Humanities and Science, preparing them for the academic, social and professional expectations during and after the course. Also generates potency to communicate in social surroundings.

B.A. BENGALI

PSO : Developing the character and accountability of the learners through acquiring wisdom regarding the reflection of the human mind and life and their conflicts with society and knowledge of various movements and visions which shape our life.

Class/ Paper/ Semester	Title	Course Outcome
Bengali Hons Core Paper I SemI	History of Bengali Literature : Ancient and Middle Era	Acquiring knowledge about Society and Literature ,Comprehending the evaluation of literary forms and styles Arousing aesthetic sense and inquisition in every walk of life
Bengali Hons Core Paper II SemI	Linguistic	Being familiar with various groups of people and their languages; thus having an overall clarity of understanding the human civilisation .
Bengali Hons Core Paper III SemII	Religion and Literature	Learning the influence of religion and culture on Literature
Bengali Hons Core Paper IV SemII	Structure of Bengali Language	Deeply learning the Bengali language in the perspective of other languages
Bengali Hons Core Paper V Sem III	History and Forms of Bengali Poetry	Understanding the manifestation of the deepest emotions of human mind.
Bengali Hons Core Paper VI Sem III	History of Bengali Prose and Periodicals	Acquiring general knowledge about philosophy, science, literature and religious movement.
Bengali Hons Core Paper VII Sem III	History of Bengali Theatre, Drama and Fiction	Conception of human mind character and conflict.
Bengali Hons SEC I Sem III	Printing and Publishing	Practical knowledge of printing and publishing
Bengali Hons Core Paper VIII Sem IV	Rabindranath and Post Rabindranath Bengali Poetry	Harmony and conflict between idyllic and romantic mindset and the grim struggle after the world wars.
Bengali Hons Core Paper IX Sem IV	**Bengali Novel**	Knowing our polyphonic symphony and variegated expression .
Bengali Hons Core Paper X Sem IV	**Bengali Short Story**	Acquiring familiarity with the beliefs and wonders of our fast life.
Bengali Hons SEC II Sem IV	**Translation**	Learning and understanding different languages and bringing out the possibilities of a promising translator.

Bengali Hons Core Paper XI Sem V	**Bengali Drama**	Learning the polychromatic conflicts and realisation .
Bengali Hons Core Paper XII Sem V	**Bengali Prose**	Perception of sociability and rationality and reality.
Bengali Hons DSE I Sem V	**Theory of Folk Culture**	Arousing sincere reverence towards long-deprived yet now world famous folk culture .
Bengali Hons DSE II Sem V	**Folk Literature**	Being knowledgeable and respectful towards the folk literature
Bengali Hons Core Paper XIII Sem VI	**Theory and Movement of Literature**	Realisation of world wide forms and movements of literature .
Bengali Hons Core Paper XIV Sem VI	**History of Comparative Literature**	Being adept in comparative understanding of ancient and present Indian literature as well as world literature.
Bengali Hons DSE III Sem VI	**Regional Literature**	Conception and reverence towards various aspects of regional literature.
Bengali Hons DSE IV Sem VI	**Field Wark and Interview**	Perception and recording of our own land and own people.

BA POLITICAL SCIENCE

PSO: Undergraduate Course in Political Science prepares the students to become informed, active and responsible citizens. The course emphasizes the comprehension of political thinking, application of ideological and analytical skills in a culturally diverse perspective. The learning objectives aims to increase the understanding of basic facts, concepts and principles of political theory, public administration, constitutional structure, international relations, political processes in India, public policy etc. additionally to increase knowledge of diverse political systems and global processes around the world in a changing domestic and global context within which they operate. The course also aims at increasing knowledge of the history of classical and modern political thought (Western and Indian) of the fundamental values and ethical issues contested in politics over time. It also aims to empower the learners by imparting ability enhancement courses empowering themselves to face the challenges on their own as well as become able to serve the society at large.

Semester	Title	Course Outcome
SEM-I, PLSC-1/101	Understanding Political Theory	The students will be acquainted with the knowledge of politics and political theory. The course provides an understanding of various approaches to politics and operational aspects of it like democracy, representation, participation etc.
SEM-I, PLSC-2/102	Constitutional Government and Democracy in India	Students will be able to understand the philosophy of the Indian Constitution. Students also will be able to comprehend the function and role of the President, Prime Minister, Governor and the Courts in the Constitutional design of India.
SEM-I, PLSGE-1/101	Nationalism in India	Through this course students will gain an understanding in the struggle of the people against colonialism by looking at this struggle from different theoretical perspectives that highlights its different dimensions : communal, class struggle, caste and gender questions.
SEM-II, PLSC-3/201	Political Theory – Concepts & Debates	The course aims to introduce key concepts and its related debates to sharpen their understanding of political discourses and the ability to make the scientific enquiry into the political phenomenon and political questions.
SEM-II, PLSC-4/202	Political Process in India	This course will familiarize students to know about the actual working of the Indian state and paying attention to the contradictory dynamics of modern state power. As politics operates in an ecology constituted by the constitutional, socio-economic, linguistic and ethnic subsystem, the course is designed to understand their roles in the politics of the country.
SEM-II, PLSGE-2/201	United Nations and Global Conflicts	This course introduces students to the key organization of United Nations; its principles, objectives, and also its specialized agencies. The course discusses some key global conflicts of Korean war, Vietnam war, Afghanistan war and Balkans: Serbia and Bosnia. An attempt has been made to make an evaluation of U.N.O in its endeavor to ensure peace and security with special reference to the reformation needed to fulfill the objective.
SEM-III, PLSC-5/301	Introduction to Comparative Government and Politics	This foundational course on Comparative Politics introduces concepts and historical context of its evolution and development. Apart from theoretical perspective the functional aspects of the developed and developing countries were undertaken for a comparative study in the backdrop of theoretical framework.
SEM-III, PLSC-6/302	Perspectives on Public Administration	This course has been structured with various classical and contemporary administrative theories which will provide the learners a comprehensive understanding of public administration and contemporary administrative developments.
SEM-III, PLSC-7/303	Perspectives on International Relations and World Politics	This course endeavors at creating awareness and knowledge about the primary tools of understanding in international relations. It introduces students to the most important theoretical approaches and provides comprehensive overview of the major political events of international relations.
SEM-III, PLSSEC-1	Public Opinion	It is a basic course to take up an understanding of a quantitative survey

	and Survey Research	research method. It equips them to conceptualize and measure public opinion by developing basic skills pertaining to the collection, analysis and utilization of quantitative data.
SEM-IV, PLSC-8/401	Political Processes and Institutions in Comparative Perspective	This course will enable the students to understand the functioning of governments and political systems in comparative perspective. It gives an in-depth knowledge regarding the concepts and approaches which can apply to understand different political regimes in terms of origin of governmental structures and their functioning.
SEM-IV, PLSC-9/402	Public Policy and Administration in India	The student will be acquainted to the interface between public policy and administration in India. It emphasizes issues of democracy, social welfare and financial accountability from a non-western perspective.
SEM-IV, PLSC-10/403	Global Politics	This course introduces the conceptions and debates on the meaning and nature of globalization. The understanding of the globalization process with its multiple dimensions were discussed along with the changing role of global economic anchors. It also offers insights into the key global issues of diverse shades.
SEM-IV, PLSSEC-2	Legislative Practices and Procedures	This course will acquaint learners to the legislative process in India. The learners acquire knowledge of the powers and functions of an elected representative ,law making procedure, Standing Committee functions and diffusion of information through media.
SEM-V, PLSC-11/501	Classical Political Philosophy	The students get acquainted with the ancient past especially Greek philosophical along with the modern western political thought. It also helps the students to the understand the way of study the text and its interpretation.
SEM-V, PLSC-12/502	Indian Political Thought-I	This course has been designed to familiarize the learners with key ideas of some of the ancient political thinkers whose writings and ideas have impacted the Indian statecraft significantly.
SEM-V, PLSDSE-I	Development Process and Social Movements in Contemporary India	This course delves deep into the contexts and forms of political contestation over development paradigms. The repercussions on the socio economic fronts, leading to the emergence of New Social Movements in a contested democratic space, giving insight to a challenging socio- economic scenario as well as a spirit of attaining consensual outcome.
SEM-V, PLSDSE-II	Understanding Global Politics	This course aims at providing an insight to know the world around them as an interlinked whole and at the same time the existence of forces creating the world apart. It also explores as to how and why the world needs to be interdependent, despite having difference.
SEM-VI, PLSC-13/601	Modern Political Philosophy	Students learn the philosophy and politics as closely inter connected and enhance the greater perspectives of knowledge about the modern political philosophy.
SEM-VI, PLSC-14/602	Indian Political Thought-II	This course is a category of the ideology, ethics and laws. It provides the students an insight to the political philosophy involved on the one hand and on the relationships between individual, society and state on the other.
SEM-VI, PLSDSE-III	Women, Power and Politics	This course tries to develop a perspective of taking the question of women beyond empowerment towards a radical social agent. It deals with issues of gender inequality and extends to cover new forms of precarious work and labour under the new economy.
SEM-VI, PLSDSE-IV	Public Policy in India	This course provides an integrative link in the multidimensional aspect to the understanding of political science, economic theory and the practical world of development and social change. The contemporary approach of political economy has been used to understand politics as it is shaped by economic forces.

BA (General) Political Science

Semester	Title	Course Outcome
SEM-I, PLSDSC-II (A)	Introduction to Political Theory	Students will become conscious about concept of political theory and its relevance. The course also introduces the students to the key concept such as Democracy, Liberty, Equality, Justice, Rights, Gender, Citizenship, Civil Society and State along with the relevant debates associated with it.
SEM-II, PLSDSC-II(B)	Indian Government and Politics	This course gives an over view about Indian government and politics. It focusses on the various approaches to the study of Indian politics along with the institutional structure and functions as enshrined in the Constitution. It also delves into the functional aspect and the various social processes and movement developed in response to the actual functioning of the state machinery.
SEM-III, PLSDSC-II(C)	Comparative Government and Politics	The students will be able to understand and apply different approaches to explain the functioning of different type of governing regime.
SEM-IV, PLSDSC-II(D)	Introduction to International Relations	This course critically analyzes the key theories of International Relations such as Realism, Neo-Realism, Neo-liberalism, World system theory Dependency theory and feminist theory. It also focuses on Cold War and its different phases. It describes role of Non alignment movement in the cold war scenario along with the role of India in particular.
SEM-V, PLSDSE-I	Themes in Comparative Political Theory	The student will be acquainted with the need to recognize how conceptual resources in political theory draw from plural traditions. It exploring the Indian and western traditions of political theory through some selected themes.
SEM-V, PLSGE-I	Reading Gandhi	The purpose of this course is to present an alternative approach regarding the concept of politics, state structure and development. It not only gives a critique to the western approach but also gives critical note to the social process prevailing in Indian society. Introduction of an alternative view of the world has been highlighted in this course.
SEM-V, PLSSEC-I	Public Opinion and Survey Research	It is a basic course to take up an understanding of a quantitative survey research method. It equips them to conceptualize and measure public opinion by developing basic skills pertaining to the collection, analysis and utilization of quantitative data.
SEM-VI, PLSDSE-II	Understanding Globalization	This course will lead to develop a basic understanding of the origin and forms of the phenomena of globalization. Learners will become familiar with the key global actors which has shaped the world and also get an acquaintance to the major global issue faced by the world community.
SEM-VI, PLSGE-II	Human Rights, Gender and Environment	The purpose of this course is to develop the understanding of the issues concerning the basic human rights in general with an emphasis on the rights of the marginalized groups in particular and make an assessment of institutional and policy measures taken in response to the demands of social movements.
SEM-VI, PLSSEC-II	Democratic Awareness with Legal Literacy	This course will acquaint learners to the legislative process in India. The learners acquire knowledge of the powers and functions of an elected representative ,law making procedure, Standing Committee functions and diffusion of information through media.ly

BA EDUCATION

PSO: The students acquire skills in lucid presentation and ideas in Education, involve in various social works which proves their social aim in education and understand the recent trends of the subject. Students also build a sound concept in different aspects of Education.

Class/ Paper/ Semester	Title	Course Outcome
EDUCATION Hons Core Paper I SemI	Introduction to Education	Basic concept of education, introduction to the role of educational philosophy as the mainstay of education and leading the way of ideals through the philosophy of great educators.
EDUCATION Hons Core Paper II SemI	Psychological Foundation of Education	Acquiring knowledge about the concept of psychology, its relation with education and the nature, scope of the human mind and its behavioural manifestation.
EDUCATION Hons Core Paper III Sem II	Philosophical Foundation of Education	The philosophical basis of the curriculum determines as the driving force of education. It is the study or creation of theories about basic things such as the nature of existence, knowledge, thought, or about how people should live and above all improving the standards of society and make pupil more rational.
EDUCATION Hons Core Paper IV Sem II	Sociological Foundation of Education	Helping to understand the cultural, economic, social and political trends related to formal and informal agencies of education and creating a curriculum that adequately socialized each individual student. Sociological perspective of education is helping pupil to learn about different aspects of society and increase their sociological skills through actual perception of education.
EDUCATION Hons Core Paper V Sem III	Education in Ancient & Medieval India	Creating perception about the sources and bases of education, maintain trends of education by implementing the historical concept of education and forming deep understanding about the ancient and medieval educational trends of India and above all, to be aware of the historical aspect of education.
EDUCATION Hons Core Paper VI Sem III	Pedagogy	Learning different bases of Pedagogy by acquiring a deeper knowledge of teaching techniques and bringing a deeper grasp about the psychological aspect of child and its fundamental sources.
EDUCATION Hons Core Paper VII Sem III	Curriculum Studies	In addition to the basic concepts of the curriculum, learn about the different curriculum and get acquainted with the recognized design of the curriculum, get an idea of the curriculum development and evaluation.
EDUCATION Hons SEC-I Sem III	Power Point Presentation	Students apply their computer skill in their classroom presentation and also apply their writing skill for their further study.

	Computer Application in Education	Understanding the basic idea and basic use of computer in education,
EDUCATION Hons Core Paper VIII Sem IV	Education in British India	Knowing different educational initiation in British ruled India and Gaining perception about the impact of British administered education system on current educational perspectives.
EDUCATION Hons Core Paper IX Sem IV	Educational Management	Students learn the managerial techniques as well as different parts and functions of administrative body in the field of educational institutions and relating the work concept in terms of organization or supervision from grassroot to administrative level.
EDUCATION Hons Core Paper X Sem IV	Evaluation in Education	Student understands the evaluation and measurement techniques in the field of education and they also learn about the validity, reliability, objectivity as a part of evaluation. Gain deeper knowledge about the process of academic evaluation.
EDUCATION Hons SEC II Sem IV	Field Visit	Students have the knowledge of field visit and also developed their leadership quality
	Project work	Students have the ability to complete the project work and developed writing skill.
EDUCATION Hons Core Paper XI Sem V	Education in Post-Independence India	Students aware about the post independent era of education, gain knowledge about the different commission, committees and their contribution in the field of education.
EDUCATION Hons Core Paper XII Sem V	Statistics in Education	Students have the basic understanding of statistical impact in education and have the knowledge of different types of statistical techniques and data interpretation in the field of education.
EDUCATION Hons DSE-I Sem V	Teacher Education	Understand the development and the trends of teacher education in Indian education system
	Value Education	Students are perceiving some ethical values of teaching profession as well as of the way of life.
EDUCATION Hons DSE-II Sem V	Inclusive Education	Students learn the value of inclusive education in Indian society and have the inclusive mentality towards the educational environment.
	Great Educators	They get ideal way of life through the philosophical aspect of Great educators.
EDUCATION Hons Core Paper XIII Sem VI	Research in Education	Students build their deep understanding about research methodology in the area of education.
EDUCATION Hons	Guidance &	The course provides understanding about basic techniques

Core Paper XIV Sem VI	Counselling in Education	and types of educational guidance and counselling. Student identify the diverse learners and understand their need of Guidance & Counselling.
EDUCATION Hons DSE-III Sem VI	Educational Technology	Acquiring knowledge about the concept of technology, its relation with education and develop basic skills in the production of different types of instructional material.
	Open & Distance Learning	Knowing the concept of open and distance education and apply new technologies in the field of Open and DistanceLearning.
EDUCATION Hons DSE-IV Sem VI	Yoga Education	Students have the basic knowledge of Yoga education and Yoga skill.
	Dissertation	Understanding about the techniques and method of dissertation in the field of education.

B.A PHILOSOPHY

PSO : The student understands the basic concepts in different branches of Philosophy and can apply them in real life . He/she is also updated with the recent trends in the subject. The student also builds a sound base for Post Graduate Course in Philosophy and related fields .

Sem / Paper	Title	Course Outcome
Sem – I Paper – C- I	Indian Philosophy- I	To introduce the students to Indian Philosophical Schools and key debates within Indian Philosophical Schools.
Paper – C – 2	History of Western Philosophy	To be Introduced to the history of Western Philosophy . Learning about the theories of knowledge , some metaphysical issuesetc.
Sem-II/ Paper- C– 3 Paper – C- 4	Indian Philosophy – II History of Western Philosophy - II	The student builds on the knowledge consolidated in the Previous semesters.
Sem –III/ Paper – C – 5	Social & Political Philosophy	To introduce the students to the basic concepts of Society, Community, Association, Institution, Family,Caste etc. To provide students with in-depth understanding of social change from the standpoints of Vidyasagar, Marx and Gandhiji. To inculcate responsibilities and promote equality.
Paper –C-6	Western Logic –I	Learning about the structures , rules , testing and applications of different arguments in western perspectives. To develop the skill of reasoning among the students
Paper – C - 7	Indian Logic –I	To impart knowledge and understanding of the fundamental concepts of cognition in Nabya Nyaya (Indian Logic). To familiarize students with the analytical approach of knowledge in Nabya-Nyaya. To develop the skill of analysing the subject-matter.
Paper - SEC – I	Psychology	To impart knowledge of the basic concepts and modern trends in Psychology . To foster interest in the subject of Psychology and to create a foundation for further studies. To make the students aware of the applications of psychological concepts in various fields so that they understand the relevance of Psychology in different areas of life.
Sem-IV / Paper – C- 8 Paper – C- 9	Western Logic – II Indian Logic - II	The student builds on the knowledge consolidated in the pre-vious semesters.

Paper – C 10	Ethics – I	Learning about theories, moral ideals and some elementary concepts of ethics . To grow the notion of what is right or wrong, or good and bad etc. in the student's mind through the different moral theories.
Paper - SEC – II	Ethics in Practice	To bring awareness and sensibilities among the students towards some contemporary issues . To grow in them the sense equality, brotherhood and friendship through the different Philosophical theories so that can live in the world peacefully .
SEM – V Paper – C 11	Philosophical Analysis – I	The course provides a deep understanding about the theories of knowledge, meaning of the words, sentence, principles of Logic. The students critical thinking and reasoning skill and ability of expression properly which help the students in future research work.
Paper – C 12	Philosophy of Religion	The student learns about the real meaning of Religion, Religious consciousness , and different theories religious language .Its aim to make the students morally good ,ethically enriched ,dutiful, sympathetic and liberal. To grow in them sense of equality , brotherhood and friendship through the basic tenets of three major universal Religions which help them to live in the society peacefully.
Paper - DSE – I	Kathopanisad	To familiarize students with the basic tenets of the Indian Classic (Kathopanisad) and its relevance in human life . To analyse about the real nature of man in the light of Upanisad and to create awareness about the necessity of restrained life among the students . To make the students ethically enriched and motivate them to do work for the well-being of the society .
Paper - DSE– II	Feminism	To understand new and emerging issues in the Indian feminist landscape . To understand newer methods of protest and resistance. To trace the evolution of gender as a category of social analysis. To trace the emergence of women's movement and the history of their struggles. To bring awareness and sensitivity among the students regarding women's movement and struggles.
SEM – VI / Paper – C – 13	Philosophical Analysis – II	The student builds on the knowledge consolidated in the previous semester.
Paper- C-14	Philosophical Classics	The course provides a deep understanding about the problems of Philosophy eg. the limits of Philosophical knowledge, the value of philosophy etc. To foster interest in the subject of philosophy and to

		create the foundation for further studies. To improve the students critical thinking and reasoning skills.
Paper - DSE-III	Mahabharata (Shantiparva)	To introduce the students to one of great Indian epic(Mahabharata) to familiarize students with Indian epic, the holy religion book, Mahabharata. The student learns about the moral ideal of human life to analyse the real meaning of drama. To create awareness about his /her duties in real life. To make the students ethically enriched, dutiful sympathetic and liberal which help them to live peacefully in family or Society. To motivate the students to do good for th other people and society and be a good citizen in future.
Paper - DSE-IV	Republic	To impart knowledge and understanding of the fundamental concepts of state with emphasis on educational policy, women's status ,duties of citzen etc from the standpoint of Plato. The students will understand the relevance of Plato's thought in current times.

BA GENERIC PROGRAMME

PSO : The student will be acquinted the basic concepts in different branches of Philosophy and can apply them in real life . He/she is also updated with the recent trends in the subject. The student also builds a sound base for higher studies.

Sem/Paper	Title	Course Outcome
SEM I & III GE- I & GE- III	Indian Philosophy)	To introduce students to indian Philosophical schools i.e Vedic & Non- Vedic system of Indian Philosophy. Learning about the theories of knowledge and some metaphysical issues. To increase the knowledge of the students in different branches of Philosophy and to teach them how to enrich their life in the light of Philosophical Knowledge.
SEM- II & IV GE- II &GE- IV	Western Logic	To important knowledge of the basic concepts of logic i.e. Proposition, argument, argument forms etc. Learning about the content of Symbolic logic . Learning about the method for testing the

		arguments as valid or invalid. To develop the skill of reasoning, to understand the relation between the two things,to develop the skill of interpretation among the students.

BA GENERAL COURSE PROGRAMME

PSO : The student will be acquinted the basic concepts in different branches of Philosophy and can apply them in real life . He/she is also updated with the recent trends in the subject. The student also builds a sound base for higher studies.

Sem/Paper	Title	Course Outcome
SEM-I, DSC-I	Indian Philosophy	To introduce the students to Vedic and Non-Vedic schools of Indian Philosophy. The students will be acquinted with the theories of knowledge, Theories of Reality etc.
SEM-II, DSC- II	Western Philosophy	The students will learn about the theories of the origin of knowledge, and some metaphysical issues.
SEM-III, DSC III	Western Logic	To important knowledge and understanding of the fundamental concepts of symbolic logic. Learning about the validity and invalidity o0f an argument in western perspective. To develop the skill of reasoning and to understand the relation in between objects. It will help them to solve the problems in real life.
SEM-IV, DSC- IV	Ethics	To import knowledge about the theories of moral ideal, moral actions etc. To grow the sense of morality in the mind of the students. To make the students ethically enriched and motivate to work for the welfare of the society.
SEM –V, SEC-3	Psychology	Learning about the nature, content, methods of Psychology. To create interest in the subject of Psychology and to create a foundation for further studies. To make them aware about the relevance of Psychology in different areas of life.
SEM-V, GE- I	Indian Philosophy	To familiarise students with the fundamental concepts of Indian Philosophy. To enable the students to understand the real nature of the world, to know the real nature of self from the news of great Indian Philosophers. The students will learn how to enrich their life and be able to line in the world peacefully.
SEM –V,DSE-I	Feminism	Learning about women's movement and the history of their struggles.

		To trace the evolution of gender as a category of social analysis. To bring awareness and sensitivity among the students regarding women's movement and struggle till now.
SEM-VI, SEC-4	Applied Ethics	To bring awareness and sensitivity among the students towards some contemporary issues. To grow the sense of equality, brotherhood and friendship through the different philosophical theories in the mind of students. To aware the students about the necessity of preservation of the environment.
SEM-VI, GE- II	Social philosophy	To familiarize students with the fundamentals concepts of society, community, state, nation, social groups. To analyse the role and impotance of the different social groups.
SEM-VI, DSE- II	Political Philosophy	To introduce the students of Political Philosophy. To important knowledge of the basic concepts of Democracy, Socialism. To familiarise students with the news of Rabindranath, Max and M.N Roy on Humanism.

BA SANSKRIT

PSO: Students of this scheduled programme equipped themselves with the knowledge of Sanskrit . They get refreshed through the studies of ancient culture, language as well as the post modern Sanskrit studies as a hole. Their learning of the east and west particularly on the subject open the wider space to become a rationable student with having moral character.

Semester/ Paper	Title	Course Outcome
SEM-I, SANC-I/101	**Classical Sanskrit Literature (Poetry)**	This course aims to get students acquainted with Classical Sanskrit Poetry. It intends to give an understanding of literature, through which students will be able to appreciate the development of Sanskrit Literature. The course also seeks to help students to negotiate texts independently.
SEM-I, SANC-II/102	**Priliminary Sanskrit Grammar**	This course have been introduced to the betterment of students to acquaint themselves tothe vocal Sanskrit as well as comprehensive framing of Sanskrit writing through the basic and fundamental knowledge of grammar.As such studies of grammar is very much essential in Sanskrit teaching and leanings.
SEM-II, SANC-III/201	**Classsical Sanskrit Literature (Prose)**	This course aims to acquaint students with Classical Sanskrit Prose literature. Origin and development of prose, Important prose romances and fables Sanskrit are also included here for students to get acquainted with the beginnings of Sanskrit Prose literature. The course also seeks to help students negotiate texts independently.
SEM-II, SANC-IV/202	**Critical Survey of Sanskrit Literature**	This course aims to get students acquainted with the journey of Sanskrit literature from Vedic literature to Purāṇa. It also intends to give an outline of different shastric traditions, through which students will be able to know the different genres of Sanskrit Literature and Śāstras.
SEM-III, SANC-V/301	**Classical Sanskrit literature (Drama)**	This course aims to acquaint students with two most famous dramas of Sanskrit literature which represent two stages in the growth of Sanskrit drama.
SEM-III, SANC-VI/302	**Poetics and literary criticism**	The study of *sāhityaśāstra* (Sanskrit Poetics) embraces all poetic arts and includes concepts like *alaṅkāra, rasa, rīti, vakrokti, dhvani, aucitya* etc. The entire domain of Sanskrit poetics has flourished with the topics such as definition of poetry and divisions, functions of word and meaning, *alaṁkāra* (figures of speech) and *chandas* (metre), etc. This develops capacity for creative writing and literary appreciation.
SEM-III, SANC-VII/303	**Self Management**	The objective of this course is to study the

	in the Gītā	philosophy of self-management in the Gītā. The course seeks to help students negotiate the text independently without referring to the traditional commentaries so as to enable them to experience the richness of the text.
SEM-III, SEC I /304	**Reading skills in Brahmi script and evolution of indian scripts**	Ability Enhance Elective Course (AEEC) is very much essential part in the syllabus. It emphasis the early development of scripts like Brahmi. Learning and imparting of Brahmi scripts focus the light on ancient Indian culture and literature. As such knowledge of various ancient scripts reading and translating the texts of scripts are introduced in this part.
SEM-IV, SANC-VIII/401	**Grammar and Indian Chronology Epigraphy(Karak)**	This course have been introduced to the betterment of students to acquaint themselves tothe vocal Sanskrit as well as comprehensive framing of Sanskrit writing through the basic and fundamental knowledge of grammar. As such studies of grammar is very much essential in Sanskrit teaching and leanings. Also this course aims to acquaint the students with the epigraphy and chronology of Sanskrit.
SEM-IV,SANC- IX/402	**Modern Sanskrit Literature**	The purpose of this course is to expose students to the rich & profound tradition of modern creative writing in Sanskrit, enriched by new genres of writing.
SEM-IV, SANC- X/403	**Indian Social Institution and Polity**	The aim of this course is to make the students acquainted with various aspects of social institutions and Indian polity as propounded in the ancient Sanskrit texts such as *Saṁhitās*, *Mahābhārata*, *Purāṇa*, Kauṭilya's *Arthaśāstra* and other works known as *Nītiśāstra.*
SEM-IV, SEC II/404	**Sanskrit meters**	The objectives of this course to learn Sanskrit meter for analysis and lyrical techniques. Students will get the complete information regarding selected Vedic and Classical meters with lyrical techniques.
SEM-V, SANC- XI /501	**Vadic literature**	This course on Vedic literature aims to introduce various types of vedic texts. Students will also be able to read one Upaniṣad, namely, Muṇḍaka, where primary Vedānta-view is propounded.
SEM-V, SANC-XII/502	**Samas Prakaran**	This course have been introduced to the betterment of students to acquaint themselves tothe vocal Sanskrit as well as comprehensive framing of Sanskrit writing through the basic and fundamental knowledge of grammar.As such studies of grammar is very much essential in Sanskrit

		teaching and leanings.
SEM-V,DSC: Paper – I/503	**Sanskrit linguistic**	Sanskrit linguistics is very much essential to know the evolution of languages. This part covers the characteristics of languages. Specialties apart from its application of the part of languages. Phonetic laws Syntax Morphology and Indo European language family etc are discussed in this part. Sanskrit and comparative studies, evolution and history of Sanskrit languages also highlighted in this portion.
SEM-V,DSC: Paper – II/504	**Basic Computer Awareness**	This course will introduce the current research and development in Sanskrit computing. Primary emphasis will be on tools and techniques developed under government and private funding and to explore new technologies for Sanskrit
SEM-VI, SANC- XIII /601	**Indian ontology & Epistemology**	This course aims to get the students acquainted with the cardinal principles of the Nyāya-Vaiśeṣika philosophy through the Tarkasaṁgraha and to enable students to handle philosophical texts in Sanskrit. It also intends to give them an understanding of essential aspects of Indian Philosophy.
SEM-VI, SANC- XIV /602	**Sanskrit and World Literature**	This course is aimed to provide information to students about the spread & influence of Sanskrit literature and culture through the ages in various parts of the world in medieval & modern times.
SEM-VI,DSC: Paper – III/603	**Theater and dramaturgyin Sanskrit**	Being audio-visual, drama is considered to be the best amongst all forms of arts..The dramaturgy was later developed by the Bharatamuni. The objectives of this curriculum are to identify the beauty of drama and to introduce classical aspects of development of Indian theatre among the students**.**
SEM-VI,DSC: Paper – IV/604	**Environmental Awareness in Sanskrit Literature**	The aim of this course is to make the students acquainted with the basic concept of Indian Science of Environment and salient features of environmental awareness as reflected in Vedic and Classical Sanskrit Literature.
BA GENERIC PROGRAMME **PO:** The students of other departments opt for General Electric Courses along with their regular specific papers. This programme is made for the students to enrich themselves to the basic knowledge of Sanskrit culture, text, and vocal Sanskrit studies through regular class teachings.		
BA GENERIC **PSO:** Generic studies are made available to the students beyond this department. General Elective papers		

are prepared for wider knowledge to the Sanskrit beyond their regular core subjects. As a result the students of Generic Elective studies could refresh themselves to the basic fundamentals knowledge of Indian culture, heritage and language through Sanskrit studies.		
Semester/ Paper	**Title**	**Course Outcome**
SEM-I, GE- I	**Basic Sanskrit Grammar & Manusamhita**	The Department introduced the basic knowledge of grammar with vaving fundamental structure of composition and Mannusamhita
SEM-II, GE- II	**History of Vedic & Classical Sanskrit literature**.	History of Vedic and classical Sanskrit Literature. Ramayana and Mahabharata have been taken into account in GE-II for prospective studies for the students beyond this Department.

BA SOCIOLOGY

PSO: Studying Sociology provides a better understanding of the followings: Reasons for social differences, including differences in social behavior. Reasons for the differentials in group opportunities and outcomes. The relevance of social hierarchies and social power in everyday life.

Class/ Paper/ Semester	Title	Course Outcome
SOCIOLOGY Hons Core Paper I SemI	Introduction to Sociology-I	The mandate of the course is to introduce the students to the basic concepts of Sociology------- the nascent social science. It provides the foundation for the other more detailed and specialized courses in the subject.
SOCIOLOGY Hons Core Paper II SemI	Sociology of India -I	This paper introduces students to the different perspectives of construction of knowledge for the concepts and institutions of Indian society, and its culture and social systems. Knowledge regarding the tribal communities of India and the modern industrial Indian society is also the quintessential part of the paper.
SOCIOLOGY Hons Core Paper III SemII	Introduction to Sociology -II	The objective of this paper is to provide the students a general introduction to sociological thought. The focus is on studying from the original texts to give the students a flavor of how over a period of time thinkers have conceptualized various aspects of society. This also provides a foundation for thinkers in other papers.
SOCIOLOGY Hons Core Paper IV SemII	Sociology of India -II	It helps the students to draw the attention to the variety of ideas and emergence of different movements in India and the history of their struggles. It also helps to develop awareness and sensitivity among the students towards contemporary issues.
SOCIOLOGY Hons Core Paper V SemIII	Political Sociology	It helps the students to understand the political aspects of society such as state, government, power, authority, legitimacy, citizenship etc and by which, being a citizen they can understand their social as well as political life.
SOCIOLOGY Hons Core Paper VI SemIII	Sociology of Religion	This course emphasizes on religion and its relation with human society. This paper is roughly divided into three basic categories society and religion, elements of religion and techniques of religion.
SOCIOLOGY Hons Core Paper VII SemIII	Sociology of Gender	The course aims to introduce the general information about gender, sex, sexuality, masculinity and femininity. It also provides knowledge about emergence of women's movements and the history of their struggles. Students also get to know about the new and emerging issues in the gender landscape.
SOCIOLOGY Hons SEC-01 SemIII	Indian Society : Issues and Problems	It helps the students to understand the different issues and problems in Indian society.
SOCIOLOGY Hons Core Paper VIII SemIV	Economic Sociology	This course provides an understanding between Sociology and Economics. The paper discusses the economic system from the primeval time to the modern era. Economic Sociology is also one of the newest chapters of modern sociology.
SOCIOLOGY Hons Core Paper IX SemIV	Sociology of Kinship	The course aims to introduce general principles of kinship and marriage by some theoretical statements. The course elaborates trajectories and directions of kinship of an individual life in society.

SOCIOLOGY Hons Core Paper X SemIV	Social Stratification	The course provides a deep understanding of the existence of the differences, inequality, hierarchy and ranking of individual and groups in society.
SOCIOLOGY Hons SEC –02 SemIV	Cultural Studies	It provides an intensive study in cultural theory. With the help of this course, students get to know the formations, roles, struggles and changes within and among various cultures.
SOCIOLOGY Hons Core Paper XI Sem V	Sociological Thinkers -I	The course introduces the students to the sociological thought of the pioneers of Sociology through selected texts. It helps the students to develop a valuable insight and be well grounded in classical sociology.
SOCIOLOGY Hons Core Paper XII Sem V	Sociological Research Methods -I	The course is general introduction to the methodologies of sociological research, also provides some elementary knowledge about the steps and complexities of research in social science. It also enables students to apply theoretical knowledge of social research.
SOCIOLOGY Hons DSE -01 Sem V	Urban Sociology	This course provides the student an attempt to acquaint with the theories and concepts of urban sociology. It is also aims to explore the issues concerning urban society in modern India. It is always reflect on urban living life style. This course will help students relate to different perspective, settlements and politics of urban society.
SOCIOLOGY Hons DSE -02 Sem V	Environmental Sociology	This course provides the students with a comprehensive conceptual theoretical and empirical background to the interaction between environment and human society. This paper details description on different theoretical approaches and environmental movement in India. It encourages students to think critically about the subject matter of the course and develop their own questions about human society and environment.
SOCIOLOGY Hons Core Paper XIII Sem VI	Sociological Thinkers -II	The course aims to introduce students to post- classical sociological thinking through original texts. This eventually gives a rounding to the leading theoretical perspectives in Sociology.
SOCIOLOGY Hons Core Paper XIV Sem VI	Sociological Research Methods -II	The course acquaints students with the important concepts, techniques, methods, and statistics. It acquaints students to choose right research topic, that they can do field study and take project based original works.
SOCIOLOGY Hons DSE -03 Sem VI	Sociology of Health and Medicine	The course introduces students to the socio- cultural dimensions of illness and medical knowledge. To be introduced students to the history of medicines of our society and how illness is constructed, with theoretical perspectives.
SOCIOLOGY Hons DSE -04 Sem VI	Indian Sociological Tradition	The course aims to introduce students to the Indian Sociological tradition and familiarizes students with the research traditions in Indian Sociology.

BA ECONOMICS

PSO: The student understands the basic concepts in Economics and can apply them in the real world. He/she is also updated with the recent trends in the subject. The student also builds a sound base for various post graduate courses in Economics and related fields.

Class/ Paper/ Semester	Title	Course Outcome
1st year/core-1/Sem 1	Introductory Microeconomics	Learning and application of elementary concepts of Microeconomics in the real world.

1st year/core-II/Sem I	Mathematical Methods in Economics-1	Learning the basic mathematics that enables the study of economic theory , specially the courses on microeconomic theory, macroeconomic theory, statistics and econometrics.
1st year/core-III/Sem II	Introductory Macroeconomics	Learning about the aggregate economy concepts and determination and measurement of macroeconomic variables.
1st year/core-IV/Sem II	Mathematical Methods in Economics-II	Learning to apply the basic mathematics learnt in semester -I , to economic theory in general.
2nd year/core-V/Sem III	Intermediate Microeconomics-I	With the basic mathematical concepts and elementary concepts of Microeconomics from Sem-I, the students learn to analyse the behaviour of consumers, producers and firms in a better way.
2nd year/core-VI/Sem III	Intermediate Macroeconomics-I	With the basic macroeconomic concept from Sem -II, here the students learn the alternative theories of determination of output and employment in closed economy. They also learn theoretical issues related to open economy.
2nd year/core-VII/Sem III	Statistical Methods for Economics	Learning statistical methods to apply in economics. It basically focuses on probability theory and statistical inference.
2nd year/SEC-I/Sem III	Descriptive Statistics	Learning the basic theories and techniques to represent and analyse statistical data.
2nd year/ core-VIII/Sem-IV	Intermediate Microeconomics-II	This course is in sequence with the microeconomic course in Sem -III. Here the emphasis is given on developing the conceptual clarity on general equilibrium,welfare etc.
2nd year/ core-IX/Sem-IV	Intermediate Macroeconomics-II	This course is in sequence with the macroeconomic course in Sem -III. Here the emphasis is laid on the long run dynamic issues like growth technological progress .
2nd year/ core-X/Sem-IV	Introductory Econometrics	Learning basic econometric concepts and techniques to analyse real life data.
2nd year/ SEC-II/Sem-IV	Computer Application	Learning to analyse real data in computer using the statistical methods and techniques done in sem -III.
3rd year/core-XI/ Sem-V	International Trade	Learning the classical theories of international trade and also concepts like BOP, Tarrif ,quota etc.

3rd year/core-XII/ Sem-V	Public Economics	Learning the Government policy from the point of view of economic efficiency and equity. This paper is also about nature of Government intervention and its implication for allocation, distribution and stabilization.
3rd year/DSE-I/ Sem-V	Economic History of India(1857-1947)	Learning the key aspects of Indian economic development during the second half of British colonial rule down to independence of India.
3rd year/DSE-II/ Sem-V	Money and Financial markets	Learning the theory and functioning of the monetary and financial sectors of the economy. Financial and banking sector reforms and monetary policy of India is also focused
3rd year/core-XIII/ Sem-VI	Indian Economy	Learning the major trends in economic indicators and policy debates in India in the post independent period with particular emphasis on paradigm shifts and turning points.
3rd year/core-XIV/ Sem-VI	Development Economics	The course discusses the alternative theory and their justification. It also covers growth models, measures of inequality and discusses the role of state in economic development.
3rd year/DSE-III/ Sem-VI	Issues in Indian Economy	Learning sector-specific policies and their impact . It focuses on major policy debates and evaluates the Indian emperical evidence.
3rd year/DSE-IV/ Sem-VI	Comparative economic development(1850-1950)	Learning selected issues in comparative historical perspective over the 19th century and first few decades of the 20th century. A set of countries are focused which followed clearly diverse trajectories and patterns of growth to achieve their industrial transition and compares the outcomes on sectoral change , inter-sectoral relations and others.

BA HISTORY

PSO: The Graduates belonging to this Programme in an institution of academic heritage equip themselves with knowledge of History, with the notions of history, emergence of Indian and World civilization and the history of ancient, early medieval, medieval and modern India and the world. There is ample scope for students to acquaint themselves with the diverse influential text books and enrich their creative and critical faculties. Education is not always an end in itself but a means to an end. Thus, the graduates become accomplished academicians, civil servants etc. and become proficient both in person and profession.

Semester/ Paper	Title	Course Outcome
SEM-I, HISC-I/101	**History of India-I**	The students will be acquainted with the notions of early Indian History, Pre-historic hunter-gatherers, Food production, the Harappan civilization, and cultures in transition etc.
SEM-I, HISC-II/102	**Social Formations and Cultural Patterns of the Ancient World**	The students will be acquainted with the Evolution of Food Production Bronze age civilization with emphasis on old Egypt Kingdom, Mesopotamia, China (Shang), Eastern Mediterranean state structure economy social and religion Nomadic groups in Central and West Asia. Ancient Greece- Slave Society, Pollis, Athens and Sparta etc.
SEM-II, HISC-III/201	**History of India-II (circa 600 BCE to circa CE 750)**	The students will be acquainted with the Economy and Society, Changing Political Formations- the Mouryan empire, with a special reference to the Kushanas and Satavahanas towards Early medieval India, economy, religion, philosophy, society and the cultural developments.
SEM-II, HISC-IV/202	**Social Formations and Cultural Patterns of the Medieval World**	The students will be acquainted with the Roman Republic, Religion and culture in ancient Rome, Crisis of the Roman Empire, Economic Developments, in Religion and culture in medieval Europe and the societies in central Islamic Lands.
SEM-III, HISC-V/301	**History of India-III (circa 750 CE to circa 1206 CE)**	The students will be acquainted with the Studying Early Medieval India: Political Structures, Agrarian Structure, Social Changes, Trade and Commerce, Religious and Cultural Developments etc.
SEM-III, HISC-VI/302	**Rise of the Modern West-I**	The students will be acquainted with the Early Colonial expansion, Renaissance, The European Reformation and Economic developments of the 16th century. Emergence of European state system and the transition from feudalism to capitalism etc.

SEM-III, HISC-VII/303	**History of India-IV (c.1206-1550)**	The students will be acquainted with the Interpreting the Delhi Sultanate: Political Structures – foundation and consolidation of the Delhi Sultanate; The Mameluks, Khaljis, The Tughluqs and the emergence of provincial dynasties, Society and Economy, Religions and Cultures etc.
SEM-III, HISSEC I /301(A)*	**Archives and Museums**	The students will be acquainted with the history ofArchives and Museums, Definition and history of development with a special reference to India, Types of Archives, Museum presentation, Exhibition and society etc.
SEM-IV, HISC-VIII/401	**Rise of the Modern West-II**	The students will be acquainted with the history of European crisis in 17th century, The English Revolution, Rise of modern science in relation to European society from the Renaissance, Mercantilism European economics, politics in the 17th and 18th centuries. American Revolution – Political and economic issues preludes to the Industrial Revolution.
SEM-IV, HISC- IX/402	**History of India-V (c.1526-1605)**	The students will be acquainted with the Sources and Historiography, Establishment of Mughal rule from Babar to Akbar, Institution of the empire and the challenges to Empire and Political Crisis in India.
SEM-IV, HISC- X/403	**History of India – VI (c.1605-1750s)**	The students will be acquainted with the political culture under Jahangir, Shah Jahan and Aurangzeb of Mughal empire, Painting, Architecture, Patterns of Regional Politics, Trade and Commerce etc.
SEM-IV, **HISSEC-/401(A)***	**Understanding Popular Culture**	The students will be acquainted with the Defining popular culture, Folk art, Calendar art, Photography, Theater, Music, Cinema and Television, Fairs and popular culture in a globalized world.
SEM-V, HISC- XI /501	**History of India – VII (c.1750-1857)**	The students will be acquainted with the society economy and polity in the mid 18th century India, Expansion and Colonial Power ideology rural economy and society trade and Industry and Popular Resistance in the Colonial State.
SEM-V, HISC-XII/502	**History of Modern Europe – I (c.1780-1939)**	The students will be acquainted with the French revolution and its European repercussions, Restoration and Revolution, Capitalist Industrialization, social and economic Transformation, Varieties of Nationalism and remaking of states etc.
SEM-V,HISDSE -I/501	**History of the United states of**	The students will be acquainted with the history of the background, Making of the American Republic, Evolution

	America(c.1776-1945)	of American democracy, Early Capitalism, The Agrarian South, Foreign Policy and Civil War.
SEM-V,HISDSE – II/501	**History of East Asia – I (c.1840-1919)**	The students will be acquainted with the history of imperialism and China during the 19th century, The Emergence of Nationalism, Communism and the rise of Mao Tse Tung in China etc.
SEM-VI, HISC- XIII /601	**History of India – VIII (c.1857-1950)**	The students will be acquainted with the cultural changes and social religious reform movements, Nationalism, Gandhian Nationalism, Ideas and movements and social groups, Communalism, Indian Independence and Partition.
SEM-VI, HISC- XIV /602	**History of modern Europe – II (c.1780-1939)**	The students will be acquainted with the Liberal Democracy, working class movements and Socialism, The Crisis of Feudalism and Experiments in Socialism in Russia. Imperialism and crisis, Origins of the second World War and cultural and intellectual developments etc.
SEM-VI,HISDSE – III/601	**History of the United States of America (c.1776-1945)**	The students will be acquainted with the history of America-reconstructions, Industrial America, Resistance and Reforms, U.S. Imperialism, Afro-American Movements and Women's Movements. Religious, cultural and Intellectual Trends etc.
SEM-VI,HISDSE – IV/601	**History of Modern East Asia (c.1868-1945)**	The students will be acquainted with the history of Japan- Transition from Feudalism to Capitalism, Meiji Restoration Japanese Imperialism and the Second World War-American occupation. Emergence of modern Korea: Japan's colonization, the growth of Korean Nationalism and Post-War changes.

BA GENERIC PROGRAMME

PO: The students of other departments are opting for general electric courses along with their regular core papers. They are made ready to equip themselves for competitive examinations of the State and the Nation. The subject helps them to enrich their making of Contemporary India and the Environmental issues through regular classes and teaching texts and introducing them with the basic ideas of modern India and the importance of environment.

BA GENERIC

PSO: The students acquaint themselves with the important of Contemporary India and Environmental issues and also enrich themselves in their depth in Modern India and environmental knowledge about their social surroundings which help them to make them prepared for several competitions for job management.

Semester/ Paper	Title	Course Outcome

SEM-I, GE- I	**Making of Contemporary India**	Knowledge about towards Independence and Emergence of the new state Government of India Act 1935, Popular movements Partition. Making of the Indian Republic, Constitution, Indian Democracy at work c.1950-1970, Economy, society, Planned Economy, Industry and culture etc.
SEM-II, GE- II	**Environmental issues in India**	Knowledge about towards importance of environment, Geography, Ecology and cultures in Pre-Colonial India. Colonialism and developments in the environment issues and Environmental movements in Independent India. Environmental concerns in a Globalizing World.
SEM-III, GE- I	**Making of Contemporary India**	Knowledge about towards Independence and Emergence of the new state Government of India Act 1935, Popular movements Partition. Making of the Indian Republic, Constitution, Indian Democracy at work c.1950-1970, Economy society, Planned Economy, Industry and culture etc.
SEM-IV, GE- II	**Environmental issues in India**	Knowledge about towards importance of environment, Geography, Ecology and cultures in Pre-Colonial India. Colonialism and developments in the environment issues and Environmental movements in Independent India. Environmental concerns in a Globalizing World.

BA GENERAL

PSO: the students acquaint themselves with the important of the history of Ancient India, Medieval India, Colonial India and the Indian Independence and also enrich themselves in their depth in Indian civilization and freedom movement which help them to make them prepared for several competitions for job management and is nourished in meaningful way to be the responsible and dedicated citizens.

Semester/ Paper	Title	Course Outcome
SEM-I HISDSC-101	**Ancient India**	The students will be acquainted, Vedic Civilization, State formation, Mauryan and Gupta Empire etc.
SEM-II HISDSC-201	**Medieval India**	The students will be acquainted with the history of Arab Conquest of Sindh, Early Turkish invasion, Establishment and consolidation of the Sultanate, Emergence of regional powers, Mughal Imperialism, Bhakti & Sufi movements in India etc.
SEM-III HISDSC-301	**Select themes in the Colonial impact on Indian Economy**	The students will be acquainted with the Colonial state institutions and ideologies, land Settlement and agricultural changes, Modern Industrialization, Census and Caste, colonial ethnology, Reforms and Revivalism

	and Society	and the Islamic reform in India.
SEM-IV HISDSC-401	**Modern Nationalism in India**	The students will be acquainted with the Emergence of Nationalism, Economic Nationalism and Cultural Nationalism in India. Rise of the Indian National Congress, Swadeshi movement, Gandhi's rise to power: Non-cooperation, Civil Disobedience, and Quit India movement, Roots of Communalism, Partition and its Aftermath.

Ability Enhancement Compulsory Course (AECC-Environmental Studies):

AECC-ENVIRONMENTAL STUDIES

PSO: the students acquaint themselves with the important of the impacts of environment, human health and welfare, environmental pollution, policies and public awareness and also enrich themselves in their depth in the importance of the environmental studies which help to make them prepared is nourished in meaningful way to be the responsible and dedicated citizens.

Semester/ Paper	Title	Course Outcome
Ability Enhancement Compulsory Course (AECC-Environmental Studies)	**Environmental studies for Arts and Science**	Enhances the Environmental Studies Proficiency of Undergraduate students. Preparing them for the Introduction to environmental studies, Ecosystems, Natural Resources, Biodiversity and Conservation, Environmental pollution and Environmental Policies, Human communities and public awareness in the Environment.

B.A. HINDI

PSO : The student understands the basic concepts of Hindi Literature. He/she is also updated with the recent trends in the subject. The student also builds a sound base for various post graduate courses in Hindi Literature and related fields.

Class/Paper/ Semester	Title	Course Outcome
HINDI Hons Core Paper I SemI	**Hindi Sahitya ka Itihas (Ritikal Tak)**	Learning the Hindi Literature and to know the derivation of Hindi Language and it's importance. Defferents movements in hindi Era.
HINDI Hons Core Paper II SemI	**Hindi Sahitya ka Itihas (Adhunik Kal)**	Morden Hindi Literature and it's impact.
HINDI Hons Core Paper III SemII	**Adhikalin evm Madh kalin Hindi Kavita**	The students become aware of different Court poet and Bhakti poet.
HINDI Hons Core Paper IV SemII	**Adhunik Hindi Kavita (Chayabad)**	To make the students awareabout modern Hindi poetry from 1850 BC to 1936 BC and it's importance.
HINDI Hons Core Paper V Sem III	**Chayabadthor Hindi Kavita**	Making the students aware about Hindi poetry from 1936 BC to 1950 BC and it's importance.
HINDI Hons Core Paper VI Sem III	**Bhartiya Kavya Shatra**	To make the students aware about Bhartiya Kavya Shatra and it's different school and it's importance.
HINDI Hons Core Paper VII Sem III	**Paschatya Kavya Shatra**	To make the students awareabout Bhartiya Kavya Shatra and it's different school and it's importance. New Criticism , Marksvad modernity and post modernity.
HINDI Hons Paper (SEC-1) Sem III	**Vigyapan**	To make the students aware about advertisement and it's importance. Impact of advertisement in our social life.
HINDI Hons Core Paper VIII Sem IV	**Bhasa Vigyan evm Hindi Bhasa**	The students become awareabout Language and it's importance. Like words, sentence, Rastra-Bhasa, Raj-Bhasa, Commnucative Language and Devnagri Script.
HINDI Hons Core Paper IX Sem IV	**Hindi Upnayas**	To make the students awareabout different novelist and their novel, socical concept
HINDI Hons Core Paper X Sem IV	**Hindi Kahani**	To make the students awareabout different story writers and there story .
HINDI Hons Paper (SEC-2)	**Anuvad Shidhant our Pravidhi**	To aware the students about Translation, it's importance , Type of Translation. Translation

Sem IV		work like a bridge with different language.
HINDI Hons Core Paper XI Sem V	**Hindi Natak evm Ekanki**	To make the students awareabout Hindi one-act play and novel.
HINDI Hons Core Paper XII Sem V	**Hindi Nibhand evm anya Gadhya Vidhya**	To make the students awareabout Hindi Essay writing and its importance, etc…
HINDI Hons (DSEC-1) Sem V	**Chayabad**	To make the students awareabout Chayabad its importance. Four pillar of Chayabad and their poetry.
HINDI Hons (DSEC-2) Sem V	**Lok-Shahitya**	The students are acquainted with Folk-Lit, Folk-Dance, Folk-Culture, impact of Folk- Lit on our Social & Cultural life.
HINDI Hons Core Paper XIII Sem VI	**Hindi ki Shahityatik Patrakarita**	To aware the students about Literary Journalism,& different Era of Journalism of Hindi Lit. Famous Journal & Newspaper.
HINDI Hons Core Paper XIIV Sem VI	**Prayajanmulak Hindi**	To make the students awareabout importance of Hindi and its uses.
HINDI Hons (DSEC-3) Sem VI	**Preamchand**	The students are acquainted with about great hindi writer Preamchand and his writings like novel, story, easy and natak.
HINDI Hons (DSEC-4) Sem VI	**Ashmitamulak Vimars our Hindi Shahitya**	To make the students awareabout different discourse like Dalit, Stri, Aadivashi & their importance.

B.Sc PROGRAMME

PO: Students get ample scope to acquire adequate knowledge in various subjects of Pure Science and Bio. Science. They learn how to apply the acquired knowledge and make the most of it in solving the scientific problems through their critical and creative observation. Students crack all India competitive exams and engage themselves in academics and future researches .

B.Sc in ZOOLOGY

PSO: The student understands the basic concepts in Animal Diversity and Biology in the real world. He/she is also updated with the recent trends in the subject. The student also builds a sound base for various post graduate courses in Zoology and related fields.

Class/Paper/Semester	Title	Course Outcome
ZOOLOGY Hons Core Paper I Sem I	**Non-Chordates I: Protists to Pseudocoelomates**	Learning the diversity and biology of Protozoans and evolution of first Animal groups- parazoans & metazoans. Development and evolution of animal body designs.
ZOOLOGY Hons Core Paper II Sem I	**Fundamentals of Biochemistry**	Learning basic building blocks of Life: molecules and reactions those drive biological systems- energy and economy of common biochemical reactions.
ZOOLOGY Hons Core Paper III Sem II	**Non-Chordates II: Coelomates**	Development of coelom and diversity and biology of coelomate animals, the most diverse and successful clade of animals.
ZOOLOGY Hons Core Paper IV Sem II	**Cell Biology**	Students conceptualize the composition of cells, the basic unit of living things and understanding how cells work is fundamental to all the biological and medical sciences. Cell biology examines, on microscopic and molecular levels, the physiological properties, structure and functions of organelles (such as mitochondria), interactions, life cycle, division and death of these basic units of organisms.
ZOOLOGY Hons Core Paper V Sem III	**Diversity of Chordata**	Learners can understand the basis of Chordate classification, variety and variability of different chordate taxa and their phylogenetic relationships.
ZOOLOGY Hons Core Paper VI Sem III	**Biochemistry of Metabolic Processes**	Students achieve a basic understanding how do living organisms—or, their cells—extract energy from their environments, and how do cells use this energy to synthesize and assemble the components from which the cells are made? The overall coordination of various life sustaining multistep enzyme-mediated metabolic reactions and various diseases related to error in metabolism.
ZOOLOGY Hons Core Paper VII Sem III	**Molecular Biology**	Students will gain an understanding of structure and functions of genetic material at molecular level and application of various tools and techniques related to this discipline.
ZOOLOGY Hons Skill Enhancement course-I Sem III	**Sericulture**	Students learn to appreciate the importance of Economic Zoology. Deals with rearing and diseases of silkworm and production of silk.
ZOOLOGY Hons Skill Enhancement course-II Sem III	**Medical diagnostics**	Students are introduced about Medical Diagnostic Methods used for analysis of blood, urine, non-infectious diseases, infectious diseases as well as principles of medical imaging techniques.

ZOOLOGY Hons Core Paper VIII Sem IV	**Comparative Anatomy of Vertebrates**	Able to explain differences and relationships of various organ systems and skeletal structures of different vertebrate taxa on the basis of theoretical and practical aspects in viewpoint of Evolution.
ZOOLOGY Hons Core Paper IX Sem IV	**Principles of Ecology**	After completing this course students should be able to understand how organisms relate with each other and their relationships towards the shared resources, their relationships with the space they share, and even their relationships with the non-living aspects in the environment.
ZOOLOGY Hons Core Paper X Sem IV	**Principles of Genetics**	The objective of this course is to enhance the problem-solving skills related to inheritance biology, and to give the basic knowledge of classical Mendelian Genetics as well as real world deviations from Mendelian Genetics.
ZOOLOGY Hons Skill Enhancement course-III Sem IV	**Apiculture**	Learn biology, rearing, diseases and enemies of Bees and also able to appreciate Bee Economy and Entrepreneurship in Apiculture.
ZOOLOGY Hons Skill Enhancement course-IV Sem IV	**Research Methodology**	Make students motivated and practiced about foundations of research, research design, data collection, analysis and report writing and also aware about ethical issues like intellectual property right, commercialization, copy right, patent law, plagiarism, citation, acknowledgement etc.
ZOOLOGY Hons Core Paper XI Sem V	**Animal Physiology: Controlling and Coordinating Systems**	Able to learn about physiology, ultra-structure, structure, histology of different organs, organ-systems of animals and also understand the basis of homeostasis.
ZOOLOGY Hons Core Paper XII Sem V	**Developmental Biology**	Begin to understand the embryonic and post-embryonic development of different organisms in reference to their body plan, axis formation, organogenesis and developmental genetics also learn about implications of Developmental Biology.
ZOOLOGY Hons Discipline Specific Elective-I Sem V	**Animal Biotechnology**	Introduced to concept and scope of biotechnology, molecular techniques in gene manipulation, recombinant DNA technology, genetically modified organisms, gene therapy, animal cell culture techniques and applications.
ZOOLOGY Hons Discipline Specific Elective-II Sem V	**Immunology**	To understand how immune system protect us from infection through various lines of defense. Students will achieve a conceptual view of wide array of cells and molecules and their interplay to immune reaction, different anatomical barrier and various immune-assay tools and techniques.
ZOOLOGY Hons Core Paper XIII Sem VI	**Physiology: Life Sustaining Systems**	Students learn about physiology of life sustaining systems such as physiology of digestion, physiology of respiration, renal physiology, blood physiology, physiology of heart, physiology in extreme environment.
ZOOLOGY Hons Core Paper XIV Sem VI	Evolutionary Biology	Provides key to learner to understand the principles governing the origin and extinction of species, casual explanations, based on history and on processes of genetic change and adaptation, for the full sweep of biological phenomena, ranging from the molecular to ecological.

ZOOLOGY Hons Discipline Specific Elective-III Sem VI	Animal Behaviour and Chronobiology	The study of animal behavior begins with understanding how an animal's physiology and anatomy are integrated with its behavior. Both external and internal stimuli prompt behaviors — external information (e.g., threats from other animals, sounds, smells) or weather and internal information (e.g., hunger, fear). Understanding how genes and the environment come together to shape animal behavior is also an important underpinning of the field. Genes capture the evolutionary responses of prior populations to selection on behavior. Environmental flexibility gives animals the opportunity to adjust to changes during their own lifetime.
ZOOLOGY Hons Discipline Specific Elective-IV Sem VI	Computational Biology and Instrumentation	Students are introduced to vast arena of Bioinformatics and its possibilities and applications, Biological Databases, Data Generation and Data Retrieval, Basic concept of Sequence Alignment. Essential tools (for proceeding with biological research like) Biostatistics and Bioinstrumentations like Microscopy, Spectrophotometry and centrifugation.
ZOOLOGY (Generic Elective) Generic Elective-I & III Sem I & Sem III	Animal Diversity	Learning Biology and Diversity of various animal groups, their development and evolution. Course designed for non-zoology majors.
ZOOLOGY (Generic Elective) Generic Elective-II & IV Sem I & Sem III	Insect Vectors and Diseases	Students are introduced to vectors, insects as vectors and various vector-borne diseases and make them aware that vector-borne diseases constitute an important cause of death, disease burden and health inequity, a brake on socioeconomic development, and a strain on health services. Continued progress in controlling these diseases is therefore an important contribution to global health, development and security. Course designed for non-zoology majors.

B.Sc CHEMISTRY

PSO:

(a) Developing knowledge of chemistry through theory and practical.

(b) Explaining molecules in terms of nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.

(c) Identify chemical formulae, structures and solve numerical problems.

(d) Understanding good laboratory practices and safety.

(e) Developing research-oriented skills.

(f) Make aware and handle the sophisticated equipments and advanced instruments.

Class/ Paper/ Semester	Title	Course Outcome
Chemistry UG (CBCS) Semester-I		
CHEMISTRY –UG Paper - C-I (Theory) Sem-I	Inorganic Chemistry-I	Learning the atomic structure, atomic spectra, shapes of orbital, various Principle regarding orbital energy, periodicity of s, p, d, f block elements, ionic bonding, Born-Haber cycle, chemical bonding, VSEPR theory, MO diagram of mono and diatomic compound, Metallic bond, Oxidation –Reduction reaction and Redox equation.
CHEMISTRY –UG Paper - C-I (LAB) Sem-I	Inorganic Chemistry-I Practical	Learn about Preparation of solution for Quantitative analysis,acid-Base titration and Oxidation-Reduction Titration.
CHEMISTRY-UG Paper Code-C-II (Theory) Sem-I	Physical Chemistry-I	Learning the states of matter, velocity and speed distribution of gas molecule and their kinetic energy and energy distribution, barometric distribution, collision phenomenon, deviation from ideal behaviors of real gas, critical parameter, various real gas equation, solid states, type of unit cell, packing efficiency, plane of symmetry of crystal, Bragg's reflection, surface tension and viscosity of fluid, equilibrium constants and their inter-relation, pH scale, buffer solution, solubility product.
CHEMISTRY-UG Paper Code-C-II (PRACTICAL) Sem-I	Physical Chemistry-I Practical	Learning the measuring technique of surface tension and viscosity of different fluid, colorimetry using buffer, dissociation constant of weak acid and base using pH-meter.
CHEMISTRY-UG Paper Code-GE-I (Theory) Sem-I	Generic-I	Learning of the Bohr's theory, matter and radiation, quantum numbers, electronic configurations, Periodic trends of s- and p-block elements and structure and inertness of noble gas. Learn about fundamentals of organic chemistry, conformations and configuration of various molecules with stereochemistry, studied various types of reactions of alkane, alkene and aromatic hydrocarbons. Learn about the laws of thermodynamics, change in free energy in a chemical reaction, various types of electrolytes, pH scale and buffer solution.
CHEMISTRY-UG Paper Code-GE-I (Practical) Sem-I	Generic-I Organic Practical	Learning the detection of spceial element (N,S,Cl,Br,I), qualitative analysis of organic functional groups and determination of melting point.
Chemistry UG (CBCS) Semester-II		

CHEMISTRY-UG Paper Code-C-III Organic Chemistry-I Sem-II	Organic Chemistry-I	Understanding the structure, bonding, stability, and physical properties of organic molecule and reaction intermediates. Concept of M.O., aromaticity, and electron moving arrows to describe the reaction mechanism. Learning the three-dimensional structure of organic molecules i.e., stereochemistry and conformation, chirality, measurement of optical activity and idea of alicyclic chemistry.
CHEMISTRY-UG Paper Code-C-III LAB Sem-II	Organic Chemistry-I Practical	Knowledge of purification of organic compounds by crystallization, determination of melting points of unknown organic compounds, determination of the boiling point of liquid organic compounds. Learning qualitative analysis of unknown organic compounds containing mono-functional groups.
CHEMISTRY-UG Paper Code-C-IV (Theory) Sem-II	Physical Chemistry-II	Learning basic knowledge of thermodynamics, different type of variables of a macroscopic system and their inter-relation, 1st, 2nd and 3rd law of thermodynamics and their consequence, types of solution, colligative property, and determination of molecular mass of solutes using colligative properties.
CHEMISTRY-UG Paper Code-C-IV (Practical) Sem-II	Physical Chemistry-II Practical	Learning about the calorimetry, heat capacity, determination of enthalpy of ionization and heat of neutralization, effect of temperature on solubility product of sparingly soluble salt. Developed hand on analytical instruments.
CHEMISTRY-UG Paper Code-GE-II (Theory) Sem-II	Generic-II	Learning of chemical bonding and molecular structure of various compounds, MO theory, acid-base concept, co-ordination chemistry, crystal field theory and properties of transition element. Learn about the preparation and reactions of alcohol, Phenols, Carbonyls, Amines and Diazonium salts, Amino acids and Carbohydrates. Learn about the thermodynamics of ideal solutions, different types of conductivity, transference number, solubility product, hydrolysis constant of a salt.
CHEMISTRY-UG Paper Code-GE-II (Practical) Sem-II	Generic-II Inorganic and Physical Chemistry Practical	Leaning of various quantitative analysis (Fe,Cu), primary and secondary standard solution, performing conductometric and pH metric titration.
Chemistry UG (CBCS) Semester-III		
CHEMISTRY-UG Paper Code-C-V (Theory) Sem-III	Inorganic Chemistry-II	Study of general principle of Metallurgy, acids and Bases, various reactions and compounds of s and p block elements, preparation, property and shapes of noble gases and inorganic polymers.
CHEMISTRY-UG Paper Code-C-V (Practical) Sem-III	Inorganic Chemistry-II Practical	Learning of iodimetric titrations and preparation of some inorganic compounds.
CHEMISTRY-UG Paper Code-C-VI Organic Chemistry-II Sem-III	Organic Chemistry-II	Learn basic knowledge about organic reactions, mechanisms and reaction kinetics involving the preparation, properties and uses of alkenes and alkynes. Mechanistic understand of the substitution and elimination reactions, aromatic substitution, oxidation/reductions in carbonyl reactions and some well-known name reactions in carbonyl chemistry.

CHEMISTRY-UG Paper Code-C-VI LAB Sem-III	Organic Chemistry-II Practical	Provides training in the detection of special elements (N, S, Cl, Br, I) and qualitative analysis of unknown organic compounds. To develop the skill in the preparation of suitable derivative of organic compounds.
CHEMISTRY-UG Paper Code-C-VII (Theory) Sem-III	Physical Chemistry-III	Learn about the rate of chemical process I.e., the change of concentration of a substance with time, disintegration time of a radio-active substance, kinetics of fermentation, transition state theory, mechanism of catalytic reaction, mechanism of adsorption of gas or liquid on solid surface, applies the phase separation using phase rule.
CHEMISTRY-UG Paper Code-C-VII (Practical) Sem-III	Physical Chemistry-III Practical	Learns the effective handling the apparatus, follows the reaction with respect to time, technique to determine the partition coefficient, applies the theory in the area of phase diagram and transition temperature.
CHEMISTRY-UG Paper Code-SEC-I (Theory) Sem-III	Chemistry of cosmetics & perfumes SEC-I	Learning about the various cosmetic products like talcum powder, shampoo, nail lacquer hair dye etc. and their general composition and knowledge in the benefits and side effects of the chemicals used in the cosmetic products.
CHEMISTRY-UG Paper Code-SEC-I (Practical) Sem-III	Chemistry of cosmetics & perfumes SEC-I Practical	Experimental skill regarding preparation of talcum powder, shampoo, nail lacquer, face cream, hair dye and analysis of the product by preliminary characterization using chemical and spectroscopic means.
CHEMISTRY-UG Paper Code-GE-III (Theory) Sem-III	Generic-III	Learning of the Bohr's theory, matter and radiation, quantum numbers, electronic configurations, Periodic trends of s- and p-block elements and structure and inertness of noble gas. Learn about fundamentals of organic chemistry, conformations and configuration of various molecules with stereochemistry, studied various types of reactions of alkane, alkene and aromatic hydrocarbons. Learn about the laws of thermodynamics, change in free energy in a chemical reaction, various types of electrolytes, pH scale and buffer solution.
CHEMISTRY-UG Paper Code-GE-III (Practical) Sem-III	Generic-III Organic Practical	Learning the detection of spceial element (N,S,Cl,Br,I), qualitative analysis of organic functional groups and determination of melting point.
<u>Chemistry UG (CBCS) Semester-IV</u>		
CHEMISTRY-UG Paper Code-C-VIII (Theory) Sem-IV	Inorganic Chemistry-III	Introduction to co-ordination chemistry with learning of Crystal field theory, Jahn-Teller theorem, IUPAC nomenclature, study of transition elements, Lanthanoids–Actinoids and Bioinorganic Chemistry.
CHEMISTRY-UG Paper Code-C-VIII (Practical) Sem-IV	Inorganic Chemistry-III Practical	Learning of gravimetric analysis, preparation of complex compounds and chromatographic separation of metal ions.
CHEMISTRY-UG Paper Code-C-IX Organic Chemistry-III Sem-IV	Organic Chemistry-III	Understand the concept of carbonyl reactions and their mechanisms, elementary ideas of Green Chemistry, nucleophilic addition to α,β-unsaturated carbonyl compounds, substitution at sp^2 carbon of carbonyl compounds and reactions of carboxylic acids. Gaining basic knowledge about organic nitrogen compounds. Understand the mechanism with evidence and

		stereochemical features of different rearrangements and their synthetic utility. Learn basic principles & applications of retrosynthetic analysis. Familiarize students with the organometallic chemistry and dynamic stereochemistry.
CHEMISTRY-UG Paper Code-C-IX LAB Sem-IV	Organic Chemistry-III Practical	To develop the skill in organic preparations using some specific reactions such as acetylation of amines, benzoylation of amines, oxidation of alcohols, bromination, nitration, selective reductions, hydrolysis of amides/esters, semicarbazone formation, aldol condensation and benzil-benzilic acid rearrangement.
CHEMISTRY-UG Paper Code-C-X (Theory) Sem-IV	Physical Chemistry-IV	Learn the application of electrochemistry, develops the usage of electrode kinetics, electrochemical cell formation and their reactions, electrochemical series and its uses in daily life, conductance and its importance.
CHEMISTRY-UG Paper Code-C-X (Practical) Sem-IV	Physical Chemistry-IV Practical	Learns the effective handling of conductometer, pH-meter, and use of electrodes, understand the potential of storage device, Standard EMF determination of various electrode and compare with the electrochemical series, validate the Ostwald's dilution law for a weak electrolyte.
CHEMISTRY-UG Paper Code-SEC-II (Theory) Sem-IV	Drugs & pharmaceuticals SEC-II	Learning about the discovery, design and development of different drugs like analgesic, antipyratic agents, anti inflammatory agents etc. and preparation of different antibiotics, vitamins by fermentation.
CHEMISTRY-UG Paper Code-SEC-I (Practical) Sem-IV	Drugs & pharmaceuticals SEC-II Practical	Experimental skill regarding preparation of aspirin and an antacid and its preliminary characterization by chemical and spectroscopic means.
CHEMISTRY-UG Paper Code-GE-IV (Theory) Sem-IV	Generic-IV	Learning of chemical bonding and molecular structure of various compounds, MO theory, acid-base concept, co-ordination chemistry, crystal field theory and properties of transition element. Learn about the preparation and reactions of alcohol, Phenols, Carbonyls, Amines and Diazonium salts, Amino acids and Carbohydrates. Learn about the thermodynamics of ideal solutions, different types of conductivity, transference number, solubility product, hydrolysis constant of a salt.
CHEMISTRY-UG Paper Code-GE-IV (Practical) Sem-IV	Generic-IV Inorganic and Physical Chemistry Practical	Leaning of various quantitative analysis (Fe,Cu), primary and secondary standard solution, performing conductometric and pH metric titration.
Chemistry UG (CBCS) Semester-V		
CHEMISTRY-UG Paper Code-C-XI Organic Chemistry-IV Sem-V	Organic Chemistry-IV	Basic understanding of spectroscopic methods such as UV, IR and NMR to characterize and identify the chemical structures of simple organic molecules. Learn basic knowledge about heterocyclic reactions, amino acids, structure of biomolecules peptide, protein, nucleic acid, enzymes, and brief information about few well-known alkaloids and terpenoids.

CHEMISTRY-UG Paper Code-C-XI LAB Sem-V	Organic Chemistry-IV Practical	To develop the skill for the identification of simple organic compounds by IR and NMR spectroscopy. Learn the estimation and titration methods in laboratory such as estimation and study of glycine and estimation of proteins. Gain knowledge in isolation and characterization of DNA from onion/cauliflower/peas.
CHEMISTRY-UG Paper Code-C-XII(Theory) Sem-V	Physical Chemistry-V	Learning the spectroscopy and structural property of molecule, moment of inertia, mode of vibration and vibrational energy of a molecule, zero-point energy a harmonic oscillator, Raman scattering, fluorescence and phosphorescence and their mechanism, Operators used in quantum mechanics, matter and wave property of a system, wave function and energy of 1D, 2D, 3D box and hydrogen like system.
CHEMISTRY-UG Paper Code-C-XII (Practical) Sem-V	Physical Chemistry-V Practical	Learning the spectrophotometry, molar extinction coefficient and technique to determine the maximum wavelength at which a very dilute color solution absorbs the light, extent of light absorption and emission by a color solution, validation of Lambert-Beer's law.
CHEMISTRY-UG Paper Code-DSE-I Sem-V	Analytical Methods in Chemistry DSE-I Elective	Learning the qualitative and quantitative aspects of chemical compound analysisusing Optical, thermal,electroanalytical methodssuch as UV-Visible, Infrared,absorption and emission spectrometry,thermogravimetry,pHmetric, potentiometric andconductometric titration as wel asthe separation techniquesfrom mixture such as solvent extraction and chromatographic methods.
CHEMISTRY-UG Paper Code-DSE-I LAB Sem-V	Analytical Methods in Chemistry DSE-I Elective Practical	Learning the Chromatography, solvent extractions, techniques for separation of mixtures of metal ions carbohydrates and some natural products. Using the spectrophotometry techniques to determine the pKa values and structural characterization of compounds.
CHEMISTRY-UG Paper Code-DSE-II Sem-V	Industrial Chemicals and Environment DSE-II Elective	Learning the large-scale production, uses, storage and application of Industrial gases, Inorganic chemicals as well as the different sources of energy, major sources of pollution in our environment like air pollution and water pollution through the industrial waste.
CHEMISTRY-UG Paper Code-DSE-II LAB Sem-V	Industrial Chemicals and Environment DSE-II Elective Practical	Advance learning technique for the estimation of different chemical present in our environment like air and water, and large-scale preparation of some commonly used chemical compound.
Chemistry UG (CBCS) Semester-VI		
CHEMISTRY-UG Paper Code-C-XIII (Theory) Sem-VI	Inorganic Chemistry-IV	Study of theoretical principles of Qualitative analysis (H_2S scheme), definition and classification of organometallic compounds, metal carbonyls, Ferrocene and introduction to inorganic reaction mechanism and catalysis.
CHEMISTRY-UG Paper Code-C-XIII (Practical) Sem-VI	Inorganic Chemistry-IV Practical	Learning of qualitative semimicro analysis of ions from ionic mixture and introduction to spot test of various inorganic compounds.

CHEMISTRY-UG Paper Code-C-XIV Organic Chemistry-V Sem-VI	Organic Chemistry-V	Learning the basic concept of pericyclic reactions and their mechanisms, organic macromolecules such as carbohydrates and lipids. Familiarize students with the chemistry and applications of dyes and polymers. Grow concept of energy in biosystems and pharmaceutical compounds. Gain a brief overview on chromatography technique.
CHEMISTRY-UG Paper Code-C-XIV LAB Sem-VI	Organic Chemistry-V Practical	To adapt the students to extract of caffeine from tea leaves, preparation of sodium polyacrylate, urea formaldehyde and methyl orange, analyze carbohydrates. Learn to determine the saponification value and iodine number of an oil/fat sample. Provides training in chromatographic separation of binary mixture.
CHEMISTRY-UG Paper Code-DSE-III Sem-VI	Green Chemistry DSE-III Elective	Learning the principles of green chemistry and designing a chemical synthesis and minimization of hazardous or toxic products for reducing toxicity by using green solvents, selection of proper starting material and avoidance of unnecessary derivatization and use of green chemical for synthesis.
CHEMISTRY-UG Paper Code-DSE-III LAB Sem-VI	Green Chemistry DSE-III Elective Practical	Learning the alternative source of energy and basic of green chemistry technique for the synthesis by choosing safer starting materials, renewable resources and avoiding waste as well as the use of enzymes as catalysts for various synthesis.
CHEMISTRY-UG Paper Code-DSE-IV Sem-VI	Instrumental Methods of Chemical DSE-IV Elective	Advance learning of basic principle of different spectroscopy and spectrophotometry techniques for qualitative and quantitative analysis of different chemical compounds using the Infrared, UV-Visible, NMR, and mass spectrometry.
CHEMISTRY-UG Paper Code-DSE-IV LAB Sem-VI	Instrumental Methods of Chemical DSE-IV Elective Practical	Advance learning methodology for characterization of chemical compound using the Infrared, UV-Visible, NMR, and mass spectrometry as well as electroanalytical methods.

BSc GEOGRAPHY

PSO: The student understands the basic concepts in Physical and Human Geography in the real world. He/she is also updated with the recent trends in the subject. The student also builds a sound base for various post graduate courses in Geography and related fields like Remote Sensing & GIS, Population Studies, MSW etc.

Class/Paper/ Semester	Title	Course Outcome
GEOGRAPHY Hons Core Paper I Sem I	GEOTECTONIC	Students develop knowledge of the Earth as a dynamic system. The objectives of this course are: a) explaining the Fundamentals of Geotectonic; b) understanding crustal mobility and tectonics; with special emphasis on their role in landform development; c) relation of structure with tectonic movement; d) establishing the relationships between landforms, processes and underlying structure.
GEOGRAPHY Hons Core Paper Ⅱ Sem I	GEOMORPHOLOGY	Students gain knowledge the various geomorphological processes of various environment, identify the various landform features and landscape, detect the natural and environmental hazards efficiently, vulnerability studies, know the geology, archeology, engineering, planning, mining, construction, urbanization etc.
GEOGRAPHY GENERAL GE-I, Sem I	GOEGRAPHY OF TOURISM	Tourism geography studies the relations between places, landscapes and people, describing travel and tourism as an economic, social and cultural activity. More concisely, it is all about the spatial and temporal dynamics, as well as the interactions between the tourism resources.
GEOGRAPHY Hons Core Paper Ⅲ Sem II	SOCIAL AND CULTURAL GEOGRAPHY	The study of social and cultural geography helps to identify social **relations, identities and inequalities,** cultural assimilation, diffusion are created and how these social creations vary over space and the role of space in their construction is the principle distinction.
GEOGRAPHY Hons Core Paper Ⅳ Sem II	FUNDAMENTAL HYDROLOGY	Students learn the distribution and movement, recharge, discharge of water both on and below the earth surface of various environment, impact of human activity on water availability and conditions.
GEOGRAPHY GENERAL GE-Ⅱ, Sem II	DISASTER MANAGEMENT	Students develop efforts and skill to reduce or avoid the potential losses from hazards and disaster, assure prompt and appropriate assistant to the victims of a hazards and disaster and achieve a rapid and effective recovery.
GEOGRAPHY Hons Core Paper V Sem III	CLIMATOLOGY	Climatology is the study of climate and how it changes over time. This science helps for better understanding of the atmospheric conditions that cause weather patterns and temperature changes over time. Students can better interpret every climatic phenomenon that happens in time.
GEOGRAPHY Hons Core Paper VI Sem III	GEOGRAPHY OF INDIA	One should know his country from various aspects like Physical setting, climate, economy, culture etc. This course helps to know the details of our country.
GEOGRAPHY Hons Core Paper VII Sem III	STATISTICAL METHODS IN GEOGRAPHY	Students develop basic understanding with various types of data and their analysis using statistical method for meaningful inferences.

GEOGRAPHY Hons SEC-I Sem III	ADVANCE STATISTICAL TECHNIQUES	This course gives hands on training for using various statistical software far data analysis and graphs and diagrams
GEOGRAPHY GENERAL GE - III, Sem III	GOEGRAPHY OF TOURISM	Tourism geography studies the relations between places, landscapes and people, describing travel and tourism as an economic, social and cultural activity. More concisely, it is all about the spatial and temporal dynamics, as well as the interactions between the tourism resources.

Class/Paper/ Semester	**Title**	**Course Outcome**
GEOGRAPHY Hons Core Paper VIII Sem IV	REGIONAL PLANNING AND DEVELOPMENT	Students develop efforts and skill to reduce or avoid the potential losses from hazards and disaster, assure prompt and appropriate assistant to the victims of a hazards and disaster and achieve a rapid and effective recovery.
GEOGRAPHY Hons Core Paper IX Sem IV	ECONOMIC GEOGRAPHY	Understand the economic structure of India and the economic scenario globally. Gains knowledge about several theories and economic policies of the country.
GEOGRAPHY Hons Core Paper X Sem IV	ENVIRONMENTAL GEOGRAPHY	Students can represent a critically important set of analytical tools for assessing the impact of human presence on the environment by measuring the result of human activity on natural landforms, global warming and cycles etc.
GEOGRAPHY Hons SEC - II Sem IV	REMOTE SENSING AND GIS (TECHNIQUS)	This field aims at providing an in-depth understanding and practical knowledge about the application of Remote Sensing and GIS technology. Care of practical applications and spatial data examples, students will be provided with the necessary skills to generate and analyze high-level remote sensing products. The objectives of this course are: a) to train students on RS data type and formats, imagery products, and their utility; b) use GIS-software (ArcGIS 10.6) to conduct basic data processing and analysis on geospatial data; c) to give principles and methods of multi-spectral data fusion, multi temporal processing, and accuracy assessment; d) students will learn how to prepare map based on GIS.
GEOGRAPHY GENERAL GE -IV, Sem IV	DISASTER MANAGEMENT	After learning the course, the students should be able to: a) understand disasters, types of disaster, disaster preparedness, and mitigation measures; b) understand disaster management acts and guidelines; c) understand the role of remote sensing and GIS in risk reduction.
GEOGRAPHY Hons Core Paper XI Sem V	FIELDWORK AND RESEARCH METHODOLOGY	Students learn preliminary steps towards research work, gaining knowledge of various methods to approach various research issues, literature review, data analysis, report writing etc.
GEOGRAPHY Hons Core Paper XII Sem V	REMOTE SENSING AND GIS	This course provides students with foundations of RS theory, RS image processing techniques, and applications. The objectives of this course are: a) to provide background knowledge and understanding of principles of RS and RS systems; b) to enhance students' capacity to interpret images and extract information on the earth surface from multi-

		spectral and multi-resolution imagery at multi-scale level; c) to acquire skills on basic image processing, classification techniques, and overlay analysis.
GEOGRAPHY Hons DSE – I, Sem V	POPULATION GEOGRAPHY	Students get conversant with basic ideas of population studies and learn various methods and techniques used for analysis of population data
GEOGRAPHY Hons DSE–II, Sem V	URBAN GEOGRAPHY	Urban Studies provides a broadly interdisciplinary understanding of how urban dynamics shape both global interdependence and local spaces. It emphasizes how cities are increasingly critical to the organization of economic, social, and cultural activities that shape and transform human experience.

Class/Paper/ Semester	**Title**	**Course Outcome**
GEOGRAPHY Hons Core Paper XIII Sem VI	GEOGRAPHICAL THOUGHT	Understand the geography of past times and how geography has played important roles in the evolution of people, their ideas, places and environments.
GEOGRAPHY Hons Core Paper XIV Sem VI	SOIL AND BIOGEOGRAPHY	Development of necessary knowledge on soil and biotic world and various lab techniques of soil analysis
GEOGRAPHY Hons DSE -III, Sem VI	POLITICAL GEOGRAPHY	Political geography could maximize its contribution to the understanding of the citizen–state relations and social transformation by paying increasing attention to the dynamics and geographical difference of social movements and their intimate relationships with formal institutions.
GEOGRAPHY Hons DSE- IV Sem VI	SETTLEMENT GEOGRAPHY	Understand about the nature & scope of rural settlement geography. Compare the theories & models of settlement diffusion and understand the settlement type, pattern & nature of different rural and urban settlements.

BSc MICROBIOLOGY

PSO: The student understands the basic concepts in Microbial Diversity and Microbial World. They also get idea about the challenge of microbiologists in the real world. Students can also updated with the recent trends in the subject and their related fields.

Class/ Paper/ Semester	Title	Course Outcome
Microbiology Hons Core Paper I MCBC – 101 Semester I	Introduction to Microbiology and Microbial Diversity	Students learn to appreciate the history and fundamental concepts of varied groups of microorganism and properties of bio macromolecules.
Microbiology Hons Core Paper II MCBC – 102 Semester I	Bacteriology	Students able to know different cell organization, bacteriological techniques and systematics. They also know regarding the nutrition, growth, reproduction of eubacteria and archaebacterial.
Microbiology Hons Core Paper III MCBC – 201 Semester II	Biochemistry	Students achieve a basic understanding of bioenergetics, carbohydrates, proteins, lipids, enzymes and vitamins.
Microbiology Hons Core Paper IV MCBC – 202 Semester II	Virology	Students able to know about nature and properties of viruses, brief information about bacteriophages. They also able to know about viral transmission, viral replication of different viruses, brief information of cancer and prevention and control of viral diseases; application of virology.
Microbiology Hons Core Paper V MCBC – 301 Semester III	Microbial Physiology and Metabolism	Students achieve a basic understanding of microbial growth, nutrient uptake and transport. They also get the information regarding chemoheterotrophic, chemolithotrophic, phototrophic and nitrogen metabolism.
Microbiology Hons Core Paper VI MCBC – 302 Semester III	Cell Biology	Students able to know about the brief information of Eukaryotic cell like structure and organization. They also know protein sorting and transport, cell signaling and cell cycle.
Microbiology Hons Core Paper VII MCBC – 303 Semester III	Molecular Biology	Learners can understand the basis of biological genetic information like structure of genetic material, replication, transcription, translation, gene regulation of Eukaryotes and Prokaryotes.
Microbiology Hons Skill Enhancement Course -1 (SEC-1) Semester III	Microbiological analysis of Air and Water	Students can understand about microbiological analysis of air and water and the information of different air borne and water borne diseases and their control measures.
Microbiology Hons Core Paper VIII MCBC – 401 Semester IV	Microbial Genetics	Learners can understand the basis of biological genetic information of genome organization, plasmids, mutation, and mechanism of genetic exchange, transposable elements and phage genetics.
Microbiology Hons Core Paper IX MCBC – 402 Semester IV	Environmental Microbiology	Students learn the impact of microorganisms in all Environments and their applications in waste management, bioremediation. They also know about microbial interaction and biogeochemical cycling.
Microbiology Hons Core Paper X	Food and Diary Microbiology	Students learn the impact of microorganisms and their applications in Food and Dairy Industry. They also get information regarding food spoilage, fermented foods, food borne diseases, food sanitation

MCBC – 403 Semester IV		and food preservation.
Microbiology Hons Skill Enhancement Course -2 (SEC-2) Semester IV	Bio-fertilizer and Bio-pesticides	Students conceptualize about biofertilizers, phosphate solubilizer and bioinsectisides.
Microbiology Hons Core Paper XI MCBC – 501 Semester V	Industrial Microbiology	Students study techniques in different aspects of Industrial microbiology and fermentation processes and are made aware of their commercial and economic aspects.
Microbiology Hons Core Paper XII MCBC – 502 Semester V	Immunology	Students conceptualize virulence factors of pathogens and the intricate molecular mechanisms in causing diseases, exposed to methods in Diagnostic microbiology. They are introduced to basic concepts of Immunology and different immunological techniques.
Microbiology Hons Discipline Specific Elective – 1(DSE-1)	Microbes in Sustainable Agriculture and Development	Students will be able to know soil microbiology, microbial activity in soil and greenhouse gases, biofertilization, bioinsecticides, GM crops, biofuels, biomanure and microbial control of soil borne plant pathogen.
Microbiology Hons Discipline Specific Elective – 2(DSE-2)	Microbial Biotechnology	Learners can understand microbial, therapeutic and industrial biotechnology and their applications. They also get information regarding biotransformation, microbial products and their recovery, RNAi and intellectual property rights.
Microbiology Hons Core Paper XIII MCBC – 601 Semester VI	Medical Microbiology	Learners can understand the basic idea regarding normal microflora of the human body and host pathogen interaction. They also get information regarding the causative agent, symptoms, mode of transmission, prophylaxis and control of bacterial, viral, protozoan and fungal diseases.
Microbiology Hons Core Paper XIV MCBC – 602 Semester VI	Recombinant DNA Technology	Students will be able to know regarding genetic engineering, molecular cloning, DNA amplification and sequencing, construction and screening of genomic and cDNA libraries and application of RDT.
Microbiology Hons Discipline Specific Elective – 3(DSE-3)	Biosafety and Intellectual Property Rights	Learners get information of biosafety guidelines and brief introduction regarding intellectual property, grant of patent, and patent infringement.
Microbiology Hons Discipline Specific Elective – 4(DSE-4)	Project Work	Students undertake to submit small Research Proposals and carry out Research Dissertations in the final semester. They have to give presentation and reviews of literature related to various current trends in the subject area.

B.Sc NUTRITION

PSO: The student understands the basic concepts of Nutrients, food chemistry. This subject allows students to combine the knowledge of human physiology, microbiology and biochemistry with food science to apply the knowledge on the field of food processing, food safety and for the planning and preparation of dietary guidelines for the individual specifically on the basis of age, height, weight, etc and for the community also to create, promote and aware about the need and importance of balance nutrition and to prevent and break the vicious cycle of malnutrition. Learning the pathophysiology of diseases associated with the understanding of the requirements of specific nutrient or combine of nutrients to prevent the outbreak or to cure from the specific disease and act as nutraceuticals. This correlates with the role of various nutrients to safeguard against disease or disorders. Learning concepts of biostatistics and research methodology allows them to make a path for future experimental studies and interpretation of statistical data on their own.

Class/Paper/Semester	Title	Course Outcome
Nutrition Hons Core Paper 1 Sem-I	Basic Nutrition	Learning about the basic concept of food and nutrition and their role in maintaining good health. This course disseminates the general concept of balance diet and its importance and also provides the idea about the requirement of vitamins and minerals in our daily life.
Nutrition Hons Core Paper 2 Sem-I	Human Physiology	The course provides concept about the different physiological systems and vital organs. The students know about the functions of various organs in our body and can able to combine their knowledge how food and nutrient interact and affect with these organs and tissues within the systems.
Nutrition Hons Core Paper 3 Sem-II	Nutritional Biophysics & Chemistry of Bio-molecules	This course gathers the knowledge about the chemistry of different biomolecules and their interaction and importance within the body. This also focuses the basic building blocks of the body and introduce about the study of genetics and nucleic acid.
Nutrition Hons Core Paper 4 Sem-II	Community Nutrition and nutritional epidemiology	Provides the view of community nutrition, demography, and the possible causes of malnutrition, mortality and morbidity in community. The role of various organisation to minimise and irradicate the malnutrition associated problems and improve the health of community people.
Nutrition Hons Core Paper 5 Sem-III	Nutritional Biochemistry	Students learn about the metabolism of important macronutrients i.e. carbohydrate, protein and fat within the body and the interaction of these nutrients and their impact. This course also provides the knowledge about the concept of anabolism, catabolism and energy production from metabolic pathway especially from electron

		transport chain via oxidative phosphorylation.
Nutrition Hons Core Paper 6 Sem-III	Food Commodities	This course enhances the concept of various food and their nutritional values for health and preventing disease. Students may learn about the different food processing methods to improve the nutritional values of food. This course also improves the knowledge of identifying quality food products and their merits in daily basis.
Nutrition Hons Core Paper 7 Sem-III	Family Meal Management and Meal Planning	Students learn about the basic nutritional and physiological needs in various life stages i.e. from infancy to old age of an individual's entire life. This course also offers the concept of physiological changes throughout the life cycle. Students may gain about the theoretical basis of how to formulate and plan a diet for an individual as per their physiological condition to meet their optimum nutritional requirement.
Nutrition Hons Skill Enhancement Course 1 (A/B) Sem-III	BiostatisticsOREntrepreneurship Development	This course provides an introduction to a variety of statistical methods of use in describing and analysing biological data, types of biological data, descriptive statistics and learning about tabulation of data, measurements of central tendency, test of significance and graphical presentation of statistical data and their interpretation. Students will learn about how to develop and organize a small business with small resourses.
Nutrition Hons Core Course 8 Sem-IV	Dietand Diseases	Students learn about the pathophysiology of various disease associated with different factors. And also learn about to formulate and plan the specific modified diet to cure the disease.
Nutrition Hons Core Course 9 Sem-IV	FoodMicrobiology	This course offers the students to understand about microorganisms present in food and other matters, to provide knowledge to identify good and disease causing microbes. This also introduces the several environmental factors for multiplication and growth of microbes and their utilization in sectors.
Nutrition Hons Core Course 10 Sem-IV	Food ProcessingandPreservation	This course introduces and discuss about various methods of preservation and processing of foods for increasing their shelf life. Students get to know about how to

		minimise the food wastage and store them for future use.
Nutrition Hons Skill Enhancement Course 2 (A/B) Sem-IV	Basic Molecular Biology OR Sports Nutrition	This course discuss about the structure of DNA, RNA, introduces the process of replication, transcription and translation to understand about the genomics. Learn about the endurance activity, different aerobic and anaerobic exercise. To disseminates the understanding about the energy and other nutritional needs during sports and exercise.
Nutrition Hons Core Course 11 Sem-V	Public Health and hygiene	Describe and understand the public health importance of public institutions, explain the basic hygiene requirements of institutions, describe the activities needed for planning the promotion of hygiene and sanitation in local institutions, create awareness and influence to promote the concepts of hygiene and hygiene practices in the community for improved public health.
Nutrition Hons Core Course 12 Sem-V	Research Methodology	Learning general definition of research design. To know the importance and identify the overall process of designing a research study, learning about the variables, hypothesis, and methods of data collection and interpretation for a scholarly education study.
Nutrition Hons Discipline Specific Elective 1 (1/2) Sem-V	Food Sanitation and Hygiene OR Microbiological Safety of Foods	Students know about the safety regards including hygiene and sanitation practices to prevent the occurrence of microbes in food and other matters and to prevent the several pathological conditions. To know about the microbial spoilage of foods and associated health complications.
Nutrition Hons Discipline Specific Elective 2 (1/2) Sem-V	Quality control and food standard OR Food Quality and Sensory Evaluation	This course associated with various National and International standards for the production of quality food products and to provide safe food to the consumer. This also elaborates the safety of food production and discuss about the characterization of food.
Nutrition Hons Core Course 13 Sem-VI	Dietetics and Counselling	Learn about the concept of psychology, skill and the process of dietary counselling for improving the patient's health and mental health. To know about the patient education by dietitian and the different aids and techniques of patients education used in several hospitals and clinics.
Nutrition Hons		Students learn about the managerial

Core Course 14 Sem-VI	Entrepreneurship development, Enterprise management and Entrepreneurship for small catering units	principles, marketing management and financial management in a business. Also know how to make a menu in a food service unit and the process and planning of a small business.
Nutrition Hons Discipline Specific Elective 3 (1/2) Sem-VI	Geriatric Nutrition OR Personnel Management and Food Service Management	Introduce about physiological changes, heath issues and challenges during old age and the role of various agencies in maintaining the heath of geriatric person. Learn about the personal management, organizational management and various labour policies and legislation in a food service unit.
Nutrition Hons Discipline Specific Elective 4 (1/2) Sem-VI	Food packaging OR Bakery Technology and Mushroom Culture	Students learn about different packaging materials, goods, machinery used in food processing industries. They can use this knowledge in future prospect. They know about the various technique and sources used for the production of bakery foods and identify the life cycle of mushrooms and their nutritive value. To know the characteristics and harmful effect of poisonous mushrooms on health.

BSc PHYSIOLOGY

PSO: The students understand the basic concepts in System Physiology, Biochemistry, Microbiology, Immunology and Molcularbiology. He / she has been updated with the recent trends in the subject. The students also build a sound base for various post graduate courses in Physiology, biotechnology, clinical nutrition, biomedical science and in the field of other related subjects of life science.

Class/ Paper/ Semester	Title	Course Outcome
Physiology Hons: Sem I Core Paper I	Cellular basis of physiology	Learning the cellular basis of physiology
Physiology Hons: Sem I Core Paper II	Biological physics and enzymes	Learning the biophysical principle of physiological functions enzyme kinetics
Physiology Hons: Sem II Core Paper III	Physiology of nerve and muscle cells	Learning the nerve muscle connection and molecular basis of muscle contraction
Physiology Hons: SemII Core Paper IV	Chemistry of bio-molecules	Learning the fundamental chemistry of biomolecules and their importance in the formation of basic building blocks
Physiology Hons: SemIII Core Paper V	Circulating body fluids	Learning the features and functional aspects of hematology
Physiology Hons: SemIII Core Paper VI	Circulation	Learning the regional circulation and their peculiarities
Physiology Hons: SemIII Core Paper VII	Functions of the nervous system	Learning the structural and functional basis of central nervous system
Physiology Hons: SemIV Core Paper VIII	Nutrition, energy balance and metabolism	Learning the fundamentals of nutrition and biochemical basis of metabolism
Physiology Hons: SemIV Core Paper IX	Digestion and gastrointestinal functions	Learning the process of digestion and functions of GI tract
Physiology Hons: SemIV Core Paper X	Respiration- gaseous exchange	Learning the mechanism of respiration , gas transport and acclimatization
Physiology Hons: SemV Core Paper XI	Special senses	Learning the molecular basis of sensory physiology
Physiology Hons: SemV Core Paper XII	Endocrinology	Learning the functional aspects of endocrine glands amd regulation of metabolism
Physiology Hons: SemVI Core Paper XIII	Reproduction & embryology	Learning the physiological basis of reproduction and development of fetus
Physiology Hons: SemVI Core Paper XIV	Formation and excretion of urine	Learning the formation of urine and mechanism of micturation.

B. Sc. COMPUTER SCIENCE

PSO: The undergraduate student will be enriched with the fundamental bits of knowledge in Computer Science in the domain of the real world. Students are also upgraded with the recent trends in the subject. The student also builds a knowledge base for various postgraduate courses in Computer Science and allied fields. Following are the silent key objectives:

1. The student gets familiar to various core technologies in the IT industry such as programming, testing, operating system administration, networking, website designing, databases etc.
2. The syllabus also covers subjects to develop soft skills of students which enables them to prepare a better resume, interviews, leadership skills, etc.
3. This enables the student to get absorbed in the campus placement.
4. The syllabus prepares the students to prepare for certification courses.
5. The course enables the students for higher studies like postgraduate programs M. Sc., MCA in Computer Science or with other allied subjects.

Class/ Paper/ Semester	Title	Course Outcome
COMPUTER SCIENCE Hons Core Paper I Sem I	Programming Fundamentals using C/C++	The objective of this course is to provide a comprehensive study of the C and C++ programming language, stressing upon the strengths of C, and C++, which provide the students with the means of writing modular, efficient, maintainable, and portable code.
COMPUTER SCIENCEHons Core Paper Ⅱ Sem I	Computer System Architecture	The objective of this paper is to understand the number formatting system of the Universe and System. Concept of buffer and frames also introduce to the learners so as to visualise the storage locations of the data better. To understand the structure and operation of modern processors and their instruction sets.
COMPUTER SCIENCE Minor Generic Elective Papers (GE) (Minor – Computer Science) Paper I Sem I	Computer Fundamentals	To understand computer system, uses, types, memory, data representation and overview of emerging technologies.

COMPUTER SCIENCE Hons Core Paper Ⅲ Sem II	Programming in JAVA	The objective of this course is to teach the learner how to use Object Oriented paradigm (OOP) to develop code and understand the concepts of Core Java and to cover-up with the pre-requisites of Core java.
COMPUTER SCIENCE Hons Core Paper Ⅳ Sem II	Discrete Structures	The purpose of the course is to familiarise the prospective learners with mathematical structures that are familiarise the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and graph theory. The purpose of this course is also to familiarise students with basics of Statistics and probability. This will be essential for prospective researchers and professionals to know these basics. To give the learner a broad exposure of combinatorial Mathematics through applications especially the Computer Science applications.
COMPUTER SCIENCE Minor Generic Elective Papers (GE) (Minor – Computer Science) Paper II Sem II	Introduction to Programming	The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.
COMPUTER SCIENCE Hons Core Paper V Sem III	Data Structures	To explore and understand the concepts of Data Structures and it's significance in programming. Provide and holistic approach to design, use, and implement abstract data types. Understand the commonly used data structures and various forms of its implementation for different applications using C/C++/Java.

COMPUTER SCIENCE Hons Core Paper VI Sem III	Operating Systems	Learners must understand proper working of operating system. To provide a sound understanding of Computer operating system, its architectures, functioning, processing and algorithms.
COMPUTER SCIENCE Hons Core Paper VII Sem III	Computer Networks	To understand the concepts of networking and data communication. In this era of Information, its computation and its exchange techniques, learner should be able to conceptualise and understand the framework and working of communication networks. And on completion, will be able to have a firm grip over this very important segment of Internet.
COMPUTER SCIENCE Hons Sem III SEC –1	Option-I: HTML Programming LAB Option-II: UNIX/LINUX Programming LAB	Option-I: To understand basic of HTML, links, images, form design, CSS etc. Option-II: This course introduces basic commands, shell programming with various tools and techniques commonly used by UNIX/Linux programmers, system administrators and naive users to achieve their operational works in UNIX/Linux environment.
COMPUTER SCIENCE Minor Generic Elective Papers (GE) (Minor – Computer Science) Paper III Sem III	Introduction to Programming	The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.

COMPUTER SCIENCE Hons Core Paper VIII Sem IV	Design and Analysis of Algorithms	1. To understand basic principles of algorithm design and why algorithm analysis is important. 2. To understand how to implement algorithms in C/C++. 3. To understand how to transform new problems into algorithmic problems with efficient solutions. 4. To understand algorithm design techniques for solving different problems.
COMPUTER SCIENCE Hons Core Paper IX Sem IV	Software Engineering	To understand the concept of designing a software, to understand the Software Development Life Cycle Phases and to have awareness about the software metrics and testing. To understand the importance of software Testing and the overall process.
COMPUTER SCIENCE Hons Core Paper X Sem IV	Database Management Systems	The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to understand creation, manipulation and querying of data in databases and to explore the idea behind PL/SQL.
COMPUTER SCIENCE Hons Sem IV SEC –2	Option-I: Programming in MATLAB Option-II: Programming in Python	Option-I: To understand fundamentals of MATLAB, programming environment, graph plotting, procedures and functions, control statements, manipulating texts, and GUI interface. Option-II: The objective of this paper is to explore the style of structured programming to give the idea to the students how programming can be used for designing real life applications by reading/writing to files, GUI programming, interfacing database/networks and various other features.

COMPUTER SCIENCE Minor Generic Elective Papers (GE) (Minor – Computer Science) Paper IV Sem IV	Computer Fundamentals	To understand computer system, uses, types, memory, data representation and overview of emerging technologies.
COMPUTER SCIENCE Hons Core Paper XI Sem V	Internet Technologies	To provide insight into emerging technologies to design and develop state of - the art web applications using client - side scripting, server - side scripting, and database connectivity. To explore JSP technologies for designing and developing dynamic, interactive and responsive web applications.
COMPUTER SCIENCE Hons Core Paper XII Sem V	Theory of Computation	To provide the comprehensive insight into theory of computation by understanding grammar, languages, and other elements of modern language design. Also, to develop capabilities to design and develop formulations for computing models and identify its applications in diverse areas.
COMPUTER SCIENCE Hons Sem V DSE –1	Option-I: Microprocessor Option-II: Digital Image Processing	Option-I: The objective of this paper is to understand the structure and operation of modern processors and their instruction sets. Option-II: To understand fundamentals of Digital image Processing like pixel, filtering, image restoration, image compression, morphological image processing, and segmentation etc.
COMPUTER SCIENCE Hons Sem V DSE –2	Numerical Methods	To understands Floating point representation and computer arithmetic, different models of linear and non-linear systems, interpolation methods, Extrapolation methods, iterative methods, and numerical integration method etc. To enlighten them with numerical analysis of engineering problems which cannot be done analytically.

COMPUTER SCIENCE Hons Core Paper XIII Sem VI	Artificial Intelligence	To understand Artificial Intelligence, Background and Applications, Problem Solving and Searching Techniques, Knowledge Representation with PROLOG, Dealing with Uncertainty and Inconsistencies , and Understanding Natural Languages.
COMPUTER SCIENCE Hons Core Paper XIV Sem VI	Computer Graphics	To understand the hardware structure and pictures representation in memory so that designing graphics objects become easy. To explore the ways of animation to add the same onto the created object.
COMPUTER SCIENCE Hons Sem VI DSE –3	Option-I: System Programming Option-II: Big Data Analytics	Option-I: To understand Assemblers & Loaders, Linkers, phases of Compiler, Lexical analysis, parsing, and code generation etc. Option-II: To understand big data, data mining, data processing, graphical plotting etc. with R languages.
COMPUTER SCIENCE Hons Sem VI DSE –4	Project Work / Dissertation	To formulate the real life problems. The objective is to understand the pattern behind project dissertation and to know the nuances of managing the software projects.

BSc STATISTICS

PSO: The student understands the basic concepts of statistics and to some extent mathematical concepts required for computations and their various real life applications. He/she is also updated with the recent trends in the subject. The student also builds a sound base for various post graduate courses in Statistics and related fields.

Class/Paper/ Semester	Title	Course Outcome
STATISTICS Hons Core Paper I Sem I	Descriptive Statistics	Learning the basic terminologies of statistics, representing the data by means of diagrams and graphs, learning the statistical concepts of central tendency, dispersion, skewness, kurtosis, index numbers, calculating and interpreting their values and thus analyzing and comparing different sets of data.
STATISTICS Hons Core Paper Ⅱ SemI	Calculus	Learning to compute limits, derivatives, integrals and using them to analyze different types of functions and recognizing the appropriate tools of calculus to solve applied problems.
STATISTICS Hons Core Paper Ⅲ Sem II	Probability and Probability Distributions	Developing problem solving techniques needed to accurately calculate probabilities, translating real world problems to probability models, applying selected probability distributions to real world problems, solve them and present the analysis of derived statistics.
STATISTICS Hons Core Paper Ⅳ Sem II	Algebra	Learning the process of finding the roots of polynomial equations , development of the vector space and the use of computational techniques and algebraic skills essential for the study of different operations in matrix algebra.
STATISTICS Hons Core Paper V Sem III	Sampling Distributions	Understanding the usefulness and the applications of Central Limit theorem, investigating the variability in sample statistics from sample to sample, finding the measures of central tendency and dispersion of distribution of sample statistics and thus using them to make conclusions about problems that arise in applied statistics.
STATISTICS Hons Core Paper VI Sem III	Survey Sampling and Indian Official Statistics	Learning how to design and implement surveys, estimatesample size for different sampling designs in order to estimatepopulation level point estimates and testing null hypothesis, understand concepts and techniques in sampling methods, understanding the functioning of official statistics.
STATISTICS Hons Core Paper VII Sem III	Mathematical Analysis	Learning the concept of limit, continuity, sequence, seriesetc. techniques from analysis and their use in many areas ofmathematics including analytic number theory, continuousprobability, partial differential equations etc. Learning the use of numerical methods to find approximate solutions of equations when exact solutions cannot be determined.
STATISTICS Hons Skill Enhancement Paper I Sem III	Statistical Data Analysis Using Software Package SPSS	Performing a wide range of data management tasks, descriptive statistics and graphics, and basic inferential statistics for comparisons and correlations, creating simple tables, charts and thus perform statistical analysis of data.

STATISTICS Hons Core Paper VIII Sem IV	Statistical Inference	Drawing conclusions about the whole population on the basis of a sample by deducing properties of an underlying probability distribution by analysis of data drawn from the population.
STATISTICS Hons Core Paper IX Sem IV	Linear Models	Learning the usefulness of linear models and how to apply them in practice, identifying the type of linear model to be used according to the situation in real life problems, fit and estimate the appropriate model and also performing some diagnostic checks in the fitted model.
STATISTICS Hons Core Paper X Sem IV	Statistical Quality Control	Learning the role of quality control in production and service operations: methods to detect the lack of control in a production process through control charts, inspection of product lots to detect its quality and then applying appropriate tools to bring the process under control or to make the quality of the product as per standard quality.
STATISTICS Hons Skill Enhancement Paper II Sem IV	Statistical Data Analysis Using R	Learning how to analyze and visualize data in R and create reproducible data analysis reports, demonstrate a conceptual understanding of the unified nature of statistical inference, perform statistical inference and modeling to understand natural phenomena and make data-based decisions and communicate statistical results correctly and effectively.
STATISTICS Hons Core Paper XI Sem V	Stochastic Processes and Queuing Theory	Learning how to model complex systems with uncertainity using random processes and to analyze the system performance.
STATISTICS Hons Core Paper XII Sem V	Statistical Computing Using C/C++ Programming	Learning how to choose appropriate data structures to represent data items in real world problems, designing programs using variety of data structures and analyzing and implementing various kinds of searching and sorting techniques.
STATISTICS Hons Disciplinary Specific Elective Paper I Sem V	Time Series Analysis	Getting acquainted with the main concepts of time series theory and methods of analysis, knowing how to use them in examining and analyzing economic and financial processes.
STATISTICS Hons Disciplinary Specific Elective Paper II Sem V	Demography and Vital Statistics	Understanding how a population is coping with the burdens of reproduction and mortality, learning the various measures of mortality, fertility and their interpretation, use of life table and various measures of population growth.
STATISTICS Hons Core Paper XIII Sem VI	Design of Experiments	Learning how to plan, design and conduct experiments efficiently and effectively so that the data obtained can be analyzed to yield objective conclusions.
STATISTICS Hons Core Paper XIV	Multivariate Analysis and Nonparametric	Understanding basic concepts associated with multivariate distributions and their properties, analyzing multivariate data with data reduction techniques, classification method of multivariate data, drawing conclusion

Sem VI	Methods	about a completely unknown population using a random sample from the population by non-parametric techniques.
STATISTICS Hons Disciplinary Specific Elective Paper III Sem VI	Operations Research	Learning to formulate and solve problems as networks and graphs, to construct linear integer programming models and discuss the solution techniques, to set up decision models and use some solution methods for nonlinear optimization problems, to propose the best strategy using decision making methods under uncertainty and game theory, to solve multi-level decision problems using dynamic programming method and to use computer softwares like LINGO to solve decision models.
STATISTICS Hons Disciplinary Specific Elective Paper IV Sem VI	Project Work	To analyze and interpret and take appropriate decisions in solving real life problems using statistical tools, using different Statistical packages for graphical interface, data analysis and interpretation and write a systematic Statistical project report.
STATISTICS Generic Elective Paper I	Basic Statistics & Probability	Learning the knowledge of Statistics and scope of Statistics, concepts of statistical data collection and interpretation, understanding the axiomatic formulation of modern probability theory and think of random variables as an intrinsic need for the analysis of random phenomena. Learning how to characterize probability models and function of random variables based on single and multiple random variables.
STATISTICS Generic Elective Paper II	Statistical Inference & Applied Statistics	Drawing conclusions about the whole population on the basis of a sample drawn from the population, identifying the type of analysis of variance(ANOVA) model to be used according to the situation in real life problems, fit and estimate the appropriate model, getting acquainted with the main concepts of time series theory and methods of analysis, knowing how to use them in examining and analyzing economic and financial processes, learning the role of quality control in production and service operations.

B.SC PHYSICS

PSO: The student understands the basic rules of the material world. Student is also updated with the recent trends in the subject. Apart from building a sound base for various post graduate courses in Physics and related fields, the course is targeted towards the development of logical thinking, unbiased reasoning and self-sufficientsturdiness. The emphasis of course is on applications in solving problems of interest to physicists.

Class/ Paper/Semester	TITLE	Course Outcome
Physics Hons Core Paper-1 Semester-1	**Mathematical Physics-I**	To be able to solve first and second order ordinary differential equations important in the physical sciences. To learn about vector differential operator, curvilinear coordinates, theory of probability and delta function.
Physics Hons Core Paper-1 Semester-1	**Mathematical Physics-I Lab**	The aim of this Lab is to use of computational methods to solve physical problems
Physics Hons Core Paper-2 Semester-1	**Mechanics**	To be able to apply Newton's laws and to describe the rotational motion of rigid bodies. To learn the basic of general properties of matter, central force and Special theory of relativity
Physics Hons Core Paper-2 Semester-1	**Mechanics Lab**	Aim of this lab is to familiarize with different measurement tools and apply them to find different physical parameters
Physics Hons Core Paper-3 Semester-II	**Electricity and Magnetism**	The aim is to familiarize with the fundamental concepts and laws in electrostatic, electricity and magnetism and to solve problems.
Physics Hons Core Paper-3 (LAB) Semester-II	**Electricity and Magnetism Lab**	Aim of this lab is to familiarize with different electrical instruments and to use them in reality for measurement purpose.
Physics Hons Core Paper-4 Semester-II	**Waves and Optics**	To get concepts of simple harmonic motion and superposition of waves. To understand different optical phenomena on the basis of superposition.
Physics Hons Core Paper-4 (LAB) Semester-II	**Waves and Optics Lab**	Aim of this lab is to familiarize with different optical instruments. To use them to find unknown wavelength emitted from some monochromatic source and to realize the superposition of light waves.
Physics Hons Core Paper-5 Semester-III	**Mathematical Physics-II**	To learn to expand a function in a Fourier series and to be Familiarized with different polynomials, Beta and gamma functions and method of separation of variables.

Physics Hons Core Paper-5 (Lab) Semester-III	**Mathematical Physics-II Lab**	This lab is oriented towards proper understanding of theories by using 3D models using sophisticated mathematical software
Physics Hons Core Paper-6 Semester-III	**Thermal Physics**	To learn the laws of thermodynamics and to acquire knowledge of different thermodynamic parameters including free energies. And also learn the kinetic theory of gases to relate macroscopic properties of gas to the behavior of the individual molecules of ideal gas as well as real gas.
Physics Hons Core Paper-6 (Lab) Semester-III	**Thermal Physics Lab**	This Lab helps the student to learn thermodynamics as a phenomenological science.
Physics Hons Core Paper-7 Semester-III	**Digital Systems and Applications**	This course covers the basic concept of digital circuits using Boolean algebra and Karnaugh map circuits' simplification. Additionally, different combinational and sequential circuit designing offers to the students to understand many digital devices.
Physics Hons Core Paper-7 (Lab) Semester-III	**Digital Systems & Applications Lab**	To design and verify digital circuits using different integrated chips in the laboratory.
Physics Hons Skill Enhancement Course-1 Semester-III	**ELECTRICAL CIRCUITS AND NETWORK SKILLS**	After this course the students are expected to be able to analyze and detect fault in simple household electrical wirings and overcome problems.
Physics Hons Core Paper-8 Semester-IV	**Mathematical Physics III**	To have a good knowledge of the basic elements of complex analysis including the residues of a complex functions and use the residue theorem to compute certain types of integrals. To be aware of the integral transforms and be able to use them to solve problems.
Physics Hons Core Paper-8 (Lab) Semester-IV	**Mathematical Physics-III Lab**	This course provides computational ideas for performing many differential equations, Fourier transforms, Dirac delta functions, etc. using C + or Scilab.
Physics Hons Core Paper-9 Semester-IV	**Elements of Modern Physics**	This course gives a bird's eye view of all the advancement in the present days in the scientific domain with proper qualitative reasoning.
Physics Hons Core Paper-9 (Lab) Semester-IV	**Elements of Modern Physics Lab**	The students are expected to learn to understand the physical phenomena, to know the difference between classical
		& quantum domain.

Physics Hons Core Paper-10 Semester-IV	**Analog Systems and Applications**	This course gives the idea of the internal fabrication of many electronic devices and their working principles. Diode, transistors, amplifiers, and oscillators are the essential elements for designing any kind of device.
Physics Hons Core Paper-10 (Lab) Semester-IV	**Analog Systems & Applications Lab**	This course is essential to understand the properties of electronic device elements practically.
Physics Hons Skill Enhancement Course-2 Semester-IV	**APPLIED OPTICS**	This course gives an overview regarding the present day technologies like LASER Holography Signal Processing; Fourier Techniques used in medical sciences like MRI CT scan etc.
Physics Hons Core Paper-11 Semester-V	**Quantum Mechanics & Applications**	This course gives an introduction to quantum mechanics, to describe the physics of small scales where experimental behavior cannot be explained by classical mechanics.
Physics Hons Core Paper-11 (LAB) Semester-V	**Quantum Mechanics Lab**	This lab is done in both Practical rooms as well as virtually in computer. The computer is used to model and analyze practical problems in Quantum domain and then some experiments are done by high ended experimental setups for verification of the theory.
Physics Hons Core Paper-12 (LAB) Semester-V	**Solid State Physics**	Understand the basics of crystallography & semiconductor physics
Physics Hons Core Paper-12 (LAB) Semester-V	**Solid State Physics Lab**	This Lab is oriented towards research level experiments so that students feel confident in sophisticated labs and at par with research standards.
Physics Hons Discipline Specific Elective -1 Semester-V	**CLASSICAL DYNAMICS**	The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.
Physics Hons Discipline Specific Elective -1 (Tutorial) Semester-V	**CLASSICAL DYNAMICS Tutorial**	This tutorial is targeting to teach students to solve the motion of objects in everyday life by setting up problems and solving them analytically.
Physics Hons Discipline Specific Elective -2 Semester-V	**Nuclear and Particle Physics**	To have a basic understanding of nuclear properties and models that describe the, decay, and reactions of nuclei and to be able to explain the atomic and molecular spectra The course is built on exploring the fundamentals of nuclear matter as well as considering some of the important applications of nuclear physics
Physics Hons Discipline Specific Elective -2 (Tutorial) Semester-V	**Nuclear and Particle Physics Tutorial**	This tutorial is aimed towards teaching Long derivations that are generally beyond the scope of examinations but are otherwise necessary for proper understanding.

Physics Hons Core Paper-13 Semester-VI	**Electro-magnetic Theory**	This course is mainly designed to understand light's interaction when propagating through different media and signaling by optical fiber which ns the heart of signaling in the present days.
Physics Hons Core Paper-13 (LAB) Semester-VI	**Electro-magnetic Theory Lab**	Practical observation of light matter interactions
Physics Hons Core Paper-14 Semester-VI	**Statistical Mechanics**	This course will introduce the students to know the difference between classical & quantum statistics, different aspects of statistical mechanics and to explain the existence of the celestial bodies
Physics Hons Core Paper-14 (LAB) Semester-VI	**Statistical Mechanics Lab**	The aim of this Lab is to use the computational methods to solve physical problems, numerical simulations for solving the problems based on Statistical Mechanics
Physics Hons Discipline Specific Elective -3 Semester-VI	**Nano Materials and Applications**	This course is developed to gives the basic ideas about the nonmaterial and their properties and applications.
Physics Hons Discipline Specific Elective -3 (Tutorial) Semester-VI	**Nano Materials and Applications**	To synthesize the nonmaterial in the laboratory and measure their optical, electrical and magnetic properties.

Generic Elective Papers (GE) (Minor-Physics) for other Departments

PSO: To develop subject specific technical as well as non-technical skills and enhance the analytical ability of students and to imbibe the values of hard work, independent opinion and team work.

Class/ Paper/Semester	Title	Course Outcome
Physics GE GE-1 Semester-I/ III	**Mechanics**	Students are expected to be able to analyze the cause and effects of the different phenomena happening round about instead of superstition. This is a course that gives a proper reasoning ability in terms of simple theories.
	Mechanics Lab	This lab is oriented towards training students using various scales and make measurements on their own so that it helps in their everyday life.
Physics GE GE-2 Semester-II/ IV	**Waves and Optics**	To get concepts of different phenomena on the basis of superposition happening in the surroundings and nature.
	Waves and Optics Lab	Aim of this lab is to familiarize with different monochromatic and polychromatic source and to realize the superposition of light waves giving rise to various colorful events.

BSc MATHEMATICS

PSO: A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning. Enabling students to develop a positive attitude towards mathematics & Think in a critical manner and Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand. Students Formulate and develop mathematical arguments in a logical manner and acquire good knowledge and understanding in advanced areas of mathematics, chosen by the student from the given courses. Understand, formulate and use quantitative models arising in social science.

Semester/ Paper	Title	Course Outcome
1st SEM MTMC101	**Calculus**	Students gathering concept of higher derivaties by using Leibnitz rules and its applications to problems of type, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences. Reduction formulae, derivations and illustrations of reduction formulae of the type sin nx dx, cos nx dx, tan nx dx, sec nx dx, log dx, x x dx, volumes by slicing, disks and washers methods, volumes by cylindrical shells, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, area of surface of revolution. Techniques of sketching conics, reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics. Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration, modeling ballistics and planetary motion.
MTMC102	**Algebra**	The students will be acquainted with the Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic. Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear

		systems, applications of linear systems, linear independence. Linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of R^n, dimension of subspaces of R^n and rank of a matrix, Eigen values, Eigen Vectors and Characteristic Equation of a matrix.
2ND SEM MTMC201	**Real Analysis**	To make the students aware about Review of Algebraic and Order Properties of *R,* -neighborhood of a point in *R,* Idea of countable sets, uncountable sets and uncountability of *R.* Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R,* The Archimedean Property, Density of Rational (and Irrational) numbers in *R,* Intervals. Limit points of a set, Isolated points, Illustrations of Bolzano-Weierstrass theorem for sets. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion. Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's n^{th} root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.
MTMC202	**Differential Equations**	The students become aware about Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations. Introduction to compartmental model, exponential decay model, lake pollution model (case study of Lake Burley Griffin), drug assimilation into the blood (case of a single cold pill, case of a course of cold pills), exponential growth of population, limited growth of population, limited growth with harvesting. General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.

		Equilibrium points, Interpretation of the phase plane, predatory-prey model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.
3rd SEM MTMC301	**Theory of Real Functions**	Capability of students of Limits of functions (approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem. Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem, Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials, Taylor's theorem to inequalities. Cauchy's mean value theorem and its application. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions.
MTMC302	**Group Theory I**	The students gathering the idea of the Group theory about Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups. Subgroups and examples of subgroups, centralizer, normalizer, center of a group, product of two subgroups. Properties of cyclic groups, classification of subgroups of cyclic groups. Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group, properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem. External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite abelian groups. Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third

		isomorphism theorems and its applications (Simple programme).
MTMC303	**PDE and Systems of ODE**	Gathering idea of Partial Differential Equations –Definitions, Mathematical Problems. First-Order Equations: Classification, Construction and Geometrical Interpretation. Method of Characteristics for obtaining General Solution of Quasi Linear Equations. Canonical Forms of First-order Linear Equations. Method of Separation of Variables for solving first order partial differential equations. Derivation of Heat equation, Wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms. The Cauchy problem, the Cauchy-Kowaleewskaya theorem, Cauchy problem of an infinite string. Initial Boundary Value Problems, Semi-Infinite String with a fixed end, Semi-Infinite String with a Free end, Equations with non-homogeneous boundary conditions, Non-Homogeneous Wave Equation. Method of separation of variables, Solving the Vibrating String Problem, Solving the Heat Conduction problem. Systems of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions, The method of successive approximations, the Euler method, the modified Euler method, The Runge-Kutta method and its application.
4th SEM MTMC401	**Numerical Methods**	The students become aware about Algorithms, Convergence, Errors: Relative, Absolute, Round off, Truncation. Transcendental and Polynomial equations: Bisection method, Newton's method, Secant method. Rate of convergence of these methods. System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation and its application. Numerical Integration: Trapezoidal rule, Simpson's rule, Simpsons 3/8th rule, Boole's Rule. Midpoint rule, Composite Trapezoidal rule, Composite Simpson's rule. Salutation of Ordinary Differential Equations by Euler's method, Runge-Kutta methods of orders two and four application to some

		examples.
MTMC402	**Riemann Integration and Series of Functions**	Gathering the idea of Integration from Newtonian Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions; Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorems of Calculus. Idea of Improper integrals and its Convergence specially of Beta and Gamma functions. Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test. Limit superior and Limit inferior. Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.
MTMC403	**Ring Theory and Linear Algebra I**	Expertise of students about Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring. Ideal, ideal generated by a subset of a ring, factor rings, operations on ideals, prime and maximal ideals. Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients. Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces. Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.
5th SEM MTMC501	**Multivariate Calculus**	Students aware about Functions of several variables, limit and continuity of functions of two variables Partial differentiation, total differentiability and differentiability, sufficient condition for

		differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems, Definition of vector field, divergence and curl Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals. Line integrals, Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservative vector fields, independence of path. Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.
MTMC502	**Group Theory II**	Expertise the students about higher educations and different examinations National and International (JEM, NET, GATE, TIFR, ISI) using the concept of Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties. Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups. Group actions, stabilizers and kernels, permutation representation associated with a given group action, Applications of group actions: Generalized Cayley's theorem, Index theorem. Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, *p*-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of Anfor n≥5,non-simplicity tests.
6th SEM MTMC601	**Metric Spaces and Complex Analysis**	Expertise the student for higher education using the concept of Metric spaces: definition and examples. Sequences in metric spaces, Cauchy sequences. Complete Metric Spaces. Open and

		closed balls, neighbourhood, open set, interior of a set. Limit point of a set, closed set, diameter of a set, Cantor's theorem. Subspaces, dense sets, separable spaces. Continuous mappings, sequential criterion and other characterizations of continuity. Uniform continuity. Homeomorphism, Contraction mappings, Banach Fixed point Theorem. Connectedness, connected subsets of R. Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability. Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula. Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples. Laurent series and its examples, absolute and uniform convergence of power series.
MTMC602	**Ring Theory and Linear Algebra II**	To make the students aware about Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, unique factorization in Z[x]**.** Divisibility in integral domains, irreducibles, primes, unique factorization domains, Euclidean domains. Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators, Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator. Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

MTMC DSE1	**Number Theory**	Expertise the student for higher education about the problem of Linear Diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture, linear congruences, complete set of residues, Chinese Remainder theorem, Fermat's Little theorem, Wilson's theorem. Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius Inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues, some properties of Euler's phi-function. Order of an integer modulo n, primitive roots for primes, composite numbers having primitive roots, Euler's criterion, the Legendre symbol and its properties, quadratic reciprocity, quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.
MTMC DSE2	**Probability and Statistics**	Expertise the student for different filled of mathematis using the idea of Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables. Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers, Central Limit theorem for independent and identically distributed random variables with finite variance, Markov Chains, Chapman-Kolmogorov equations, classification of states.
MTMC DSE3	**Linear Programming**	Expertise the student for handling the real life problem such as linear programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex

		method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem. Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.
MTMC DSE4	**Mathematical Modeling**	The students become aware about Power series solution of a differential equation about an ordinary point, solution about a regular singular point, Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order. Monte Carlo Simulation Modeling: simulating deterministic behavior (area under a curve, volume under a surface), Generating Random Numbers: middle square method, linear congruence, Queuing Models: harbor system, morning rush hour, Overview of optimization modeling, Linear Programming Model: geometric solution algebraic solution, simplex method, sensitivity analysis
3rd SEM MTMC SEC1	**Logic and Sets**	Development of the student skills by Introduction of logic propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations. Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set. Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set, Composition of relations, Types of relations, Partitions,

		Equivalence Relations with example of congruence modulo relation, Partial ordering relations, n-ary relations.
4th SEM MTMC SEC 2	**Graph Theory**	Basic idea of the graph and its application in higher mathematics. Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs, paths and circuits, Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.
BSc GENERIC PSO:		
Semester/ Paper	**Title**	**Course Outcome**
MTMGE 101	**Combinatorial Mathematics**	The students gather knowledge about counting principles, Permutations and Combinations (with and without repetitions), Binomial theorem, Multinomial theorem, Counting subsets, Set-partitions, Stirling numbers Principle of Inclusion and Exclusion, Derangements, Inversion formulae Generating functions: Algebra of formal power series, Generating function models, Calculating generating functions, Exponential generating functions. Recurrence relations: Recurrence relation models, Divide and conquer relations, Solution of recurrence relations, Solutions by generating functions. Integer partitions, Systems of distinct representatives. Polya theory of counting: Necklace problem and Burnside's lemma, Cyclic index of a permutation group, Polya's theorems and their immediate applications. Latin squares, Hadamard matrices, Combinatorial designs: *t* designs, BIBDs, Symmetric designs.
MTMGE201	**Applications of Algebra**	To gives the idea of real life problem students aware about Balanced incomplete block designs (BIBD): definitions and results, incidence matrix of a BIBD, construction of BIBD from difference sets, construction of BIBD using quadratic residues, difference set families, construction of BIBD from finite fields. Coding Theory: introduction to error correcting codes, linear cods, generator and parity check matrices, minimum distance, Hamming Codes, decoding and cyclic codes.

		Symmetry groups and color patterns: review of permutation groups, groups of symmetry and action of a group on a set; colouring and colouring patterns, Polya theorem and pattern inventory, generating functions for non-isomorphic graphs. Special types of matrices: idempotent, nilpotent, involution, and projection tri diagonal matrices, circulant matrices, Vandermonde matrices, Hadamard matrices, permutation and doubly stochastic matrices, Frobenius- König theorem, Birkhoff theorem. Positive Semi-definite matrices: positive semi-definite matrices, square root of apositive semi- definite matrix, a pair of positive semi-definite matrices, and their simultaneous diagonalization. Symmetric matrices and quadratic forms: diagonalization of symmetric matrices, quadratic forms, constrained optimization, singular value decomposition, and applications to image processing and statistics. Applications of linear transformations: Fibonacci numbers, incidence models, and differential equations. Least squares methods: Approximate solutions of system of linear equations, approximate inverse of an m×n matrix, solving a matrix equation using its normal equation, finding functions that approximate data. Linear algorithms: LDU factorization, the row reduction algorithm and its inverse, backward and forward substitution, approximate inverse and projection algorithms.
MTMGE 301	**Combinatorial Mathematics**	The students gather knowledge about Basic counting principles, Permutations and Combinations (with and without repetitions), Binomial theorem, Multinomial theorem, Counting subsets, Set-partitions, Stirling numbers Principle of Inclusion and Exclusion, Derangements, Inversion formulae Generating functions: Algebra of formal power series, Generating function models, Calculating generating functions, Exponential generating functions. Recurrence relations: Recurrence relation models, Divide and conquer relations, Solution of recurrence relations, Solutions by generating functions. Integer partitions, Systems of distinct representatives. Polya theory of counting: Necklace problem and Burnside's lemma, Cyclic index of a permutation group, Polya's theorems and

		their immediate applications. Latin squares, Hadamard matrices, Combinatorial designs: *t* designs, BIBDs, Symmetric designs.
MTMGE401	**Applications of Algebra**	To make the students aware about Balanced incomplete block designs (BIBD): definitions and results, incidence matrix of a BIBD, construction of BIBD from difference sets, construction of BIBD using quadratic residues, difference set families, construction of BIBD from finite fields. Coding Theory: introduction to error correcting codes, linear cods, generator and parity check matrices, minimum distance, Hamming Codes, decoding and cyclic codes. Symmetry groups and color patterns: review of permutation groups, groups of symmetry and action of a group on a set; colouring and colouring patterns, Polya theorem and pattern inventory, generating functions for non-isomorphic graphs. Special types of matrices: idempotent, nilpotent, involution, and projection tri diagonal matrices, circulant matrices, Vandermonde matrices, Hadamard matrices, permutation and doubly stochastic matrices, Frobenius- König theorem, Birkhoff theorem. Positive Semi-definite matrices: positive semi-definite matrices, square root of apositive semi- definite matrix, a pair of positive semi-definite matrices, and their simultaneous diagonalization. Symmetric matrices and quadratic forms: diagonalization of symmetric matrices, quadratic forms, constrained optimization, singular value decomposition, and applications to image processing and statistics. Applications of linear transformations: Fibonacci numbers, incidence models, and differential equations. Least squares methods: Approximate solutions of system of linear equations, approximate inverse of an m×n matrix, solving a matrix equation using its normal equation, finding functions that approximate data. Linear algorithms: LDU factorization, the row reduction algorithm and its inverse, backward and forward substitution, approximate inverse and projection algorithms.

BSc BOTANY

PSO: The aim of this course is to ensure that students can achieve an up-to-date level of understanding of plant science. The students will be able to demonstrate the knowledge in understanding plant science research and addressing practical problems in different field of interdisciplinary plant science.

Students will apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form. They can develop a conceptual understanding of principles and importance of Botany. Students would be benefited with knowledge of core subjects like plant diversity, physiology and biochemistry, molecular cytogenetic and application of statistics etc. which are offered in these subjects Modules on analytical techniques, plant tissue culture and photochemistry would make them obtain skills that help in doing research. Selection and application of proper techniques and modern instruments for Biochemical experiments, Molecular Biology, Biotechnology, in vitro culture techniques, cytogenetical and plant physiological activities of plants should be executed.

Students should apply resource based knowledge to assess and access plant diversity, its importance for society and ecology, health and hazards, legal and environmental issues and conservation of biodiversity practice with responsibility. They would identify, formulate and analyze the complex problems with reaching a substantiated conclusion. Logical thinking with application of biological, physical and chemical sciences. Learning that develops analytical and integrative problem-solving approaches.

Students should apply the knowledge and principles of interdisciplinary plant science and utilize those in various capacities either as a member or a leader in a team to carry out projects in multidisciplinary fields.

Class/ Paper/ Semester	**Title**	**Course Outcome**
BOTANY Hons **SemI** **Core Course I**	Phycology and Microbiology	1. Understand the microbial diversity along with its mode of nutrition, reproduction and its economic importance. 2. Know the role of microbe in the maintenance of the ecological imbalance. 3. Know the importance of microbes in modern research and its application. 4. Knowledge on the systematics of viruses, algae, bacteria and their various metabolic processes. 5. Understand the difference between beneficial and harmful viruses or bacteria. 6. Role of beneficial or harmful viruses in in research, medicine and diagnostics, as causal organisms of plant diseases.
BOTANY Hons **SemI** **Core Course II**	Biomolecules and Cell Biology	1. Knowledge on the different bonding pattern among the chemical compounds and further understand the polar compounds. 2. Understand the significance of pH, buffers and their role in biological metabolism. 3. Understand the structure, types and importance of different biomolecules (Lipids, Carbhohydrates, Nucleic Acids, Protein) 4. Develop the concept on various bioenergetic reactions and its mechanism under various conditions. 5. Understand the different redox reactions and the mechanism of ATP serving as the currency molecule. 6. The students will be able to understand the fundamental biochemical principles of enzymes, such as the structure

		and function of enzymatic process in living system. 7. Understand the structure and chemical composition of chromatin and concept of cell division. 8. Gain knowledge about "Cell Science" 9. Understand Cell wall Plasma membrane, Cell organelles and cell division.
BOTANY Hons **SemII** **Core Course III**	Mycology and Phytopathology	1. Study and impart knowledge about the general Characteristics, structure, reproduction, life history and economic importance of fungi. Understand the features of Lichens. 2. Students on the completion of this paper will gain a clear view of the plant disease causing pathogens and their life cycle. 3. Students will know the symptoms of various plants diseases and their by undertake different control measures to protect plants or crops from disaster. 4. Knowledge on the different disease management and usage of various control agent's agaisnt various pathogens. 5. Students able to explain about structure, classification, reproduction, life cycle and economic importance of Fungi and Lichens. 6. Understand the high industrial application of microbes based on the metabolite it develops which are useful for the human application in various fields of medicine and nutrient.
BOTANY Hons **SemII** **Core Course IV**	Archegoniate	1. The students will be able to understand the structure and reproduction of certain selected bryophytes, Pteridophytes and gymnosperm. 2. Learn about the importance and evolution of the plant diversity. 3. Know life cycle pattern and economic importance of cryptogams and spermatophytic plants.
BOTANY Hons **SemIII** **Core Course V**	Anatomy of Angiosperms	1. Plant anatomy and embryology are much awaited subject to study the internal structures and structure & function of reproductive organs in plants. 2. The course paper cover basic aspects of anatomy of plant tissues such as meristems, epidermis, permanent tissues, complex tissue systems and structure of plant organs. 3. Students will be benefitted by studying the plant anatomy enables to identify fragmentary plant materials, wood, forensic investigation, and applied aspects of meristems cultures. 4. Students will be able to utilize embryological studies in various aspects like analysis of evolutionary trends, circumscription and delimitation of taxa and making a decision on systematic positions.
BOTANY	Economic	1. Understand scope and importance of pharmacognosy.

Hons **SemIII** **Core Course VI**	Botany	2. Know the cultivation, collection, processing & importance of various herbal drugs. 3. Understand the scope of economic botany. 4. Know the botanical resources like non wood forest products. 5. Understand the concept of Ayurvedic pharmacy.
BOTANY Hons **SemIV** **Core Course VII**	Plant Taxonomy and Biosystematics	1. To know about plant classification and plant nomenclature. 2. To know about plant preservation and processes of fild study.
BOTANY Hons **SemIV** **SEC-1**	Plant diversity and Human Welfare	1. Know about on plant diversity and its scope, types of diversity, value and uses of Biodiversity. 2. Knowledge on cause of biodiversity loss. 3.Knowledge on organizations associated with biodiversity management-methodology. 4.To know negative impact of biodiversity loss. 5. To acquired concept for different method of biodiversity conservation. 6.Concept on In situ and ex situ conservation, sustainable development, Biodiversity awareness programmes. 7.Concept on ecological and economical value of plants, use of plant and plant products in various purpose.
BOTANY Hons **Sem IV** **Core Course VIII**	Molecular Biology	On the completion of this paper students will be able to 1. Identify the parts, structure and dimensions of DNA molecules, RNA molecules and chromosomes and be able to categorise DNA also. 2. Compare the structure of genetic material of eukaryotic cells with the structure of simpler prokaryotic cells and with the structure of viruses and aslo within the cell organelles like mitochondria and chloroplast. 3. Explain the fundamental structure, properties and process of DNA packaging method. 4. Accurately diagram and describe the processes of DNA replication, transcription and translation,as well as predict the outcome of these processes.
BOTANY Hons **Sem IV** **Core Course IX**	Plant Geography And Ecology	By the end of this course, students will be able to:- 1. analysis the phytogeographical division of India focussing mainly on the Estern Himalaya, Western Himalaya and Sunderban region. 2. Learn about the factors and types of endemism found in Indian flora and the basic concept on indigenous and exotic plant. 3. Explore ecological principles that link individuals at population, community and ecosystem levels. 4. Investigate the richness, relative abundance and types of species in a community 5. Understand phytoremediation technique to conserve soil fertility. 6. Examine the levels of biodiversity and its conservation

		methods.
BOTANY Hons **Sem IV** **Core Course X**	Genetics	By the end of this paper, students will be able to 1. Explain Mendel's law of inheritance and pattern of inheritance. 2. Gain knowledge about construction of pedigrees and analysis of pattern of inheritance in the families. 5. Relate variations in chromosome number and structure to phenotypic variations. 6. Understand general features of transposable elements in prokaryotes and eukaryotes and aslo 8. Get knowledge of calculating allelic and genotype frequency. 9. Gain a clear view of Hardy Weinberg law and its application and also explain genetic variation and speciation and genetic drift in individuals.
BOTANY Hons **Sem IV** **SEC 2**	Biofertilizers	1.General account about the microbes used as biofertilizer. 2.Knowledge on production method and application of biofertilizer using different type of microorganism. 3. concept on mycorrhizal association, types of mycorrhizal association, taxonomy. 4. Concept on Isolation and inoculum production of VAM, and its influence on growth and yield of crop production. 5.Knowledge on production of organic fertilizer by using several wastes organic materials. 6. Concept on vermicompost, types of vermicompost,method of vermicompost production.
BOTANY Hons **Sem V** **Core Course XI**	Reproductive Biology of Angiosperms	1. Plant Reproductive Biology are much awaited subject to study the internal structures and structure & function of reproductive organs in plants. 2. Learn about the importance and evolution of the plant diversity. 3. Know life cycle pattern and economic importance o
BOTANY Hons **Sem V** **Core Course XII**	Plant Physiology	1. Understanding of physiological processes involved in the plant sciences. 2. Knowledge on metabolic processes 3. Mineral nutrition, energy conservation through photosynthesis, breakdown of stored foods through respiration. 4. Provide knowledge on nitrogen metabolism with special reference to assimilation of nitrogen in amino acids and protein. 5. Role of plant growth regulators and their application in agriculture and horticulture. 6. Growth and other related physiological aspects such as

		cycardian rhythm, photoperiodism and vernalization. 7. Movements, responses to light, water and gravity.
BOTANY Hons **Sem- V** **DSE - 1**	Natural resource management	1.know on natural resource and their sustainable utilization. 2. concept on land utilization and management. 3.knowledge on biodiversity, types, significance, management strategies. 4. concept on forest and forestproducts, depletion, and management. 5. concept on EIA, GIS, Waste management, etc
BOTANY Hons **Sem- V** **DSE - 2**	Industrial and Environmental Microbiology	1. Know the role of microbe in the maintenance of the Industry and our Environment.. 2. Know the importance of microbes in modern research and its application. 3. Provide knowledge on different fermented product with special reference to Microbial enzymes, organic acid Etc. 4. Investigate the microbial pollution of air, water and soil. 5. Understand remediation technique to conserve soil and water against pollution.
BOTANY Hons **Sem VI** **Core Course XIII**	Plant Metabolism	1. Know scope and importance of plant physiology. 2. Understand the process of different modes of photosynthesis and understand the energy releasing steps in respiration. 3. To acquire knowledge in metabolism of different biomolecules in plant system and synthesis of ATP. 4. The students will be able to understand the fundamental bio-molecular process of signal transduction.
BOTANY Hons **Sem VI** **Core Course XIV**	Plant Biotechnology	1. Students will be benefitted by studying the technology developed within the biological organisms or through the biological organisms. 2. Learn about the different types of biotechnological product isolation, preparation and utilization.
BOTANY Hons **Sem VI** **Discipline Specific Elective 3**	Plant Breeding	1. Provide the knowledge on plant breeding. 2. Students will know the importance of plant breeding to improve crop varieties. 3. Understand the methods for production of new crop varieties through plant breeding. 4. Learn about various achievements and consequences of plant breeding through genetic approaches. 5. Students will able to understand the basic role of biotechnology in crop improvement.
BOTANY Hons **Sem VI** **Discipline Specific Elective 4**	Horticultural Practices And Post-Harvest Technology	1. Develop concept on horticulture as well as its importance in food and nutritional security. 2. Understanding of various types, classification and salient features of ornamental plants. 3. Learning about different steps of horticultural techniques and its scope and limitation.

		4. Students will be able to know about landscaping, gardening tradition and garden design. 5. Obtain knowledge on floriculture. 6. Understanding of post harvest technology and disease control management.

BOTANY(Generic Elective) Sem-I
Paper-I

Class/paper/semester	Title	Course Outcome
Botany Generic Elective Sem—I Unit -1	Microbes	1. Being knowledgeable about the structure,reproduction, economic importance ofmicrobial world specially about virus &bacteria.
Botany Generic Elective Sem—I Unit—2	Algae	1. Studying about the generalcharacteristics, structure,reproduction,life history and economic importanceof algae.
Botany Generic Elective Sem_--I Unit—3	Fungi	1. Enabling the Students to explain about structure,classification,reproduction,life cycle and economic importance of fungi. 2. Acquiring the knowledge to explain about the significance of mycorrhiza.
Botany Generic Elective Sem—I Unit—4	Introduction to Archegoniate	1. Understanding the importance of evolution in plantdiversity.
Botany Generic Elective Sem-I Unit -5	Bryophytes	1. Understanding the importance of bryophytesthrough studying its marshy habitat & its structural significance in the emergence of true leaf.
Botany Generic Elective Sem—I Unit—6-	Pteridophytes	1. Making sense about the emergence of pteridophytes as the 1st land plants in the path of evolution. 2. Being knowledgeable about the emergence of vascular tissue in the plant world which explains its growing significance in coming world.
Botany Generic Elective Sem—I Unit—7	Gymnosperm	1. Knowing the history & characters of gymnospermic plants which was the primary plant groups of Mesozoic era. 2. Being knowledgeable about the importance of gymnospermic plants in modern day economy.

Class / Paper / Semester	Title	Course Outcome
Botany Generic Elective Sem II Paper II	Introduction to Plant Taxonomy	1. Gaining the introductory knowledge about plant world. 2. Knowing the style & significance of various

Unit 1		types of plant through Identification, Classification & Nomenclature.
Botany Generic Elective Sem II Paper II Unit 2	Identification	1. Going to the basics of grouping of plants by means of their different identifying characters. 2. Knowing about the different theoretical & practical arrangements towards identifying procedures of plant kingdom.
Botany Generic Elective Sem II Paper II Unit 3	Taxonomic evidences from palynology, cytology, phytochemistry & molecular data	1. Gaining the knowledge of different branches of Botany. 2. Understanding the importance of different branches of Botany to assess the proper systematic status and phylogeny of taxa.
Botany Generic Elective Sem II Paper II Unit 4	Taxonomic hierarchy	1. Attaining the knowledge of grouping the whole plant world into proper ladder according to their evolutionary stand point.
Botany Generic Elective Sem II Paper II Unit 5	Botanical nomenclature	1. Understanding the science behind the naming of plant species according to internationally accepted rules & regulations. 2. Being accustomed with the scientific naming of plants along with their local naming.
Botany Generic Elective Sem II Paper II Unit 6	Classification	1. Attaining the Knowledge of different types ofclassification of plant world based on their morphological characters, anatomical characteristics & evolutionary evidences. 2. Gaining the primary knowledge of history& modification of classification with the passage of time.
Botany Generic Elective Sem II Paper II Unit 7	Biometrics, numerical taxonomy & cladistics	1. Understanding the application of modern technologies in the systematic studies of plant world.
Botany Generic Elective Sem II Paper II Unit 8	Plant-water relations	1. Being knowledgeable regarding the different techniques, plants used to adopt to run itsday to day physiological processes in terms of their water requirement.
Botany Generic Elective Sem II Paper II Unit 9	Photosynthesis	1. Understanding the know-how of most astonishing character of greenery – the power of producing organic product from inorganic materials. 2. Being knowledgeable about different types of techniques plants adopt to make its daily food, such as photorespiration, C3, C4, CAM.
Botany Generic Elective Sem II Paper II Unit 10	Respiration	1. Attaining the Knowledge on glycolysis,TCACycle,oxidativephosphorylation – the processes of plant respiration. 2. Knowing the process of generating power in

		the form of ATP.
Botany Generic Elective Sem II Paper II Unit 11	Plant growth regulators	1. Knowing the importance of hormones in the development of plant parts & its role on different physiological processes. 2. Being accustomed with the role of plant growth regulators in modern day practices ofagriculture and horticulture.
BOTANY(Generic Elective) Sem-III		
Class/paper/semester	Title	Course Outcome
Botany Generic Elective Sem—III Unit -1	Microbes	1. Being knowledgeable about the structure, reproduction, economic importance of microbial world specially about virus & bacteria.
Botany Generic Elective Sem—III Unit--2	Algae	1. Studying about the general characteristics, structure, reproduction, life history and economic importance of algae.
Botany Generic Elective Sem_--III Unit--3	Fungi	1. Enabling the Students to explain about structure, classification, reproduction, life cycle and economic importance of fungi. 2. Acquiring the knowledge to explain about the significance of mycorrhiza.
Botany Generic Elective Sem—III Unit--4	Introduction to Archegoniate	1. Understanding the importance of evolution in plant diversity.
Botany Generic Elective Sem- III Unit -5	Bryophytes	1. Understanding the importance of bryophytes through studying its marshy habitat & its structural significance in the emergence of true leaf.
Botany Generic Elective Sem—III Unit--6-	Pteridophytes	1. Making sense about the emergence of pteridophytes as the 1st land plants in the path of evolution. 2. Being knowledgeable about the emergence of vascular tissue in the plant world which explains its growing significance in coming world.
Botany Generic Elective Sem—III Unit--7	Gymnosperm	1. Knowing the history & characters of gymnospermic plants which was the primary plant groups of Mesozoic era. 2. Being knowledgeable about the importance of gymnospermic plants in modern day economy.
Class / Paper / Semester	**Title**	**Course Outcome**
Botany Generic Elective Sem IV	Introduction to Plant Taxonomy	3. Gaining the introductory knowledge about plant world.

Paper II Unit 1		4. Knowing the style & significance of various types of plant through Identification, Classification & Nomenclature.
Botany Generic Elective Sem IV Paper II Unit 2	Identification	3. Going to the basics of grouping of plants by means of their different identifying characters. 4. Knowing about the different theoretical & practical arrangements towards identifying procedures of plant kingdom.
Botany Generic Elective Sem IV Paper II Unit 3	Taxonomic evidences from palynology, cytology, phytochemistry & molecular data	3. Gaining the knowledge of different branches of Botany. 4. Understanding the importance of different branches of Botany to assess the proper systematic status and phylogeny of taxa.
Botany Generic Elective Sem IV Paper II Unit 4	Taxonomic hierarchy	2. Attaining the knowledge of grouping the whole plant world into proper ladder according to their evolutionary stand point.
Botany Generic Elective Sem IV Paper II Unit 5	Botanical nomenclature	3. Understanding the science behind the naming of plant species according to internationally accepted rules & regulations. 4. Being accustomed with the scientific naming of plants along with their local naming.
Botany Generic Elective Sem IV Paper II Unit 6	Classification	3. Attaining the Knowledge of different types ofclassification of plant world based on their morphological characters, anatomical characteristics & evolutionary evidences. 4. Gaining the primary knowledge of history& modification of classification with the passage of time.
Botany Generic Elective Sem IV Paper II Unit 7	Biometrics, numerical taxonomy & cladistics	2. Understanding the application of modern technologies in the systematic studies of plant world.
Botany Generic Elective Sem IV Paper II Unit 8	Plant-water relations	2. Being knowledgeable regarding the different techniques, plants used to adopt to run itsday to day physiological processes in terms of their water requirement.
Botany Generic Elective Sem IV Paper II Unit 9	Photosynthesis	3. Understanding the know-how of most astonishing character of greenery – the power of producing organic product from inorganic materials. 4. Being knowledgeable about different types of techniques plants adopt to make its daily food, such as photorespiration, C3, C4, CAM.
Botany Generic Elective Sem IV Paper II	Respiration	3. Attaining the Knowledge on glycolysis,TCACycle,oxidative phosphorylation – the processes of plant

Unit 10		respiration. 4. Knowing the process of generating power in the form of ATP.
Botany Generic Elective Sem IV Paper II Unit 11	Plant growth regulators	3. Knowing the importance of hormones in the development of plant parts & its role on different physiological processes. 4. Being accustomed with the role of plant growth regulators in modern day practices ofagriculture and horticulture.

BSc ELECTRONICS

PSO: The student understands the basic concepts Electronics applications in the real world. He/sheisalsoupdatedwiththerecenttrendsinthesubject.B.ScElectronics(Honours) may be a professional program which must develop a specialized skill set among the graduates to cater the necessity of industries. In recent years, Electronics has made unprecedented growth in terms of latest technologies, new ideas andprinciples. The research organizations and industries that employment during this frontier area is in need of highly skilled and scientifically oriented manpower. This manpower are often available onlywithflexible, adaptive and progressive training programs and a cohesive interaction among theresearch organizations, academicians and industries. The key areas of study within disciplineof Electronics comprise: Semiconductor Devices, analog and digital circuit design,microprocessors & Microcontroller systems and computation techniques for Electronics,computer coding/programming in high level languages etc. Thestudentalsobuildsasound base for various post graduate courses in Electronics and related fields.

Class/ Paper/ Semester	Title	Course Outcome
Electronics Hons. Core Paper I Sem I	Basic Circuit Theory and Network Analysis	1. Study circuits in a systematic manner suitable for analysis and design. 2. Understands how to formulate circuit analysis problems in a mathematically tractableway with an emphasis on solving linear systems of equations. 3. Analyze the electric circuit using network theorems. 4. Determine Sinusoidal steady state response. 5. Understand the two–port network parameters with an ability to find out two-portnetwork parameters & overall response for interconnection of two-port networks.
	Basic Circuit Theory and Network Analysis (Lab)	1. Verify the network theorems and operation of typical electrical and electronic circuits. 2. Choose the appropriate equipment for measuring electrical quantities and verify the same for different circuits. 3.Prepare the technical report on the experiments carried.
Electronics Hons Core Paper II Sem I	Mathematics Foundation for Electronics	1. Use mathematics as a tool for solving/modeling systems in electronics 2. Solve non-homogeneous linear differential equations of any order using a variety ofmethods, solve differential equations using power series and special functions 3. Understand methods to diagonalize square matrices and find eigenvalues andcorresponding eigenvectors for a square matrix, and check for its diagonalizability. 4. Familiarize with the concept of sequences, series and recognize convergent, divergent,bounded, Cauchy and monotone sequences. 5. Perform operations with various forms of complex numbers to solve equations
	Mathematics Foundation for Electronics (Lab)	1. Perform operations with various forms of complex numbers to solve equations 2. Use mathematics as a tool for solving/modeling systems in electronics 3. Prepare the technical report on the experiments carried.

Electronics Hons Core Paper Ⅲ SemII	Semiconductor Devices	1.Describe the behavior of semiconductor materials 2. Reproduce the I-V characteristics of diode/BJT/MOSFET devices 3. Apply standard device models to explain/calculate critical internal parameters of semiconductor devices 4. Explain the behavior and characteristics of power devices such as SCR/UJT etc.
	Semiconductor Devices (Lab)	1. Examine the characteristics of basic semiconductor devices. 2. Perform experiments for studying the behavior of semiconductor devices for circuit design applications. 3. Calculate various device parameters' values from their IV characteristics. 4. Interpret the experimental data for better understanding the device behavior.
Electronics Hons Core Paper IV SemII	Applied Physics	1. Explain the limitation of classical physics and basic concepts of quantum physics, 2. Describe the mechanical, thermal and magnetic properties of materials. 3.Understand the various thermal effects life Seebeck and Peltier effect and their usefulness in solving the real life problems
	Applied Physics (Lab)	1. Perform lab experiments for studying mechanical, thermal and magnetic parameters of materials 2. Calculate and determine mechanical parameters such as young modulus, rigidity etc. 3. Collect data and Present it in the form of lab report
Electronics Hons Core Paper V SemIII	Electronics Circuits	1. Illustrate about rectifiers, transistor and FET amplifiers and its biasing. Also comparethe performances of its low frequency models. 2. Describe the frequency response of MOSFET and BJT amplifiers. 3. Explain the concepts of feedback and construct feedback amplifiers and oscillators. 4. Summarizes the performance parameters of amplifiers with and without feedback
	Electronics Circuits (Lab)	1. Understand and analyze electronic circuits. 2. Choose the appropriate equipment for measuring electrical quantities and verify the same for different circuits. 3. Ability to understand and apply circuit theorems and concepts in engineering applications 4. Prepare the technical report on the experiments carried.
Electronics Hons Core Paper VI SemIII	Digital Electronics and Verilog/VHDL	1. Understand and represent numbers in powers of base and converting one from the other,carry out arithmetic operations 2. Understand basic logic gates, concepts of Boolean algebra and techniques toreduce/simplify Boolean expressions 3. Analyze and design combinatorial as well as sequential circuits 4. Explain the concepts related to PLD's 5. Use VLSI design methodologies to understand and design simple digital systems &Understand the HDL design flow and capability of writing programs in VHDL/Verilog

		6. Familiar with Simulation and Synthesis Tools, Test Benches used in Digital systemdesign
	Digital Electronics and Verilog/VHDL (Lab)	1. Apply VLSI design methodologies to understand and design simple digital systems. 2. Familiarize with Simulation and Synthesis Tools, Test Benches used in Digital system design 3. Write programs in VHDL/Verilog 4. Prepare the technical report on the experiments carried.
Electronics Hons Core Paper VII Sem III	C Programming and Data Structures	1. Write code in C language for arithmetic and logical problems 2. Implement conditional branching, iteration and recursion. 3. Use concept of modular programming by writing functions and using them to form acomplete program 4. Understand the concept of arrays, pointers and structures and use them to develop algorithms and programs for implementing searching and sorting
	C Programming and Data Structures (Lab)	1. Implement conditional branching, iteration and recursion. 2. Write Programs in C for arithmetic and logical operations. 3. Prepare the technical report on the experiments carried.
Electronics Hons Core Paper VIII Sem IV	Operational Amplifiers and Applications	1. Infer the DC and AC characteristics of operational amplifiers and its effect on outputand their compensation techniques. 2. Elucidate and design the linear and non linear applications of an op-amp and special application ICs. 3. Explain and compare the working of multi vibrators using special application IC 555and general purpose op-amp.
	Operational Amplifiers and Applications (Lab)	1. Interpret op-amp data sheets. 2. Analyze and prepare the technical report on the experiments carried out. 3. Design application oriented circuits using Op-amp and 555 timer ICs. 4. Create and demonstrate live project using ICs. 5. Prepare the technical report on the experiments carried.
Electronics Hons Core PaperIX Sem IV	Signals & Systems	1. Represent various types of continuous-time and discrete-time signals 2. Understand concept of convolution, LTI systems and classify them based on theirproperties and determine the response of LTI system 3. Determine the impulse response, step response andfrequency response of LTI systems 4. Analyze system properties based on impulse response and Fourier analysis. 5. Analyze the spectral characteristics of continuous-time periodic and a periodic signalsusing Fourier analysis 6. Understand Laplace transform and its properties and apply the Laplace transform toobtain impulse and step response of simple circuits.
	Signals & Systems (Lab)	1. Learn the practical implementation issues stemming from the lecture material and 2. Learn the use of simulation tools and design skills. 3. L earn to work in groups and to develop MATLAB simulations

		of various signals and systems. 4. Prepare the technical report on the experiments carried.
Electronics Hons Core PaperX Sem IV	Electronic Instrumentation	1. Describe the working principle of different measuring instruments. 2. Choose appropriate measuring instruments for measuring various parameters in theirlaboratory courses. 3. Correlate the significance of different measuring instruments, recorders andoscilloscopes.
	Electronic Instrumentation (Lab)	1. Perform experiments on the measuring instruments. 2. Perform measurements of various electrical/electronic parameters using appropriateinstruments available in the laboratory. 3.Prepare the technical report on the experiments carried
Electronics Hons Core Paper XI Sem V	Microprocessor and Microcontrollers	1. Understand the basic blocks of microcomputers i.e. CPU, Memory, I/O and architectureof microprocessor's and Microcontroller's 2. Apply knowledge and demonstrate proficiency of designing hardware interfaces formemory and I/O as well as write assembly language programs for target microprocessor and microcontroller. 3. Derive specifications of a system based on the requirements of the application and selectthe appropriate Microprocessor or Microcontroller
	Microprocessor and Microcontrollers (Lab)	1. Be proficient in use of IDE's for designing, testing and debugging microprocessor and microcontroller based system 2. Interface various I/O devices and design and evaluate systems that will provide solutions to real-world problem 2. Prepare the technical report on the experiments carried.
Electronics Hons Core Paper XII Sem V	Electromagnetics	1. Understand the fundamentals of Electrostatics and Magnetostatics hence get the insightofthe characteristics of materials and their interactions with electric and magnetic fields 2. Understand the application of Vector Differential and Integral operators inElectromagnetic Theory. 3. Interpret Maxwell's equations in differential and integral forms, both in time andfrequency domains.. 4. Describe the complex ε, μ, and σ, plane waves, Snell's laws from phase matching, andcalculate the reflection and transmission coefficients at the interface of simple media 5. Calculate input impedance and reflection coefficient of an arbitrarily terminatedtransmission-line and can use Smith chart to convert these quantities.
	Electromagnetics (Lab)	1. Design capacitors & inductors and analyze their characteristics. Also, they become efficient in solving simple boundary value problems, using Poisson's equation. 2. Interpret a Smith chart and also become familiar with describing & recognizing fundamental properties of waveguide modes. 3. Calculate the cutoff frequency and propagation constant for parallel plate, rectangular, and dielectric slab waveguides. Also, they can calculate the resonant frequency of simple cavity

		resonators. 4. Analyze problems involving TEM-waves.
Electronics Hons Core Paper XIII Sem VI	Communication Electronics	1. Design basic digital communication systems to solve a given communications problemand they become conversant with the requirements and the protocols employed in thefundamental components in a communication network. 2. Understand simple block forward error correction codes and basic dispersioncompensation concepts and also the concepts of up/down conversion and modulation 3. Determine the suitability of a particular communication system to a given problem 4. Describe the concept of "noise" in analog and digital communication systems. Also, getinsight on the trade-offs (in terms of bandwidth, power, and complexity requirements) in basic digital communication systems.
	Communication Electronics (lab)	1. Understand basic elements of a communication system. 2. Analyze the baseband signals in time domain and in frequency domain. 3. Build understanding of various analog and digital modulation and demodulation techniques. 4. Prepare the technical report on the experiments carried.
Electronics Hons Core Paper XIIV Sem VI	Photonics	1. Describe the optics and simple optical systems. 2. Understand the concept of light as a wave and the relevance of this to optical effectssuch as interference and diffraction and hence to lasers and optical fibers. 3.Use mathematical methods to predict optical effects with e.g. light-matter interaction,interference, fiber optics, geometrical optics.
	Photonics (Lab)	1. Perform experiments based on the phenomenon of light/photons. 2. Measure the parameters such as wavelength, resolving power, numerical aperture etc. using the appropriate photonic/optical technique. 3. Prepare the technical report on the experiments carried.
Electronics Hons DSE Sem V	Power Electronics	1. Explain the basic principles of switch mode power conversion, models of different typesof power electronic converters including dc-dc converters, PWM rectifiers and inverters 2 Choose appropriate power converter topologies and design the power stage andfeedback controllers for various applications They use power electronic simulationpackages for analyzing and designing power converters 3. Describe the operation of electric machines, such as motors and generators and theirelectronic controls. CO4 Analyze the performance of electric machine
	Power Electronics (Lab)	1. Reproduce the characteristics of power semiconductor devices like SCR, DIAC, TRIAC etc. 2. Calculate the various device parameters from their characteristics. 3. Design power control circuits using semiconductor power

		devices. 4. Prepare the technical report on the experiments carried.
Electronics Hons DSE Sem V	Numerical Techniques	1. Understand the common numerical methods and how they are used to obtainapproximate solutions to mathematical problems. 2. Derive numerical methods for various mathematical operations and tasks, such asinterpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. 3. Analyze and evaluate the accuracy of common numerical methods
	Numerical Techniques (Lab)	1. Implement numerical methods in Matlab. 2. Write efficient, well-documented Matlab code and present numerical results in an informative way. 3.Prepare the technical report on the experiments carried.
Electronics Hons DSE Sem V	Modern Communication Systems	1. Apply the basic knowledge of signals and systems and understand the basics ofcommunication system and analog modulation techniques. 2. Apply the knowledge of digital electronics and understand the error control codingtechniques. 3. Summarize different types of communication systems and its requirements. 4. Design and Analyse the performance of communication systems.
	Modern Communication Systems (Lab)	1. Understand the functioning of various digital communication techniques 2. Calculate the performance parameters involved in electronic communication systems 3. Prepare the technical report on the experiments carried.
Electronics Hons DSE Sem V	Control Systems	1. Understand the concepts of closed loop control systems. 2. Analyze the stability of closed loop systems. 3. Apply the control techniques to any electrical systems. 4. Compute and assess system stability.
	Control Systems (Lab)	1.Perform experiments involving concepts of control systems 2. Design experiments for controlling devices like AC/DC motors etc. 3. Design interfacing circuits for peripherals like I/O, A/D, D/A, timer etc. 4. Develop systems using different microcontrollers.
Electronics Hons DSE Sem VI	Transmission Lines, Antenna and Wave Propagation	1. Describe the principals of electromagnetic wave propagation and various effects involved in it 2. Explain the phenomenon of transmission line and its types. 3. Perform calculation for finding out performance parameters of transmission lines like losses SWR 4. Understand the modes of transmission in waveguides and other components involved in microwave communications.

	Transmission Lines, Antenna and Wave Propagation (Lab)	1. Understand the working of various components involved in antenna and wave propagation. 2. Perform experiments for studying the performance of transmission lines, waveguides and antenna. 3. Prepare a technical report on the experiment performed
Electronics Hons DSE Sem VI	Digital Signal Processing	1. Understand the basic concepts related to discrete time signals, systems, Z transform and Fourier transform 2. Apply knowledge and demonstrate proficiency of analyzing signals in time as well as frequency domain using Fourier and Z transforms 3. Design and analyze IIR/FIR filters with given specifications 4. Apply transform methods for representing signals and systems in time and frequency domain
	Digital Signal Processing (Lab)	1. Draw signal flowgraphs of discrete time systems and analyze and derive properties of LTI systems 2. Apply transform methods for representing signals and systems in time and frequency domain 3. Simulate, synthesize and process signals using software tools 4. Prepare the technical report on the experiments carried.
Electronics Hons DSE Sem VI	Dissertation	1. Survey and study of published literature on the assigned topic; 2. Working out a preliminary Approach to the Problem relating to the assigned topic; 3. Conducting preliminary Analysis/ Modeling/ Simulation/ Experiment/ Design/ Feasibility; 4. Preparing a Written Report on the Study conducted for presentation to the Department; 5. Final Seminar, as oral Presentation before a departmental committee.
Electronics Hons SEC Sem III	Design and Fabrication of Printed Circuit Boards	1. Familiarize with the type of devices/components that may be mounted on PCB 2. Understand the PCB layout techniques for optimized component density and power saving. 3. Perform design and printing of PCB with the help of various image transfer and soldering techniques 4. Understand the trends in the current PCB industry
Electronics Hons SEC Sem IV	Internet and Java Programming	1. Describe the various aspects of internet technologies, java programming 2. Familiarize with data type, data operators, exception handling and file management 3. Write a program in java language for solving internet issues.
Electronics Hons SEC Sem IV	Programming with LabVIEW	1. Familiarize with the concepts of Virtual instrumentation and Graphical user interface 2. Operate LabVIEW to design Virtual instruments 3. Develop, debug, and test LabVIEW VI's for specific applications

Bachelor of Computer Application(BCA)

PO: The students enrolled in BCA programme are able to have knowledge of mathematics, computer application & have fair knowledge of the basic concepts to identify, analyses and design and perform the experiments in the core areas. The develop the skills of programming for desired results in social economical and environmental areas. They also learn to design new apps to serve the pressing demands of the society in changing circumstances.

Bachelor of Computer Application(BCA)

PSO: The BCA degree prepares the students for manpower requirement of the fast developing IT/Software industry. **They** gain the knowledge and skills necessary for success in this competitive, rapidly changing field by Demonstrating the ability to adapt to technological changes and innovations in the discipline. Also they become able Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods.

CLASS/ PAPER/ SEMESTER	TITLE	COURSE OUTCOME
BCA-101 Semester-I	Computer fundamental	Bridge the fundamental concept of computer with the present level knowledge of the students. Various types of number system and their arithmetic. Familiarize operating system, peripheral device, networking, and multimedia and internet communication of computer.
BCA-102 Semester-I	Programming concept using C	Understand a functional hierarchical code organization. Ability to define manages data structure based on problem subject domain. Ability to work with textual information, character and string. Ability to develop logics on programs and application.
BCA-103 Semester-I	Digital electronics	Have a through understanding about the technique used in digital electronics. The ability to understand, design, analyzes various combinational and sequential circuit. Gaining knowledge to prevent hazard and timing problem in digital circuit. Develops a skill to build and troubleshoot digital circuit.
BCA-104 Semester-I	Mathematics-I	Apply the knowledge of matrices to solve the problem. Know and understand various type of numerical method. Inculcate the habit of mathematical thinking through various type of mathematical expansion and series. Solve and analyze the derivatives and it's application in related practical field.
BCA-105(Gr.A) Semester-I	Communicative English Theory	Help the students to recognizes and operate in various style in English. Build up confidence in oral communication by reinforcing pronunciation. Get rid of present flaws and mistake in grammar.
BCA-105(Gr.B) Semester-I	Communicative English lab	Increasing reading speed and comprehension of academic details. Enhancing vocabulary by vocabulary journal. Student will straighten their ability to write academic paper, essay, and summary by using process approach.

BCA-106 -Semester-I	C programming Lab	Approach the programming task using technique, learned and write pseudo code. choose the right data representation format base on the requirements of the problem. Able to write the program on a computer, edits, compile, correct, debug, recompile and run it. Identify the situation where computational method would be useful.
BCA-107 Semester-I	Digital Electronics lab	Describe how analog signal is used to describe different values in different logic families. create appropriate truth table from a combinational logic function. Describe the operation and timing constraint for different latches and register. Evaluate combinational and sequential logic design using various matrices switching speed, throughput and power etc. Ability to create state transition diagram from description of sequential logic also.
BCA-201 Semester-II	Object oriented programming using C++	Articulate the principal of object oriented problem solving and programming. Explain the programming fundamental using statement, control flow and .Apply the concept of class, method, data abstraction, inheritance etc. Analyze problem and implement simple C++ application using object oriented software engineering approach.
BCA-202 Semester-II	Data structure using C	Provide the knowledge of basic data structure and their implements. Understanding the importance of data structure in context of writing efficient program. Develop the skills to apply appropriate data structure in problem solving.
BCA-203 Semester-II	Computer architecture and organization.	Describe the fundamental organization of a computer system. Explain the functional unit of a processor. Explain addressing mode, instruction format, program control statement. Distinguish the the organization of various part of system memory hierarchy. Describe fundamental concept of pipeline and vector processing.
BCA-204 Semester-II	Mathematics-II	Solve analytic problem with the various kind of mathematical reasoning. Describe the relation between set regarding the membership, equality, subset using proper relation. Be able draw and interpret Venn diagram to solve the problem. Having ability to describe some basic algorithm for graphs. Learning to formulate central theorem using trees, connectivity and matching graphs.
BCA-205(Gr.A) Semester-II	Financial accounting theory	Learn the basic concept of financial accounting. Prepare final account of sole trader. Explain concept of branch accounting. Identify the main financial statement and their purpose. Explain the main element of financial accounting like assets ,revenue, expenses etc.
BCA-205(Gr.B) Semester-II	Financial accounting lab	Calculate profit or loss from incomplete recordable to prepare account t of branches, royalty account, and account of consignment. Define bookkeeping and accounting.

BCA-206 Semester-II	Data structure lab	Be able to design and analyze the space efficiency and time of different data structure. Be capable to identify the appropriate data structure of different problem. Have practical knowledge on the application of data structure. Choose and implement efficient data structure.
BCA-207 Semester-II	C++ Lab	Analyze, write, debug basic C++ code. Implement with an attempt to developer different type of practical skill, ability to write the program of basic data structure using array. learning the essential feature of C++ language.
BCA-301 Semester-III	Operating System	Understanding the basics of operating systems like kernel, shell, types and views of operating systems. Describing the various CPU scheduling algorithms and remove deadlocks. Learning various memory management techniques and concept of thrashing. Use disk management and disk scheduling algorithms for better utilization of external memory. Recognize file system interface, protection and security mechanisms. Explain the various features of distributed OS like Unix, Linux, windows etc.
BCA-302 Semester-III	Design & Analysis of Algorithm	Analyze the asymptotic performance of algorithms. Select appropriate data structures as applied to specified problem definition. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures. Learning to implement Linear and Non-Linear data structures, appropriate sorting/searching technique for given problem. Determine and analyze the complexity of given Algorithms.
BCA-303 Semester-III	Microprocessor & Microcontroller	Learning the architecture, internal organization and their functions. and the instruction set of Intel microprocessors such as 8085(8-bit),8086(16-bit). Learning to write Assembly language programming. Describing the functioning of different peripheral ICs, Designing of microprocessors /microcontrollers-based systems.
BCA-304 Semester-III	Data Communication & Computer Network	Learning to differentiate analog and digital communication system. Identify different types of noise occurred, its minimization and able to apply Fourier analysis in frequency & time domain to quantify bandwidth requirement of variety of analog and digital communication systems. Understanding the basic computer network technology. Understand and explain Data Communications System and its components. Identify the different types of network topologies and

		protocols. Enumerate and explain the layers of the OSI model and TCP/IP. Identify the different types of network devices and their functions within a network. Understand and building the skills of subnetting and routing mechanisms.
BCA-305 Semester-III	Numerical & Statistical Analysis	Learning to apply numerical methods to obtain approximate solutions to mathematical problems. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. Analyse and evaluate the accuracy of common numerical methods.
BCA-306 Semester-III	Operating System Lab (Shell & System Call Programming)	Apply UNIX/LINUX operating system commands. Understand different UNIX/LINUX shell scripts and execute various shell programs. Apply basic of administrative tasks.
BCA-307 Semester-III	Gr.-A Microprocessor Lab & Gr.-B-Numerical Lab	Gr-A(Microprocessor Lab): Learning to write ALP to perform arithmetic, logical, relational operations and also create look-up tables, sub-program call using simulator. Gr-B(Numerical lab): Learning to implement different methods and analyze the results using C/C++ language.
BCA-401 Semester-IV	Theory of Computation	Learning the concept of machines: finite automata, pushdown automata, linear bounded automata, and Turing machines. Learning the formal languages and grammars: regular grammar and regular languages, context-free languages and context-free grammar; and introduction to context-sensitive language and context-free grammar, and unrestricted grammar and languages. Understanding the relation between these formal languages, grammars, and machines and also understands the complexity or difficulty level of problems when solved using these machines.
BCA-402 Semester-IV	Data Base Management System	Learning the basic concepts and various data model used in database design, ER modeling concepts and architecture, use and write queries using SQL. Application of relational database theory and be able to *describe* relational algebra expression, tuple and domain relation from queries. Also able to *recognize* and *identify* the use of normalization and functional dependency,

BCA-403 Semester-IV	Software Engineering	Learning the basic concepts and understanding of the analysis and design of complex systems. Ability to apply software engineering principles and techniques and also ability to develop maintain and evaluate large-scale software systems. Producing efficient, reliable, robust and cost-effective software solutions. Ability to perform independent research and analysis. Communicating and coordinating competently by listening, speaking, reading and writing English for technical and general purposes. Learning to manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain. Ability to understand and meet ethical standards and legal responsibilities.
BCA-404 Semester-IV	Management Accounting & EVS	Management Accounting: Learning to the application of management accounting and the various tools used. Able to make inter-firm and inter-period comparison, of financial statements. Learning to analyze the financial statement using various ratios. Learning to Prepare Fund Flow Statement and Cash Flow Statement. EVS: Understanding the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources. Learning the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web. Also learning the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity..
BCA-405 Semester-IV	JAVA Programming	Learning the use of OOP using JAVA programming concepts for problem solving. Write programs using Java collection API as well as the java standard class library. Able to understand the use of abstraction. Able to understand the use of Packages and Interface in java. Able to develop and understand exception handling, multithreaded applications with synchronization. Able to understand the use of Collection Framework. Able to design GUI based applications and develop applets for web applications. Apply JDBC to provide a program level interface for communicating with database using java programming
BCA-406 Semester-IV	JAVA LAB	Able to write programs based upon java concepts. Develop programs using java collection API as well as java Standard Library. Write, debug & document well

		structured java application. Create animation & events based upon advanced java concepts. Connect an application with database.
BCA-407 Semester-IV	Database Management System Lab	Learning to design and implement a database schema for a given problem-domain, Normalize a database. Populate and query a database using SQL DML/DDL commands. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS. Programming PL/SQL including stored procedures, stored functions
BCA-501 Semester-V	Computer Graphics	Understanding the basics of computer graphics, different graphics systems and applications of computer graphics. Learning various algorithms for scan conversion and fillingof basic objects and their comparative analysis. Using geometric transformations on graphics objects and their application in composite form. Extracting scene with different clipping methods and its transformation to graphics display device. Exploring projections and visible surface detection techniques for display of 3D scene on 2D screen. Also learning the types of media and define multimedia system. Learning about the process of digitizing of different analog signals Use of tools for image processing, video, sound and animation.
BCA-502 Semester-V	Advanced Database Management System	Learning to apply normalization techniques. Understanding how transactions are processed in a database and the different techniques in Concurrency Control. Learning the concepts of Distributed Databases and Data Warehousing, Object-Oriented database and some database security issues.
BCA-503 Semester-V	Compiler Design	Understanding the fundamentals of compiler and identify the relationships among different phases of the compiler. Understanding the application of finite state machines, recursive descent, production rules, parsing, and language semantics. Able to analyze & implement required module, including front-end, back-end, and a small set of middle-end optimizations. Learning the effect of hardware feature on the generated code and the practical fundamentals of compiler implementation.
BCA-504 Semester-V	Elective-I	Gets a choice to select any of the emerging new technology trend in Computer Application or Science field so that the student learn to gets a thorough theoretical knowledge of the subject.

BCA-505 Semester-V	Project Work-I	Work in a group to select a problem related to real life problem. Review the literature available on selected problem and recognize scope of work. Formulate new expressions, equations to solve that chosen problem. Apply basic technical knowledge to solve the problem. Prepare project report and present it.
BCA-506 Semester-V	Python Lab	Learning to write and run instructions in Interactive interpreter and a Python Script. Writing program to purposefully raise Indentation Error and debug it, scientific problem solving using decision making and looping. Writing simple programs for one dimensional and two dimensional arrays. Writing Programs to explore string functions, utilizing 'Functions' in Python to perform mathematical operation on set of observations. Demonstrate the use of Lists, Dictionaries. Writing program to implement Turtle, building a Classical Data Structure using Python Programming. Learning to implement Searching Operations: Linear and Binary Search and Sorting operations: Selection and Insertion Sort, find the most frequent words in a text read from a file. Also learn to demonstrate and handle Exceptions in Python.
BCA-507 Semester-V	Graphics Lab	Understanding the basic concepts of computer graphics and graphics library functions. Learning to write scan conversion problems to draw 2D geometrical shapes using C/C++ programming. Writing programs to apply clipping and filling techniques for modifying an object. Understanding and implementing the concepts of different type of geometric transformation of objects in 2D and 3D. Understanding the practical implementation of modeling, rendering, viewing of objects in 2D. Creating simple Animation using animation tools.
BCA-601 Semester-VI	Advanced Operating System	Learning the general architecture of computers Understanding and analyzing theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. Understanding the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.Understanding the high-level structure of the Linux kernel.
BCA-602 Semester-VI	Elective-II	Gets a choice to select any of the emerging new technology trend in Computer Application field so that the student learn to gets a thorough technical knowledge of

		the subject through practical class sessions.
BCA-603 Semester-VI	Grand Viva	This curriculum helps to Evaluate overall technical knowledge and industry readiness. Analyze various applications of computer science in real life problem solving. Accustomed with virtual environment of technical interview
BCA-604 Semester-VI	PHP & Dot(.) Net Lab	Learning the following scripting students learn to develop simple console programs, create webpages using HTML, CSS, JSP to create font-end design and database connectivity to create backends using MySQL. Able to test, debug and deploy simple demo or dynamic websites.
66-BCA-605 Semester-VI	Project Work-II	Work in a team and effectively communicate with team members for Implementation of the project planned in the previous semester. Formulate new expressions, equations to solve that selected problem to enhance problem solving skill. Validate theoretical and reported data with results obtained from numerical/ experimental/ analytical study. Identify scope of future studies. Prepare project report in standard format.

BA(General); Subject: Physical Education

PSO: The student understands the basic concepts of Physical Education and allied areas in the real world. They are given information about the historical development and are also updated with the recent trends in the subject. The subject knowledge and practical involvements mould them to be productive individuals and wholesome developed citizen of the country. The student also builds a sound base for various post graduate courses in Physical Education and related fields.

Class/Paper/ Semester	Title	Course Outcome
FYBA(Gen.) PEDG-DSC-1A (Theory) Semester-I	Foundation and History of Physical Education	Introductory know how to Physical Education and its history. Learning about Biological, Sociological and Psychology Foundations of Physical Education. Learning a brief introduction of Yoga Education.
FYBA(Gen.) PEDG-DSC-1A (Practical) Semester-I	Field Practical	Students learn and develop fitness by practicing rhythmic activities like marching, calisthenics and aerobics. They also learn various asana and pranayama of Yoga and selected throwing events of Athletics.
FYBA(Gen.) PEDG-DSC-1B (Theory) Semester-II	Management of Physical Education and Sports	The course provides an understanding about the broad principles and concepts of Sports Management and Leadership. It also helps the students to learn how to conduct different types of sports tournaments and to care and maintain various sports facilities and equipments.
FYBA(Gen.) PEDG-DSC-1B (Practical) Semester-II	Laboratory and Field Practical	Students practice few first aid aspects and AAHPER Youth Fitness Test. They also learn selected running events of Athletics.
SYBA(Gen.) PEDG-DSC-1C (Theory) Semester-III	Anatomy, Physiology and Exercise Physiology	Students achieve a basic understanding of Anatomy, Physiology and Exercise Physiology with special emphasis on Musculo-Skeletal and Cardio-Respiratory system.
SYBA(Gen.) PEDG-DSC-1C (Practical) Semester-III	Field Practical	Students learn assessments of few laboratory based fitness aspects. They also learn selected jumping events of Athletics and few skills of Gymnastics.
SYBA(Gen.) PEDG-SEC-1A (Theory) Semester-III		Students learn how to layout Kho-kho and Football fields along with theoretical know how of these games.
SYBA(Gen.) PEDG-SEC-1A (Practical) Semester-III		Students learn to perform the fundamental skills of Kho-kho and Football games along with rules and their interpretations and duties of the officials in these games.
SYBA(Gen.) PEDG-DSC-1D (Theory) Semester-IV	Health Education, Physical Fitness and Wellness	Building awareness and knowledge about the need of Health Education, Physical Fitness and Wellness. Imparting information about the different school health programs, activities of various health agencies and the methods to prevent and control prevailing health problems in India. Students also learn about the basic First-aid management skills.
SYBA(Gen.) PEDG-DSC-1D (Practical) Semester-IV	Laboratory and Field Practical	Students learn assessments of few laboratory based fitness aspects, measurements and field test of few fitness components. They also learn selected running events of Athletics.

SYBA(Gen.) PEDG-SEC-1B (Theory) Semester-IV		Students learn how to layout Kabaddi and Volleyball fields along with theoretical know how of these games.
SYBA(Gen.) PEDG-SEC-1B (Practical) Semester-IV		Students learn to perform the fundamental skills of Kabaddi and Volleyball games along with rules and their interpretations and duties of the officials in these games.
TYBA(Gen.) PEDG-DSE-1A (Theory) Semester-V	Sports Training	Learning and application of elementary concepts of Sports Training. The content also help the students to learn the scientific basis of planning and executing training programs for developing selected important components of fitness.
TYBA(Gen.) PEDG-DSE-1A (Practical) Semester-V	Field Practical	Students learn to perform the fundamental skills of Basketball, Badminton, Netball, Throwball and Handball games along with rules and their interpretations and duties of the officials in these games.
TYBA(Gen.) PEDG-DSE-1B (Theory) Semester-VI	Modern Trends and Practices in Physical Education Exercise Sciences	Students learn about basic concept of few Sports Science branches and test, measurement and evaluation in Physical Education. Also the student builds on the knowledge consolidated in the previous semesters.
TYBA(Gen.) PEDG-DSE-1B (Practical) Semester-VI	Project Work and Games Specialization	With advance and meticulous detail knowledge the students specializes in any one of the game according to his choice. He/she also undergoes hands on practical through the project work of his/her choice.

MA PROGRAMME

PO: The Programme belonging to Arts or Humanities and Social Sciences (Bengali, English, Sanskrit, History, Political Science and Philosophy) helps the PG students to fathom their concerned subjects & arouse interest in involving themselves in research in new areas. They also are keenly aware of the burning social issues and try to correlate their acquired knowledge of language and literature to redress them. They become men of morals and tend to serve mankind believing in concept like global citizenship.

MA ENGLISH

PSO: Literature courses in the Department of English offer students the opportunity to study influential writings from the British, American, and global Anglophone traditions. Courses may focus on a historical period, an issue or theme, a critical approach, or a literary genre. Literature provides imaginative and critical insights into all areas of human experience-war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the sacred and the profane, the burdens of history and the dreams of the future. Learning to attend to the complexities of literary texts helps students become more active and critical readers, and the creative aspects of literary texts highlight the ability of the written word to elicit feeling, to cultivate an imaginative openness to others' experiences, and to call us to account as humans. Studying literature at the Post Graduate level encourages all Post graduates Midnapore College(Autonomous) to view the reading of challenging and imaginative texts as an essential and rewarding part of a life-long commitment to learning and growth. Apart from developing the literary skills, this course help students to build skills of analytical and interpretive argument; become careful and critical readers; practice writing-in a variety of genres-as a process of intellectual inquiry and creative expression; and ultimately to become more effective thinkers and communicators who are well-equipped for a variety of careers in our information-intensive society.

Semester	Title	Course Outcome
SEM-I, ENGPG-101	BRITISH POETRY (MEDIEVAL TO PRE-ROMANTIC)	1. To describe the students with the outline of the poetry through the respective age. 2. To determine the romantic age authors and their style. 3. Explain the poems of poetic devices to the specific text. 4. To make the students aware of these literary periods and the trends of each 5. To introduce them to a bunch of English poetry; drama; prose and fiction
SEM-I, ENGPG-102	WILLIAM SHAKESPEARE	1. To describe and discuss the themes brought up in Shakespeare's plays, poems and sonnets. 2. To analyze the structures and organizations of his dramatic works. 3. Identify major literary characters in Shakespeare's works. 4. To provide the students with an in-depth, critical understanding and analysis of the canonical works of Shakespeare, including his well-known comedies, tragedies and sonnets.
SEM-I, ENGPG-103	BRITISH DRAMA (MEDIEVAL TO	1. To analyse the background of the drama and its culture to the respective era.

	EIGHTEENTH CENTURY)	2. To identity the experiment of novel concepts and its structure. 3. To make the student thorough with the main writers and their works of the literary period 4. To introduce works of different authors and their styles. 5. To make the students capable of analyzing these works.
SEM-I, ENGPG-104	FICTIONAL & NON FICTIONAL PROSE(18^{TH}& 19^{TH} CENTURIES)	1. To draw the students into their imaginative worlds and engage with the power of their invention. 2. To deepens the appreciation of life. 3. To increases pleasure of reading 4. To make them understand that Fiction is a verbal machine which transports the readers in space and time 5. To explores the entire range of human experience.
SEM-I, ENGPG-105	BRITISH POETRY(19^{TH} CENTURY)	1. To engage in close analysis of narrative and poetic language which helps in applying technical analytical terms. 2. To analyze the various elements of poetry such as Diction, Tone, Form, Genres, Imagery, Figures of Speech, Symbolism, Theme, etc.
SEM-II, ENGPG-201	BRITISH DRAMA (19^{th}- 20^{th} Century)	1. To make them know about the distinct literary characteristics of British drama, emphasizing the changing approaches to theater as well as the social, cultural, and philosophical implications in the plays. 2. Analyses play for their structure and meaning, using correct terminology.
SEM-II, ENGPG-202	FICTIONAL AND NON-FICTIONAL PROSE (19^{th}- 20^{th} Century)	1. To explain the socio-religious and cultural context of postmodernism 2. To explain the movements and trends in fiction. 3. To make the students get to know various cultures and construction of gender, nation and race throughout the history.
SEM-II, ENGPG-203	BRITISH POETRY (19^{th}- 20^{th} Century)	1. To differentiate between modern and postmodern poetry. 2. To differentiate between subjective and objective poetry. 3. Analyse the poems by Dylan Thomas, W.B Yeats.
SEM-II, ENGPG-204	RUDIMENTS OF PHONETICS AND UNDERSTANDING ENGLISH GRAMMAR AND COMPOSITION	1. To help the students in developing phonemic awareness, self expressions and memorization skills. 2. To give the Student basic information about English sounds and phonemic transcriptions in British English (Received Pronunciation) and American English, the learner would be sensitized

		regarding the nuances of English speech sounds, word accent, intonation and rhythm. 3. To introduce the core components of linguistics like phonology, morphology, syntax, semantics, discourse and pragmatics through this course. 4. To enable the Student to identify the symbols of all the 44 English sounds, and try to produce Received Pronunciation and transcription of the sounds. 5. To improve the fluency in spoken English and neutralize mother tongue influence. 6. To comprehend the articulation of English speech sounds.
SEM-II, ENGPG-205	MODERN EUROPEAN LITERATURE	1. To analyse the different social issues in Europe. 2. To determine the complex issues in European Literature. 3. To understand the concept of classical fiction in Europe. 4. To appreciate and analyse independently the narratives of Kafka, and others. 5. To understand the concept of the post Industrial Existential European fiction. 6. To understand the concept of modern European fiction with its experimentation.
SEM-III, ENGPG-301	Literary Criticism	1. To help the students develop literary sensibility, critical thinking, and an acute and penetrating understanding of literary history, literary criticism and a wide range of literary texts in British poetry, fiction and drama. 2. To enable them to further narrow down their areas of specialization for M.Phil./Ph.D. and streamline their career options. 3. To prepare them for qualifying the National Eligibility Test (NET) for Assistant Professorship and JRF.
SEM-III, ENGPG-302	Literary Criticism & Theory	1. To provide an important study of literary theory as an intellectual and critical activity from the 1960s onwards. Central to this course is the analysis of some of the major critical contributions to this area which form a benchmark in understanding the dynamics of literary/critical methods. 2. To provide a conceptual context for an understanding of the function and practice of modern literary and cultural criticism.
SEM-III, ENGPG-303	Colonialism & Post Colonialism	1. To analyse colonial and postcolonial texts. 2. To xplain how race, class, gender, history, and identity are presented and problematised in the literary works.

		3. To describe the texts in relation to postcolonial theory. 4. To explain the impact of colonization on the colonized countries. 5. To appreciate and analyse independently the drama of Soyinka, Lawler, and Karnard. 6. To understand the concept of post-colonial drama with its infinite variety 3. Appreciate and analyse independently the fiction of Achebe, Naipaul, Lawrence, and Seth. 7. To understand the concept of fictional narratives in the post-colonial domains 5. Appreciate and analyse the emerging writers of post-colonial times. 8. To understand the concept of postmodern fiction emerging from the new world. 9. To describe theory of colonialism and post colonialism.
SEM-III, ENGPG-304 (CBCS)	CRITICAL THEORY AND CULTURAL STUDIES	1. To introduce the students to the concept of culture and the evolution of cultural studies. 2. To give the rough picture of major thinkers and writers associated with cultural studies. 3. To help the Students to learn strategies to connect cultural knowledge to everyday life and practices. 4. To enable to understand various cultures through oral and written modes of communication, by becoming familiar with the basic concepts of Cultural Studies: for instance, power, agency, gender, race, ethnicity, identity and ideology that exists in a society.
SEM-III, ENGPG-305	NEW LITERATURES	
SEM-IV, ENGPG-401	AMERICAN LITERATURE	1. To examines changes in the American narrative from 1800 to the present and considers what might be distinctly 'American' about American literature. 2. To focus on the historical and cultural influences, literary movements, the short story and novel as distinct genres and on the major literary figures. 3. To explore literature that reveals and emerges from multiple perspectives such as those of race, gender, ethnicity, socio-economic class and historical period.
SEM-IV, ENGPG-402	INDIAN ENGLISH LITERATURE	1. To focus on the study of Indian contribution to literature in English, from the early advent of English in India to contemporary writing in English. 2. To scrutinize the history and development of Indian Writing in English.

SEM-IV, ENGPG-403	DIASPORIC LITERATURE	1. To introduce the students with the ideas of transnationalism, exile, migration, displacement, and so on, literature of the diaspora has come to exert a strong presence in the global scene.
SEM-IV, ENGPG-404	DALIT LITERATURE	1. To enable the students to understand and assess various mainstream like Dalit and other subaltern cultures and appreciate them.
SEM-IV, ENGPG-405	DISSERTATION	1. To implement the concepts acquired in Criticism course. 2. To make them understand library work and data collection. 3. To make the students Understand scientific data analysis with a humanities perspective. 4. To make the students Understand presentation of facts methodically and objectively. 5. To make the students Understand the latest format of presentation such as MLA 8 Editio. 6. To make the students understand how a brief presentation is done. 7. To acclimatise himself/herself to the research work and preparing for higher levels of exploration and study.

M.A. BENGALI

PSO: The Programme in Bengali (MA) offers students the opportunity to study influential writings of reputed writers Bengali Literature. Students make entry into a historical periods learn about social issues and apply their knowledge of theory to redress them. They develop critical approach and their creative faculty and also promote their research ability.They learnto critically appreciate literary texts and prepared themselves for better teaching in future in their professional career as teachers in school, colleges and universities. Students become more active and critical readers. Field works and projects help them grow their practical approach to things which ultimately contribute to their personal living and social duty.

Bengali PG Paper 101 Semester—I	**Linguistics**	Acquiring knowledge about structure and evolution of language and its relation with literature.
Bengali PG Paper 102 Semester-1	**Philosophy of religion and history of literature of the Bengal**	Realisation of the antiquity of the literature and people of Bengal.
Bengali PG Paper 103 Semester—I	**History of medieval Bengali Literature**	Conception of the medieval literature and contemporary state of the society
Bengali PG Paper 104 Semester—I	**Bengali Prose and its history**	Comprehending the forms structure evolution and style of prose
Bengali PG Paper 105 Semester—I	**Bengali children literature**	Perception of the minds of children and an insight of children
Bengali PG Paper 201 Semester—II	**Forms and styles of Bengali language**	Having a clear conception of the Bengali language and its relation with other languages.
Bengali PG Paper 202 Semester—II	**Bengali poetry**	Understanding the tradition, evolution and thematic Styles of Bengali poetry.
Bengali PG Paper 203 Semester—II	**Bengali novels and short stories**	Knowing our polyphonic symphony and variegated expression . Acquiring familiarity with the beliefs and wonders of our fast life.
Bengali PG Paper 204 Semester—II	**Language and Culture**	Learning about Bengali language and literature even if the students of some other department.
Bengali PG Paper 205 Semester—II	**Literature of Bangladesh**	Acquiring familiarity with the literature of Bangladesh.
Bengali PG Paper 301 Semester—III	**Bengali Drama**	Learning the polychromatic conflicts and realisation .

Bengali PG Paper 302 Semester—III	**Literary theory and Movement of literature**	Realisation of world wide forms and movements of literature .
Bengali PG Paper 303 Semester—III	**Indian and Occidental literature**	Being adept in comparative understanding of ancient and present Indian literature as well as world literature.
Bengali PG Paper 304 Semester- III	**Science and literature**	Learning about science based literature even if the students come from other subjects.
Bengali PG Paper 305 Semester- III	**Evaluation of personality development of students**	Manifestation of knowledge, learning ability and the ability of presenting.
Bengali PG Paper SPL.R/SPL.MP-401 Semester IV	**Rabindranath/ Modern Bengali poetry Drama and Poetry of Rabindranath/ History , Style and literary movement of Bengali Poetry**	Acquiring wisdom about the drama and poetry of Rabindranath. / Having an insight into the conflicts between individual and social existence
Bengali PG SPL.R/SPL.MP- 402 Semester- IV	**Prose by Rabindranath / Poetry of Jibanananda Das, Bishnu Dey,Shankho Ghosh, Shakti Chottopadhay**	Acquiring wisdom about the vast Rabindra Sahitya(Prose by Rabindranath). / Having an insight into the conflicts between individual and social existence
Bengali PG SPL.R/SPL.MP-403	**Novel and Short story of Rabindranath/ Poetry of Joy Goswami, Shamsur Rahaman, Mallika Sengupta, Beetoshok Bhattacharya**	Acquiring wisdom about the vast Rabindra Sahitya(Novel and ShortStory). / Having an insight into the conflicts between individual and social existence
Research Methodology		Procuring excellence in Research.
Dissertation Paper		Practical knowledge in Research.

M A HISTORY

PSO : The students have gained the basic as well as in depth knowledge in history . They are updated with the recent trends as well, that also includes whatever will benefit in their future life.

CLASS/SEMESTER/PAPER	Title	Course Outcome
HISTORY PG SEMESTER –I HISPG-101	STATE FORMATION IN ANCIENT INDIA	Students have been acquainted with the political concept as well as the process of State formation which developed a centralized government structure in Ancient *India*
HISTORY PG SEMESTER –I HISPG-102	HISTORY AND HISTORIOGRAPHY	Historiography means the art of writing *history*; based on the critical examination of sources, and from the authentic materials developed in the west and then in India.
HISTORY PG SEMESTER –I HISPG-103	STATE AND ECONOMY IN COLONIAL INDIA	This paper reveals the role of the *state* in *economic* change in *colonial India* and the economic condition as well.
HISTORY PG SEMESTER –I HISPG-104	INDUSTRIAL REVOLUTION (I) THE NATURE OF THE INDUSTRIAL REVOLUTION & ENGLISH EXPERIENCE	Students have been acquainted with the *Industrial Revolution* which was the transition to new manufacturing processes in Europe; transforming economies based on large-scale industry
HISTORY PG SEMESTER –I HISPG-105	INDIA AND THE WORLD: THE MAKING OF A FOREIGN POLICY	This paper *reveals the Non-Alignment policy and India's relations with its neighbours and major powers.*
HISTORY PG SEMESTER –II HISPG-201	STATE AND ECONOMY IN EARLY MODERN INDIA	This paper *reveals the various aspects of centralized state policy and economy under the Mughals.*
HISTORY PG SEMESTER –II HISPG-202	INDUSTRIAL REVOLUTION (II) THE CONTINENTAL EXPERIENCE	This paper *explores the mechanized textile production process and how it spread from Great Britain to* continental *Europe and the United States as well.*
HISTORY PG SEMESTER –II HISPG-203	ANTI-COLONIAL RESISTANCE AND MODERN NATIONALISM IN INDIA	Starting with the concept Nation and Nationalism, t*his paper reveals the* anti-colonial resistance and modern nationalism in india.
HISTORY PG SEMESTER –II HISPG-204[CBCS]	FREEDOM MOVEMENT IN INDIA (1914 – 1947)	This paper *explores the freedom struggle in India, starting with the outbreak of First World War and emergence of Gandhi in Indian politics until 1947 through various phases.*
HISTORY PG SEMESTER –II HISPG-205(i)	SOUTH WEST BENGAL (17^{TH}& 18^{TH} CENTURIES)	Students have been acquainted with the condition of this region under Mughal rule, especially in Midnapore .
HISTORY PG SEMESTER –III HISPG-301	SOCIAL HISTORY OF COLONIAL INDIA	Students have been acquainted with the Indian society, caste system, tribal community and religions plurality during colonial period.
HISTORY PG SEMESTER –III HISPG-302	CONTEMPORARY INDIA	Students have been acquainted with an in-depth look into the different types of issues that this country faces, covers various aspects

		of *contemporary India*.
HISTORY PG SEMESTER –III HISPG-303	HISTORY OF EUROPE: FROM REVOLUTION TO WORLD WAR (1789-1914)	This paper *explores the social, political, and cultural transformation of* Europe, *from the French* Revolution *to the outbreak of* World War *One*.
HISTORY PG SEMESTER –III HISPG-304[CBCS]	INDIA AFTER INDEPENDENCE (1947 - 1971)	Students have been acquainted with thevariousproblemsand the process of the creation of new India after 1947.
HISTORY PG SEMESTER –III HISPG-305(i)	MUGHAL INDIA	Students have been acquainted with the political, social, cultural condition and administrative practices of the Mughals during their reign.
HISTORY PG SEMESTER –IV HISPG-401	HISTORY OF MODERN EUROPE	Students have been acquainted with the important matters of Modern Europe from the First W. War to socialist Russia, west Asia and the status of China, Japan and so on.
HISTORY PG SEMESTER –IV HISPG-402	CONTEMPORARY WORLD: SELECT THEMES	Students have been acquainted with some interesting themes since the Cold war.
HISTORY PG SEMESTER –IV HISPG-403	SOUTH –WEST BENGAL: THE MODERN PERIOD	Students have been acquainted with the modern education system and political movements against the British in general.
HISTORY PG SEMESTER –IV HISPG-404	HISTORY OF CONSTITUTIONAL DEVELOPMENT IN MODERN INDIA	Students have been acquainted with the various legislations implemented during 18th to 20th century and making of our Constitution.
HISTORY PG SEMESTER –IV HISPG-405(ii)	IDEAS AND THOUGHTS IN MODERN INDIA: SELECT THEMES & PERSONALITIES	Students have been acquainted with the ideas and thoughts of different nationalist leaders and thinkers of Modern India.

MA POLITICAL SCIENCE

PSO: Masters Courses in Political Science accomplishes a learner to understand major trends in the field and the relation between the sub fields of Political Science. They developed the understanding of the issues that drive contemporary research in the subject. It provides learners the insight for an in-depth enquiry into broad range of political phenomena at the national, regional and international level.

Semester	Title	Course Outcome
SEM-I, PLSPG-101	Indian Political Thought	This course intends to acquaint learners with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.
SEM-I, PLSPG-102	Indian Political System : Structure and Process	This course gives an understanding of the evolution and approach to the study of the Indian state. The adaptability of Indian state structure in face of the internal and external changes which has recasted its role in present scenario of globalization. It gives an opportunity to appreciate the strength of democratic foundation which gives it continuity with persistence.
SEM-I, PLSPG-103	Comparative Politics	The Students will be able to understand and apply different approaches to explain the functioning of different type of governing regimes. Students will be able to analyze the various methods of Comparison.
SEM-I, PLSPG-104	Public Administration : Theories and Concepts	This course lays a foundation stone of acquiring knowledge on public Administration. It gives an insight to the nature and contemporary debate as well as various theories of organization. It also explores politico administrative relations and various techniques of ensuring administrative accountability.
SEM-I, PLSPG-105	South Asian Politics	Students gain knowledge about the South Asian Politics, Specially the development of this region and present situation.
SEM-II, PLSPG-201	Western Political Thought : Select Thinkers	The Students will able to understand the main perspective of renaissance which is considered as the curtain raiser of modernity. They also will be able to how Machiavelli depicted the theme of Secularization of Politics. They will come to know how Rawls and Nozick depicted the theory of justice.
SEM-II, PLSPG-202	Political Sociology	This course presents a new branch of the discipline where Political Science is amalgamated with Sociology. It introduces the aspect of non- political politics within the study of political phenomena.
SEM-II, PLSPG-203	International Relations : Approaches and theories	The student becomes familiar with comprehensive overview of the major political developments and events starting from the twentieth century. It also gives emphasis about the key milestones in world history and equip them with the tools to understand and analyze the same from different perspectives
SEM-II, PLSPG-204	Indian Constitution	The purpose of this course is to give an overview to the learners with key elements of Indian Constitution and enable them to critically assess the working of government institutions.
SEM-II, PLSPG-205	Politics in India : Issues and Problems	This course offers the learners to abreast themselves to the contemporary issues and problems of Indian politics. as the adoption of new economic policy has changed the politico economic scenario of India , it has compelled the analysts to rethink the issues and problems in a changed perspective of globalization.
SEM-III, PLSPG-301	Issues in Contemporary Political Theory	The course will enable students to have a grasp on the contemporary discourses in Political Theory. It will in developing a conceptual framework in the understanding of the ideological transformations in the contemporary world. They will also learn how different schools have understood patriarchy and feminist questions differently.
SEM-III, PLSPG-302	Contemporary issues in Indian Administration (Group-A)	This course delves deep into the issues of contemporary Indian administration. As administration is becoming more technical and complex in nature, the understanding of evolving structure, practices and techniques in various sectors claims an in-depth study by the learners.

SEM-III, PLSPG-303	Rural and Urban Local Governance in West Bengal (Group-A)	This course seeks to deliver an overview of the basic concept, institutions and evolution in rural and urban governance in west Bengal. It also provides insights of some significant dimensions in local governance.
SEM-III, PLSPG-302	India and the World : Post-Cold war era (Group-B)	The students become aware of the relations between India and rest of the World. It provides students the knowledge about the emergence of India as an important powerful state after the cold war era.
SEM-III, PLSPG-303	Global Issues (Group-B)	The students will be acquainted with diversities of global issues and their impact on the national policies of the states.
SEM-III, PLSPG-304	Public Administration : Principles and Application	This course is offered in order to in give an overview of the general principles of administration which will give an understanding of the administrative processes. The learners could appreciate the principles as well as its practical application in Indian administrative structure.
SEM-III, PLSPG-305	International Political Economy	This course aims at enhancing the knowledge about the economic perspective of international relations. They also learn about the origin, evolution and functions of international economic regime like World Bank etc.
SEM-IV, PLSPG-401	Major Social Movements	The very aim of this course is to disseminate knowledge about the concept of Social Movements and its intricacies which leads in molding the society. The course makes an attempt to differentiate between old and new social movements.
SEM-IV, PLSPG-402	Research Methodology	The students learn about the concept, principles and methods of social science research. They gain the knowledge about the methods of data collection, and procedure of research work which help them for their future academic life.
SEM-IV, PLSPG-403	Local Governance and Politics in India (Group-A)	The student will be acquainted with conceptual framework on local governance and politics in India which emphasizes the different perspectives. It also provides insights on various issues of rural-urban development experience from different parts of India.
SEM-IV, PLSPG-403	International Law (Group-B)	The students will be acquainted with nature, implication of international law of peace and war. They gain the knowledge about the international law which is a way of reasolving the disputes among the sovereign state, peacefully.
SEM-IV, PLSPG-404	Public Policy in India	Through this course the learner will acquaint themselves with the ever increasing importance of formulation, implementation and evaluation of public policy in India. In addition to that public accountability mechanisms and policy analysis institution's role will ignite analytical perspective of the learner.
SEM-IV, PLSPG-405	Project Work	To provide opportunity to the learners to link theory and processes learnt earlier to put into practical ground reality of the society at large by undertaking research work. It will increase development in writing skills through research paper under the supervision of the faculty.

M.A. PHILOSOPHY

PSO : The student understands the basic concepts in different branches of Philosophy and can apply them in real life . He/she is also updated with the recent trends in the subject. The student also builds a sound base for higher studies.

Semester/Paper	Title of Paper	Course outcome
SEM-I ,PHIPG-101	Indian Epistemology	Learning about the elementary concepts of Indian Epistemology. To impart knowledge of the origin and ascertainment of validity of cognition. Learning about the theories of error, The students will be acquainted with the analytical Philosophy.
SEM-I, PHIPG-102	Western Logic	Logic is an important area of philosophy which can be applied in our day to day life activities. The aim of logic therefore is to develop a system of methods and principles that we may use as criteria for evaluating the arguments of others and as guides in constructing arguments of our own.
SEM-I, PHIPG-103	Western Epistemology	Epistemology is the Philosophical study of the nature, origin and limits of human knowledge .Human appreciation of epistemology is important in order to critically assess the reliability of knowledge developed in the discipline ,
SEM-I, PHIPG-104	Oriental Ethics	To familiarise Students with some basic concepts of morality in Hindu ethics and Bauddha Ethics : Learning about basic tenets of Tribal Ethics and five Pillars of Islam, To grow the sense of morality in the mind of the students , To make the students ethically enriched and enthuse them to work for the well being of the Society.
SEM-I, PHIPG-105	Modern Indian Thinker .	To familiarise students with the views of modern Indian thinkers : to impart Knowledge regarding the real nature of man, the world, the ultimate goal of life from the standpoints of great Indian thinkers ,to create awareness about his/her duties in real life and to motivate them to lead their life in the light of Philosophical Knowledge.
SEM-II, PHIPG-201	Philosophy of Language: Indian	The course provides a deep understanding about the theories of meaning . The students will be acquainted with the conditions for understanding the meaning of a sentence. To develop the skill of analysing the facts and also develop the skill of writings.
SEM-II, PHIPG-202	Philosophy of Language: Western	Philosophy of Language is important because it is so useful in our relationships and in our development and education
SEM-II, PHIPG -203	Continental Philosophy	The P.G course in continental Philosophy aims at developing an understanding of the growing interest in the two broadly allied movements in contemporary Philosophy , referred to as Phenomenology and

		Existentialism, and the purpose of this course is to promoting skill based education. An important goal of this course is to assist critical thinking and self-discovery in the students and ensure their enthusiastic and effective participation in responding to the needs and challenges of the contemporary world. The course intends to enable students in developing skills and competencies needed for meeting the challenges and needs of the real world effectively. Hence this syllabus is created keeping in mind the changing nature of the society, educational institutions and the workplace and inculcate the required skills in the students to understand and respond to the same efficiently and effectively.
SEM-II, PHIPG-204	Modern Indian Thinker. (CBCS)	To know such a Philosophy in the Indian context is not so easy. We have to understand the different time periods to understand different epochs of Indian history. Thus it becomes not so simple to understand any philosophy or any individual philosopher without understanding their contexts. The contemporary Indian Philosophers reinterpreted the ancient Indian thoughts in to the need of the present day society.
SEM-II, PHIPG-205	Metaphysics: Indian/Indian Logic Epistemology	To familarise students with the basic concepts of Metaphysics in Indian Perspective. To grow the nation of real nature of self and the real status of the world among the students. To introduce the students to key debates on metaphysical issues within Indian Philosophical schools.
SEM-III, PHIPG 301	Classical Indian Text (Nyayakusumanjali)	To introduce the students to Indian Classic ie. Nyayakusumanjali . To familiarize students with key debates about the existence of God and some metaphysical issues within Indian Philosophical schools . The student will be acquainted with the analytical approach of Pracina Nyaya to the said topic . To develop the skill of critical thinking and writings among the students which will help them for future research work .
SEM-III, PHIPG 302	Classical Western Text. Critique of pure Reason.	Kant explain that by a Critique of Pure Reason , he means a critique of the faculty of reason in general, in respect of all knowledge after which it may strive independently of all experience and that he aims to reach a decision about possibility or impossibility of Metaphysics.
SEM-III, PHIPG 303 (SPL)	Advanced Western Logic	Logic is an important area of philosophy which can be applied in our day to day life activities. The aim of logic therefore is to develop a system of methods and principles that we may use as criteria for evaluating the arguments of others and as guides in constructing arguments of our own.

SEM-III, PHIPG 303 (SPL)	Advaita Vedanta	To introduce the students to the Fundamental book on Vedanta i.e. Brahma-sutra-bhasya of Sankaracarya. Learning about the reality or truth and also the real status of the world from the standpoint of Sankaracarya. To develop the skill of higher thinking.
SEM-III, PHIPG 304	Applied Ethics (CBCS)	To bring awareness and sensitivity among the students towards some contemporary issues. To grow make aware the students about the new vibrant fields in Applied Ethics. To foster interest in the subject of Applied Ethics and to create a foundation for further studies.
SEM-III, PHIPG 305	Socio ethical Problems	To familiarise students with some critical, disputed socio-ethical Problems. To grow interest in the subject and to aware them about the new vibrant fields in Ethics.
SEM-IV, PHIPG 401	Philosophy of Religion	The students learn about the origin and nature of Religion. To important knowledge and understanding of the fundamental concepts of Religion. To grow in them the clear notion of Religion.
SEM-IV, PHIPG 402	Applied Ethics (Indian and Western)	Learning and morality , moral standard of action in Indian Perspective. To important knowledge about some controversial issues Animal on Rights, Reproductive origin in present time. To bring awareness and sensitivity among the students towards contemporary issues.
SEM-IV, PHIPG 403 (SPL)	Advanced Western Logic	Logic is an important area of philosophy which can be applied in our day to day life activities. The aim of logic therefore is to develop a system of methods and principles that we may use as criteria for evaluating the arguments of others and as guides in constructing arguments of our own.
SEM-IV, PHIPG 403 (SPL)	Advaita Epistemology	The course provides a deep understanding about the creation of the world. The student will be acquainted with key debates about words creation within Indian Philosophical schools. To develop the skill of critical thinking, speaking and writing among the students.
SEM-IV, PHIPG 404	Philosophy of Cognitive Science	Learning about the interdisciplinary nature of cognitive science.To important knowledge and understanding of the fundamental concepts of cognitive Psychology.
SEM-IV, PHIPG 405	Project and Presentation	A project is a shorter type of dissertation . It is expected to be research oriented and prepared on the basis of field study and/or study of some books related to the topic. To develop the skill of critical thinking & writing among the students .To grow skill and ability in arguing.

PG SANSKRIT

PSO: The Post Graduates belonging to this Programme in an institution of academic heritage equip themselves with knowledge of *Sanskrit Shastrics*, honoured to be the ancient language and a window to the world. There is ample scope for them to acquaint themselves with the various knowledge of life making, influential texts of Darshan,Vyakaran, Veda, Alankar, Classical literature, Linguistic study towards development of language system and writers of modern Sanskrit literature and enrich their creative and critical faculties in a research method. Education is not always an end in itself but a means to an end. Thus, the post graduates become accomplished academicians, civil servants etc. and become proficient both in person and profession.

Semester/ Paper	Title	Course Outcome
SEM-I –SANPG-101	**Vedic Hymns**	This course on Vedic Hymns aims to introduce various types of vedic texts of Rgveda, Samvāda, Yajurveda, and Atharvaveda. The students will be acquainted with the historical, social, cultural, and religious value of the vedic texts.
SEM-I - SANPG -102	**Brāhmanas & Upanisadas**	The students will be able to read various Brāhmanas namely Śatapatha Brahan &Aitareya and Upanisadas i.e. Kathopanisada and Kenopaniṣada to acquainted with the knowledge of Vedic and vedantic studies.
SEM-I, SANPG-103	**Grammar** Siddhāntakoumudi (Samjňā) Siddhāntakoumudi (Paribhāsā)	The paper aims at teaching composition and linguistic related knowledge based on Siddhāntakoumudi Samjňā Paribhāsā prakaran. This is the essential for knowledge of Sanskrit grammar, which has been introduced with reference to Panini-sutras with commentaries of Bhattoji Dixit particularly Sajna-sutras and paribhasa-sutras out of six kind of sutras.
SEM-I, SANPG-104	**Vedic Studies**	The students will be acquainted with the Significant of veda and its nirvachan of vedic words and words of vedic Devata i.e. . Students will also gain the knowledge regarding Introduction to the Vedas consists of several chapters of Rgbhāsyabhūmikā and Principles of Etymologies of the following words: Acarya, Vira, Go, Samudra, Vrtra, Aditya, Usa, Megha, Vak, Udaka, Nadi, Asva, Jatavedas, Vaisvanara, Nighantu in Nirukta.
SEM-I, SANPG-105	**: Linguistics & Manuscriptology**	The course aims to get students acquainted with the common linguistic, history of language and literary heritage of Sanskrit and Modern Indian Language. Students will also get the knowledge of theoretical basis of historical linguistics, history of linguistics studies (Yaska, Panini

		Patyanjali, Bloomfield, N.Chomsky etc) Phonetic law & tendencies Historical development of OIA. They will also aquented with the elementary knowledge of Manuscriptology Manuscript, Manuscriptology, Archetype, Colophon Critical Apparatus, Recession , Catalogus Catalogorum, New Catalogus Catalogorum, Descriptive Catalogue, Gilgit Manuscript, Bower Manuscript, Preservation Causes of Variant readings through this course.
SEM-II,SANPG-201	**Grammar** Siddhāntakoumudi -Ac Sandhi with prakrtibhāva Siddhāntakoumudi-Ajantapunlinga	This is the essential for knowledge of Sanskrit language. This course is designed based on linguistic study specially for formation of words of join and dis-join and Ajantapunlinganta Shabdas, which has been introduced with reference to Sutras of Paninian School of grammar with commentaries of Bhattoji Dixit.
SEM-II,SANPG-202	**Drama & Dramaturgy**	This course aims to acquaint students with one most famous drama namely Uttararāmacharita of Sanskrit literature and knowledge represent of history and stages in the growth of Sanskrit drama through Nātyaśastra - Chapter –I & VI. The students will also be acquainted with the historical, social, cultural, political and literary background of the period with emphasis on the Indian Epic Tradition, Classical Indian Drama – Theory and Practice, Alankar, Rasa, Dhawni and Natyashastra.
SEM-II,SANPG-203	**Poetry** Naisadacarita – Canto –I Meghadūta	This course aims to get students acquainted with Classical Sanskrit Poetry. It intends to give an understanding of literature, through which students will be able to appreciate the development of Sanskrit Literature. The course also seeks to help students to negotiate texts independently.
SEM-II, SANPG-204 (CBCS)	**History of Sanskrit literature. & General Grammar**	This is the course of elementary knowledge of Sanskrit, especially made for students of other departments as choice based course. This course aims to acquaint students with journey of Sanskrit literature and Origin and development of Sanskrit literature from the beginning stage. Regarding General Grammar – This is an elementary course in Sanskrit language designed for students, who wish to learn Sanskrit from the very beginning.

		Essential Sanskrit grammar has been introduced without reference to Panini's sutras through the multiple example method with emphasis on students constructing themselves sentences.
SEM-II, SANPG-205	**Philosophy** Vedāntasāra Mahābhāṣya (Paspaśāhnika)	Aim of the Course is intended to impart basic concept and significant of the Vedanta philosophy. The students will also be acquainted with the knowledge of the concept of Atman. Mahabhasya- The students will also be acquainted with the concept of The *Mahābhāṣya, great commentary*, attributed to Patañjali, is a commentary on selected rules of Sanskrit grammar from *Pāṇini*'s treatise, the *Ashtadhyayi*, as well as Kātyāyana's *Varttika*, an elaboration of Pāṇini's grammar.
SEM-III, SANPG-301	**Grammar** Siddhāntakoumudī - Tiṃanta (Bhū & Edh) Siddhāntakoumudī – Stripratyaya	Siddhānta Kaumudī is a celebrated Sanskrit commentary by Bhaṭṭoji Dīkṣita (early 17th century) on the Aṣṭādhyāyī and is believed to be more popular than Pāṇini's work. It re-arranges the sūtras of Pāṇini under appropriate heads and offers exposition that is orderly and easy to follow. So, students will be acquainted with the meaning of Paninya-Sutras through this commentary and gain the knowledge of formation of words of Tinganta and Stripratyay of Siddhnta koumudi.
SEM-III, SANPG-302	**Poetics –I** **sahitya Darpan** Chapter-I & II Chapter- IX &X	The study of *sāhityadarpan* (Sanskrit Poetics) embraces all poetic arts and includes concepts like Defination and necessity of of Poetry, *alaṅkāra, rasa, rīti, vakrokti, dhvani, aucitya* etc. The entire domain of Sanskrit poetics has flourished with the topics such as definition of poetry and divisions, functions of word and meaning, theory of *rasa* and *alaṁkāra* (figures of speech) and *chandas* (metre), etc. This develops capacity for creative writing and literary appreciation.
SEM-III, SANPG-303	**Poetics –II** Daśarūpaka –I & III Dhvanyaloka –I	The students will be acquainted with the knowledge of Alankar Shastric based on Dasarupak and Dhvanyalok (Sanskrit Poetics) embraces all poetic arts and theory and Practice, Defination and necessity of of Poetry,includes concepts of *dhvani, alaṅkāra, rasa, aucitya* etc. The remarkable literary theory of dhvani, verbal power of suggestion, developed in Sanskrit. A study of all these is relevant.

SEM-III, SANPG-304 (CBCS)	**Vedic Text** i) Aksa (10.34) mantras All ii) Agni Sukta **Abhijnanasakuntalam Manusamhita (Chapt. Vii sl- 1- 100)**	This course on Vedic Hymns aims to introduce various types of vedic texts of Rgveda, Samvāda, Yajurveda, and Atharvaveda. The students will also be acquainted with the historical, social, cultural, and political and religious values through the Drama Abhijnanasakuntalam and Manusanhita.
SEM-III, SANPG-305	**Philosophy** Tarkabhāsa Sankhyakrika with Sānkhyatattvakoumudi	The students will be acquainted with the knowledge through the Tarkabhasa,which is manual of the sycretic school of Nyaya-vaishesika. They will be also get the advantages based on the old Nyaya tradition and takes into consideration the sixteen categories of the Nyayasutra of Goutam. The students will be acquainted with the thought of Sankhya-philosophy through various Karikas, written by Iswarkrisna. They will also acquainted with the Karika ,which states that the *purpose* of this union of Prakriti and Purusha, Praman ect.
SEM-IV, LITERATURE SANPG – 401	**Poetics –I** Kāvyaprakāśa (IV & V) Rasagangādhara (1st Ānana upto Rasanirupana)	The study of Kāvyaprakāśa *and* Rasagangādhara(Sanskrit Poetics) embraces all poetic arts and includes concepts like Defination and necessity of of Poetry, *alaṅkāra, rasa, rīti, vakrokti, dhvani, aucitya* etc. The entire domain of Sanskrit poetics has flourished with the topics such as definition of poetry and divisions, functions of word and meaning, theory of *rasa* and *alaṁkāra* (figures of speech) and *Rasa* etc.
SEM-IV, LITERATURE SANPG – 402	**Poetics –I** Vakroktijivitam -Chapter –I kāvyamīmāṃsā –Chapter-4-6	The purpose of this course is to expose students to the rich & profound tradition of poetic themes of Vakroktijivitam and kāvyamīmāṃsā .
SEM-IV, LITERATURE SANPG – 403	**Poetry** Harṣacarita –V Buddhacarita-III	This course aims to get students acquainted with Classical Sanskrit Poetry. It intends to give an understanding of literature, through which students will be able to appreciate the development of Sanskrit Literature. The course also seeks to help students to negotiate texts independently.
SEM-IV, LITERATURE SANPG – 404	**Drama** Mudrārākṣasa Mṛcchakatika	This course aims to acquaint students with two most famous dramas namely Mudrārākṣasa and Mṛcchakatika of Sanskrit literature and knowledge represent of history and stages in the growth of Sanskrit drama through Nātyaśastra. The students will also be acquainted with the historical, social, cultural, political and literary background of the period with emphasis

		on the Indian Epic Tradition, Classical Indian Drama – Theory and Practice, Alankar, Rasa, Dhawni and Natyashastra.
SEM-IV, LITERATURE SANPG – 405	**Modern Sanskrit literature** Ygojibanancha Rukminiharana by Haridāsasiddhantavāgīśa	The purpose of this course is to expose students to the rich & profound tradition of modern creative writing in Sanskrit, enriched by new genres of writing.
SEM-IV, PHILOSOPHY SANPG – 401	**Sarvadarśanasaṃgraha** Cārvāka Bouddha Arhat	The students will be acquainted with the Basic thought of Cārvāka, Bouddha and Arhat Philosophy. The Aim of the course To give a general awareness and develop the philosophical thought through research level of the fondamentals ideas.
SEM-IV, PHILOSOPHY SANPG – 402	**Naya-yogadarśana** Bhasaparicheda (Anumanaah) Yogasūtra with vyāsabhāṣya (Samādhipāda)	The students will be acquainted with the two important Astika systems in Indian philosophy, admitting the validity of the Veda, are Nyaya and Yoga. Original texts of the systems deserve proper study.
SEM-IV, PHILOSOPHY SANPG – 403	**Nyāyavaiśesikadarśana**	Objectives of the Course is to give a precise knowledge of the categorical scheme of Nyaya Vaisesika and to create sensibility of the characteristics of categories with all its subdivisions of Nyāyasūtra with Vātsyanabhāṣya and Praśastapādabhāṣya (Dravya section and Nyāyakandalī on uddeśaprakaraṇa.
SEM-IV, PHILOSOPHY SANPG – 404	**Purvottarmīmāmsādarśana** Arthasaṃgraha Brahmasūtra with śāṃkarbhāṣya – Catussūtrī (1.1.4)	Aim of the Course The course is intended to impart basic concept of the Vedanta philosophy. Objectives of the Course is to introduce the life and works of Sankaracarya the great teacher of Advaita and familiarize the method of teaching Vedanta from gross to subtle through Arthasaṃgraha- Brahmasūtra with śāṃkarbhāṣya –Catussūtrī .Student will also know about the concept of Atman.
SEM-IV, PHILOSOPHY SANPG – 405	**Vyākaraṇadarśana** Vākyapadīya (Brahmakāṇḍa) Paramalaghumaňjūsa (Kāraka)	The course aims to get students acquainted with the Bhartrihari's Vakyapadiya (Brahmakāṇḍa) and Paramalaghumaňjūsa of Nagesh Bhatta,which have great philosophical significance, especially with regard to the connections they posit between grammar, logic, semantics, and ontology. The students will also be acquainted with thethe *shabdadvaita* (word monistic) school of thought, which asserts that cognition and language at an ultimate level are ontologically identical concepts that refer to one supreme reality, *Brahman*. It is also interpreted

		that the notion of the originary word (*shabda*) as transcending the bounds of spoken and written language and meaning i.e. Sphota.
SEM-IV, GRAMMAR SANPG – 401	Vakyapadiyam of Bhartrihari – Brahma kandam, Karakchakram of Bhabananda	The course aims to get students acquainted with the Bhartrihari's Vakyapadiya (Brahmakāṇḍa) and Karakchakram of Bhabananda,which have great philosophical significance, especially with regard to the connections they posit between grammar, logic, semantics, and ontology. The students will also be acquainted with thethe *shabdadvaita* (word monistic) school of thought, which asserts that cognition and language at an ultimate level are ontologically identical concepts that refer to one supreme reality, *Brahman*. It is also interpreted that the notion of the originary word (*shabda*) as transcending the bounds of spoken and written language and meaning through the rules of case-system(Karaka).
SEM-IV, GRAMMAR SANPG – 402	Mahabhasyam of Patanjali - 3rd - 5th Ahnika	Aim of the Course is intended to impart the concept of The *Mahābhāṣya, great commentary*, attributed to Patañjali, is a commentary on selected rules of Sanskrit grammar from *Pāṇini*'s treatise, the *Ashtadhyayi*, as well as Kātyāyana's *Varttika*, an elaboration of Pāṇini's grammar.
SEM-IV, GRAMMAR SANPG – 403	Paribhasendushekhar of Nagesh Bhatta and Laghushabdendusekharah of Nagesh Bhatta	Aim of the Course is intended to impart a close *study* of the method and explanations of the SUtras of Paanini given at various academies all over the world through the philosophical study.
SEM-IV, GRAMMAR SANPG – 404	Vaiyakaran Bhusansarah – Dhatourtha Parama Laghu Manjusa – Upto Sphota nirnoya	The students will be acquainted with the object,subject,verves, which are uses in sentences in a research method including the discussion of Panini-sutras. It is also interpreted that the notion of the originary word (*shabda*) as transcending the bounds of spoken and written language and meaning i.e. *Sphota.*
SEM-IV, GRAMMAR SANPG – 405	Vaiyakaran Bhusansarah – Samasashakti, Laghu Shabdendusekhar – Karak	Aim of the Course is intended to impart with compound-system of words with discussion in a philosophical thought and Panini-sutras of case-ending (Karaka) with commentary of Nagesh Bhatta.

M.Sc PROGRAMME

PO: After completing successfully two years M.Sc.Programme, students are seen to have the potency to pursue and conduct research related works concerningscientific issues. Without bias and prejudice, they indulge in active research with outputs intended to serve societal needs. Apart from being accomplished academicians, most of them are inclined to joining research labs of national and international repute and have wide industrial connections.

MSc ZOOLOGY

PSO: The student is exposed to the advanced concepts of Animal Biology and other advanced fields (viz. endocrinology, cell and molecular biology) of life science to orient them towards to identify problems and ask questions about unanswered and unexplored questions of biology.

Class/ Paper/ Semester- ZOOLOGY M.Sc	Title	Course Outcome
Paper ZOOPG101	A: Nonchordates B: Chordates	Students gain knowledge in the fundamentals of animal sciences, understands the complex interactions among various living organisms& their relationship with the environment. Understands the complex evolutionary processes of animals.
Paper ZOOPG102	A: Cytology B: Histology and histochemistry	Student will learn the types of cell communication and the associated structures. Analyze the regulated sequence of events involved in cell cycle at the molecular level.
Paper ZOOPG103	A: Ecology B: Environmental biology and Toxicology	Student will understand how earth's major ecosystem works. Imparts knowledge to the student regarding environment and population characteristics and dynamics. They will learn about adverse effects of chemical substances on living organisms. The awareness about toxic agents, their effects and knowledge about mode of transformation.
Paper ZOOPG104	A: Parasitology B: Immunology	Student may understand about diseased caused by protozoa & nematodes at molecular level. This knowledge helps students to develop their future career in medical sciences and related administrative services. Students gain in depth knowledge of tissues, cells and molecules involved in host defense mechanisms, types of immunity, interactions of antigens, antibodies, complements and other immune components. Understanding of immune mechanisms in disease control, vaccination, process of immune interactions.

Paper ZOOPG105(Laboratory course)		Analyze the origin, diversification, modifications and evolutionary relationships among invertebrates and the vertebrates. It will provide an overview to know the biomolecules and their function. They will understand about histology and histochemistry.
Paper ZOOPG106(Laboratory course)		They will understand how to estimatehardness, BOD and BOD in different watersamples. This course will increase practical skills of immunology and parasitology.
Paper ZOOPG201	A: Genetics B: Molecular Biology	The students are be able to understand in-depth knowledge on Molecular Biology The students are be able to know various types of Mutagenesis, understand in detailed mechanisms of DNA replication and overall concepts of transcription. Understanding of in detailed mechanisms of translation. Understand the concepts of epigenetics,
Paper ZOOPG202	A: Insect biology & Fish Biology B: Biochemistry	The students make carrier as entomologist by studying the basic of Insect morphology and physiology. This will help in developing knowledge abot fish biology.Understand the biophysical chemistry of molecules. Understand the biochemical integrity of various life processes and the metabolic pathways.
Paper ZOOPG203	A: Animal Physiology B: Environmental Physiology	Students get adequate information regarding sensory system, muscular system and physiology of different senses.Analyses the coordination of body functions by chemical messengers and hormone in human. Understand homeostatic mechanism of the majorfunctional systems in vertebrates. Provide adequate knowledge about osmo-regulationin animals living in different habitats.
Paper ZOOPG204 (CBCS)	A. Animal Diversity and behaviour B. Animal Systems	The course provides wide knowledge about how animals interact with their environment and how they change through time. An appropriate understanding of functioning of each system and its importance.

Paper ZOOPG205 (Laboratory course)		This course helps students to gain fundamental knowledge in various instruments and techniques used in subjects like genetics biochemistry, molecular biology, and entomology & fish biology.
Paper ZOOPG206 (Laboratory course)		Understand the principle, functioning and applications of the tools and techniques available for studying biomolecule.
Paper ZOOPG301	A. Biostatistics B. Biophysics and bioinformatics	The course provides wide knowledge of the methods of statistical analysis for validating the scientific experiments as well as different tools of computational biology and different biophysical instruments.
Paper ZOOPG302	A. Evolution and Systematics B. Biodiversity and conservation	These topics help them analyze evolutionary the processes and the principle underlying it. Students will get adequate knowledge and consciousness about the biodiversity of our country and technicalities of their conservation.
Paper ZOOPG303 (Elective I, SpecialPaper-Cell and Molecular Biology)	A. Architecture of the cells B. Molecular biology	This course will help them to become specialist in the cellular parts and their functionalities at molecular level.
Paper ZOOPG303 (Elective II, Special Paper-Endocrinology)	A. Endocrine organs: Structure and functions B. Hormones and Hormone action	This course will help them to become specialist in the hormonal details of our bodily system and how their coordinate functions regulate all our metabolic pathways.
Paper ZOOPG304 (CBCS)	A. Animal Wonders B. Applied Zoology	Students will learn some of the marvels of Nature created by animals. Along with them they will get to know the entrepreneurship options after completion of a degree in zoology.
Paper ZOOPG305(Laboratory course)		This course helps students to gain fundamental knowledge in various tools, instruments and techniques used in Biostatistics, Bioinfomatics and biophysics.
Paper ZOOPG306 (Laboratory course) (Elective I, Special Paper- Cell and Molecular Biology)		Students will have hands-on-experience on different delicate instruments used in cell biology research
Paper ZOOPG306 (Laboratory course) (Elective II, Special Paper-Endocrinology)		Students will become expert in on different delicate instruments used in research field in Endocrinology
Paper ZOOPG401	A. Developmental biology B. Biotechniques and	Students will get to know the molecular aspects of developmental process of different animals. They will also learn the theoretical studies of several techniques and technologies used in modern biology.

	Biotechnology	
Paper ZOOPG402	A. Neurobiology and animal behavior B. Applied Biology	These topics help them know about the complex array of neurological processes that are the basis of animal and human behavior. Students will also learn about applications of modern biological techniques in research.
Paper ZOOPG403 Elective-I : Cell and molecular biology	A. Cell physiology B. Genomics and proteomics	The biochemical details of cellular function will be taught in this paper. They will also learn about complexities of genomes and protein population of cell and how they change with physiological responses.
Paper ZOOPG403 Elective-II : Endocrinology (Laboratory course)	A. Comparative endocrinology B. Reproductive endocrinology and Endocrine Disorders	This topic will teach them details of endocrine organs of different groups of animals and their origin and evolution.
Paper ZOOPG404(Laboratory course)		This course helps students to gain fundamental knowledge and experience in various tools, instruments and techniques used in Developmental biology, biotechnology and Neurobiology.
Paper ZOOPG405 (Laboratory course) Elective-I : Cell and molecular biology		Students will have hands-on-experience on different delicate instruments used in the field of cancer and other cell biology research as well as in analysis of bioinformatic data.
Paper ZOOPG405 (Laboratory course) Elective-II : Endocrinology		These practical will be helpful in becoming experts in the field of endocrine research.
Paper ZOOPG406* Dissertation		This will help students practicing reading journal papers and analyze them. It will also help them learn to come out of a conclusion from several views.

MSc CHEMISTRY

PSO: This branch of science deals with structure, composition, properties, and the reactivity of molecules and their transformation. The students will learn about the new reactions mechanism as well as the analytical methods to characterize them. Inorganic chemistry deals with synthesis, structure along with their properties, their physical and chemical characteristics too. The students also have a detailed understanding of structure, bonding, spectroscopic elucidation of structure, reactions and reaction mechanisms in chemistry and the fundamental, underlying theories and principles behind them. They also gain experience in research and writing scientific reports and articles and can profess in the biological, industrial and pharmaceutical fields.

Class/Paper/ Semester	Title	Course Outcome
Chemistry PG Semester-I		
CHEMISTRY-PG Paper Code-CHEMPG-101 Sem-I	Organic Chemistry	Learning the pericyclic reactions and HUMO, LUMO concepts, bonding in organic compounds and their stereochemical outcome analysis and moreover the different useful reagents for chemical transformations.
CHEMISTRY-PG Paper Code-CHEMPG-102 Sem-I	Inorganic Chemistry	Study of fundamental concepts of groups, symmetry elements and operations. Learning structure, bonding and applications of boranes, fullerenes, carbon nanotubes, graphine. The learners should be able to calculate crystal field stabilization energy and determine stability constants of complexes. Understanding of active site structure and bio-functions of O_2 uptake proteins as well as study of different physical and magnetic property of d-block elements.
CHEMISTRY-PG Paper Code-CHEMPG-103 Sem-I	Physical Chemistry	Learning the principles and applications of various thermodynamic and partial molar parameters, significant aspects of ensembles and partition functions, structure determination by microwave, infra-red and Raman spectroscopic techniques and kinetics of homogeneous and heterogeneous reactions and their theories.
CHEMISTRY-PG Paper Code-CHEMPG-104 Sem-I	Interdisciplinary Chemistry	Learning the principles and applications of supramolecular host-guest chemistry involving molecular recognition of macromolecules using various force of non-covalent interactions, MOF and green reaction involving solvent free or ionic liquid and introduction of nanoparticles and characterization by DLS, SEM, TEM, AFM.
CHEMISTRY-PG Paper Code-CHEMPG-105A Sem-I	Organic Chemistry Practical	Learning basic methodology to synthesize small organic compounds using reagents and their purifications by column chromatography separation technique.
CHEMISTRY-PG Paper Code-CHEMPG-105B Sem-I	Inorganic Chemistry Practical	Learning advance techniques for different types of titrations, spectrometric estimation, purification and analysis of metals and characterization of different inorganic complex.
Chemistry PG Semester-II		
CHEMISTRY-PG Paper Code-CHEMPG-201 Sem-II	Organic Chemistry	Learning the chemistry of metals, dynamic aspect of stereochemistry of organic compounds and brief introduction to organic reaction mechanism involving multicomponent transformations and introduction to heterocyclic compounds and

		their synthesis.
CHEMISTRY-PG Paper Code-CHEMPG-202 Sem-II	Inorganic Chemistry	To impart technical knowledge about chromatographic techniques and basic principle of solvent extraction method. Study of Metal ions transport and storage proteins. Students should be able to learn about photosynthesis process. Learning of character tables, allow and forbidden transitions. They can identify charge transfer spectra and MO theory of different molecules.
CHEMISTRY-PG Core Paper-203 Sem-II	Physical Chemistry	Learning concepts of semi-classical and quantum mechanics, spin and angular momenta, exactly solvable problems in quantum chemistry, concepts of amperometric titration, cyclic voltammetry, extended Debye-Huckel theory and advanced concepts of photoelectron and electronic absorption and fluorescence spectroscopy
CHEMISTRY-PG CBCS Paper-204 Sem-II	Environmental Chemistry	Detailed study of air, water and soil pollutants and their effect of global warming and environment, effects and remedies of metal toxicology, sampling, monitoring and detection of major pollutants of air, water and soil, chromatography and treatment of air and water pollution.
CHEMISTRY-PG Core Paper-205A Sem-II	Physical Chemistry Practical	Determination of dissociation constants and strengths of various weak and strong electrolytic solutions using potentiometry, conductometry and pH metry.
CHEMISTRY-PG Core Paper-205B Sem-II	Computer Application	Learning about languages, number systems and logic in computer, handling and use of Microsoft office and image toolkits.
Chemistry PG Semester-III		
CHEMISTRY-PG Paper Code-CHEMPG-301 Sem-III	Special Organic Paper	Advance learning of stereochemistry with fused ring system, conformational and chemical reactivity, stereoslective transformations such as kinetic resolution and dynamic kinetic resolutions.
CHEMISTRY-PG Paper Code-CHEMPG-302 Sem-III	Special Organic Paper	Study of fundamental concepts of organic photochemistry with Jablonski diagram, nomenclature of heterocyclic compounds and palladium (0) catalyzed cross coupling reactions as well as study of alkaloids and terpinoids.
CHEMISTRY-PG Paper Code-CHEMPG-303 Sem-III	Special Organic Paper	Learning of technique such as NMR and Mass spectroscopy for structure elucidation and synthetic study of different vitamins, antibiotics and gels.
CHEMISTRY-PG Paper Code-CHEMPG-301 Sem-III	Special Inorganic Paper	Understand about the chemical applications of group theory, chemistry of elements, NMR spectroscopy to comprehend about inorganic compounds. Study on PES, NQR spectroscopy and Magnetochemistry-I are also advantegeous.
CHEMISTRY-PG Paper Code-CHEMPG-302 Sem-III	Special Inorganic Paper	Study about Organometallic Chemistry–II, Crystallography on solid. IR, Raman, CD and ORD spectroscopy and UV-visible spectroscopy for determination of various inorganic structures. Understanding about Medicinal Chemistry-1 including structure and function of Vitamin-A, Vitamin-B, Vitamin-C, Vitamin- D and Vitamin-E. Idea about definition, types and mode of action of analgesics and antihistamines.

CHEMISTRY-PG Paper Code-CHEMPG-303 Sem-III	Special Inorganic Paper	Study on Inorganic photochemistry including photophysical and photochemical process, Jablonski diagram and the terms involved in it. Also learning about Electro-analytical methods, Magnetochemistry-II and application of organometallic Chemistry.
CHEMISTRY-PG Paper Code-CHEMPG-301 Sem-III	Special Physical Paper	Insight into variation and perturbation theories of quantum chemistry, origin of spin-orbit coupling, Zeeman effect, Stark effect, Fermi's golden rule, chemical applications of group theory: Orgel and Tanabe-Sugano diagrams, construction of molecular orbital and ligand group orbital diagrams and application to infra-red and Raman spectra.
CHEMISTRY-PG Paper Code-CHEMPG-302 Sem-III	Special Physical Paper	Advanced concepts and applications of statistical mechanics, classical and quantum statistics, introduction to structure of liquids and phase transition, advanced transition state theory, reactions in molecular beams and diffusion-controlled reactions.
CHEMISTRY-PG Paper Code-CHEMPG-303 Sem-III	Special Physical Paper	Theory, formalism and application of electron spin resonance, nuclear magnetic resonance and Moessbauer spectroscopic techniques, with detailed understanding of basic instrumentation, spectral appearance, peak widths, coupling and splitting effects and structure elucidation of organic compounds and transition metal complexes.
CHEMISTRY-PG CBCS Paper-304 Sem-III	Instrumental Analysis for the molecular characterization	Theory, instrumentation and applications of UV-Vis, Fluorescence, IR, NMR, ESR, microwave and Raman spectroscopy in determination of molecular structure. Application of thermal analysis and electron microscopy.
CHEMISTRY-PG Project Paper-305 A and 305 B Sem-III	Project and review work	Students get exposure of literature survey, recent trends in research, hand on research experiments, characterization of compounds, idea about computational research, writing literature reviews and scientific articles.
Chemistry PG Semester-IV		
CHEMISTRY-PG Paper Code-CHEMPG-401 Sem-IV	Special Organic Paper	Introduction to medicinal chemistry with special emphasis on drugs design and drug development along with special synthetic tools for synthesis and structural study of protein, peptides, nucleic acids and enzymes.
CHEMISTRY-PG Paper Code-CHEMPG-402 Sem-IV	Special Organic Paper	Learning of reaction equilibrium in terms of linear free energy, optical rotations of chiral compounds, organometallic chemistry and application to organic synthesis as well as chemo and regioselective oxidation and reductions.
CHEMISTRY-PG Paper Code-CHEMPG-403 Sem-IV	Special Organic Paper	Learning of retrosynthtic analysis in C-C bond formation and in organometallics, structural elucidation of terpenoids, steroids and alkaloids.
CHEMISTRY-PG Paper Code-CHEMPG-401 Sem-IV	Special Inorganic Paper	Identify the magnetic properties of different materials and understand the mechanism such as direct interaction, super exchange interactions etc. Learning the Basic principle of yclic voltametry and Coulometry and predict different types of redox processes. The learners will be able to identify different types of reaction mechanisms and redox reactions mechanism of metal complexes.
CHEMISTRY-PG Paper Code-CHEMPG-402 Sem-IV	Special Inorganic Paper	Students learn about the synthesis, structure and reactivity of metal carbonyls and predict metal–metal bonding, structure, electronic transition. The learners will be able to understand

		principles of Mössbauer spectroscopy and to apply theories for inorganic compounds. Learning drug designing, mechanism of drug action and therapeutic applications of *cis*-platin. Also to learn about defects in solids and basic understanding of band theory, band gap and different types of semiconductors.
CHEMISTRY-PG Paper Code-CHEMPG-403 Sem-IV	Special Inorganic Paper	Study of fundamental concepts of EPR spectroscopy, hyperfine splitting. The learners will be able to apply the conceptual understanding of the principle to identify the spectra of organic free radicals, transition metal complexes. Learning a comparative study of Lanthanides and Actinides with reference to stable oxidation states, absorption spectra and magnetic properties. Idea about trans actinide elements, superactinides, Hall effect, Meissner effect, and basic concepts of BCS (Bardeen-Copper-Schriffer) theory.
CHEMISTRY-PG Paper Code-CHEMPG-401 Sem-IV	Special Physical Paper	Learning the concepts of Virial and Hellmann-Feynman theorems, Hartree Fock and Density Functional theories, diffraction and color centers in ionic crystals, phonons, excitons and conductivity of metals
CHEMISTRY-PG Paper Code-CHEMPG-402 Sem-IV	Special Physical Paper	Learning the derivations of selection rules and applications of rotation, vibration, rotation-vibration, Raman and electronic spectroscopy, with additional reference to effects of nuclear spin, CARS, SERS and solvent effects
CHEMISTRY-PG Paper Code-CHEMPG-403 Sem-IV	Special Physical Paper	Principles of Jablonski diagram, fluorescence, excitation energy transfer, lifetime of excited states, quenching, quantum yield, FRET, principles of LASER action and photochemical reactions
CHEMISTRY-PG Paper Code-CHEMPG-404 Sem-IV	Polymer Paper	Learning the chemistry of polymer and rubber such as Industrial production methods of polymers, thermal, optical, mechanical, electrical, amorphous and crystalline phase properties of polymer, as well as the processing and fabrication of polymers and their uses.
CHEMISTRY-PG Project Paper-405 A and 405 B Sem-IV	Project and review work	Students get exposure of literature survey, recent trends in research, hand on research experiments, characterization of compounds, idea about computational research, writing literature reviews and scientific articles.

M.Sc BOTANY

PSO:

The MSc Botany Programme includes two types of courses, Programme Core courses (Theory and Practical) and Programme Elective Courses (Special paper). There shall be a Programme Project with a dissertation to be undertaken by all students.

Plant science is now an amalgamation of basic and applied science.

PSO 1: Understanding the classification of plants from cryptogams to Spermatophyte. Identification of the flora within field enhances basics of plants. Study of biodiversity in relation to habitat will correlates with climate change, land and forest degradation. Application of Botany in agriculture is through study of plant pathology.

PSO 2: Understand the ultra-structure and function of cell membranes, cell communications, signaling, genetics, anatomy, taxonomy, ecology and plant Physiology and biochemistry. To understand the multi functionality of plant cells in production of fine chemicals and their wide spread industrial applications.

PSO 3: Molecular and Physiological adaptations in plants in response to biotic and abiotic stress. Genes responsible for stress tolerance genetic engineering of plants.

Class/ Paper/ Semester	Title	Course Outcome
BOTANY **PGSemI** **BOT-101 (Th)**	Microbiology& Virology	1. Students learned about the different groups of microorganisms. 2. Students acquired depth of knowledge on microbial interaction and their metabolism. 3. Know about the soil microbial consortium and its role with the environment. 4. Students will be up loaded with importance of microbes and their pivotal role in environmental management. 5. Students will be familiar about fermentation techniques pertaining to industrial products.
BOTANY **PGSemI** **BOT-102 (Th)**	Phycology, Bryology and Pteridology	1. To impart knowledge about general characters, classification, reproduction methods and life cycles of Thallophyta. 2. To get knowledge in structure, reproduction and life cycle in the mentioned syllabus. 3. Study of evolutionary trends of tracheophyta-vascular cryptogams. 4.
BOTANY **PGSemI** **BOT-103 (Th)**	Mycology and Plant Pathology	1. The students will enable to know the salient features structure, classification, reproduction, life cycle and economic importance of fungi more elaborately. 2. Know the concept, scope and importance of Plant pathology. Understand courses of disease development. 3. Account of Plant disease classification. 4. Know the prevention and control measures of plant diseases. 5. Know the concept of disease forecasting 6. Knowledge of Bio-control and Integrated Pest management. 8.Applied aspects such as effect of environmental

		factors on disease development, genetics of plant pathogen interaction, plant defense mechanism, molecular aspects of host pathogen interaction and post-harvest diseases of fruits, vegetables and seeds will be learn by the students.
BOTANY **PGSemI** **BOT-104 (Th)**	Gymnosperms, Paleobotany and Plant anatomy	1. Students Gain adequate knowledge on general characters, classification and evolutionary linkage of land plant. 2. Students have a good overview of general characters, morphology, reproductive organs, classification and economic importance of Gymnosperms. 3. Students will be conversant with general characters, morphology and anatomy of *Cycas, Pinus, Ephedra and Gnetum.* 5. Student gets knowledge in the methods of fossil and fossilization. 6. To gain knowledge of plant cells, tissues and their functions. 7. The students will enable to know the internal structure of stem, leaf and root in monocot and dicot. 8. Students familiarize in secondary growth, anomalous secondary growth in monocot and dicot stems.
BOTANY **PGSemI** **BOT-105 (Pr)**	Microbiology, virology, Mycology and Plant Pathology	1. Understand the fundamentals of microscopy, staining technique, classification and control of microbes. 2. Acquire knowledge of external, internal and cultural characters of bacteria/ virus. 3. Understand the mechanism of host parasite interaction. 4. Identify the causative agent, symptoms and control measures of plant disease. 5. Acquire the knowledge on defense mechanism, hypersensitivity and auto immunity.
BOTANY **PGSemI** **BOT-106 (Pr)**	Phycology, Byrology, Pteridology, Gymnosperm and Plant Anatomy	1. Develop the skill for micro slide preparation and understand the internal structure of algae, fungi and bryophytes. 2. Students are capable to become practical knowledge in T.S. of stem and Leaf (Monocot and Dicot). To get acquire knowledge in secondary thickening dicot stem and anomalous secondary thickening in the stems. 3. Develop skill on isolation of rhizobium from root module and acquire knowledge in methylene blue reduction test. 4. Understand the internal structural variation of pteridophytes and gymnosperms through T.S and L.S. 5. Understand the importance of fossil forms and learn

		to describe the fossil specimens.
BOTANY **PGSem II** **BOT- 201 (Th)**	Biophysics and Biochemistry	1. The students Acquires a general knowledge of the physical, chemical properties and metabolism of carbohydrates and lipids in living system. 2. The students know basic knowledge of the biological importance of the biomolecules such as carbohydrates, lipids, protein, nucleic acid and enzymes. 3. The students will be able to understand the fundamental biochemical principles of enzymes, such as the structure and function of enzymatic process in living system. 4. The student acquires the ability to use mathematical, statistical methods and application relevant to the biological subjects taught, regarding First, Second and third laws of thermodynamics. 5. The student gets knowledge about bioinstruments like, centrifuge, Spectrophotometer, Electrophoresis, 6. Chromatography principle, and be able to apply these instrument mechanisms to the process of experimentation and hypothesis testing in their imminent research field.
BOTANY **PGSemII** **BOT-202 (Th)**	Plant Physiology	1. Student will be able to understand plant water relations and translocations of photo assimilate and solute. 2. Students understand the mechanism of photosynthesis and Respiration in molecular level. 3. Students get acquire knowledge in the molecular mechanism of nitrogen fixation, plant growth regulators- their mode of actions and photoperiodism-the science of flowering. 4. Students will understand stress types and their mechanism. 5. Students have a detailed knowledge of biological clocks in plants and genetical & biochemical mechanism behind photomorphogenesis.
BOTANY **PGSemII** **BOT-203 (Th)**	Taxonomy of Angiosperm and biosystematics	1. Understand classical and modern system of classification. 2. Acquire knowledge on molecular tools for classification. 3. Get knowledge on important plant families, their characteristics and its economic importance. 4. Acquire knowledge on angiosperms diversity and data sources of Taxonomy. 5. Get knowledge on Economic Botany, Ethnobotany, Floriculture-Horticulture.
BOTANY **PGSemII** **BOT-204 (Th)**	Choice based subject (CBCS): Applied Botany	1.The Students enable to acquire the knowledge about Biofertilizers, their uses, conditions, preparatons and application

		2. The Students enable to acquire the knowledge about mushroom cultivation procedure and cost benefit analysis in small scale 3. Get knowledge about types, cultivation, market of Floriculture crops and economic crops and medicinal plants.
BOTANY **PGSem II** **BOT-205 (Pr)**	Biophysics, Biochemistry and Plant Physiology	1. The laboratory courses help the student to understand and learning principles of laboratory. 2. The Students enable to acquire the practical knowledge about determination, extraction estimation, preparation and measurement of various plant physiological experiments/assay. 3. The students will get an in-hand training for performing plant physiological process like estimation of osmotic potential, photosynthesis, respiration, seed viability etc. 4. The students learn qualitative and quantitative biochemical estimation of different biomolecules, present in plants. 5. In biochemistry, the student gets practical knowledge in order to Preparation of molal, molar, normal and percentage solutions and their dilutions 6. The students gain proficiency in laboratory technique and bio-instrumentation principle, and be able to apply these instrument mechanisms to the process of experimentation in future research field.
BOTANY **PGSemII** **BOT-206 (Pr)**	Taxonomy of Angiosperms and Biosystematics, Economic botany	1. The students will get an in-hand training for performing plant dissection and description needed for preparing Flora and other taxonomic literature, vegetation and biodiversity study. 2. An excursion to know the vegetation types, plant types , species collection ,identification and preservation. 3. A social outreach program to enrich society and students and share the knowledge altogether. 4. To know about economic plants, uses ,parts, ingredients used.
BOTANY **PGSemIII** **BOT-301 (Th)**	Ecology, phytogeography, pharmacognosy	1.To Know the concept, scope and importance of Ecology and environment as a whole, Ecological energy transfer and production, 2.Phytogeographical regions and different Biomes with their vegetation types, , 3. Get idea about different Ecological adapatation of plants according to habitat, plant interactions,

		community structures, niches, succession etc 4. Aware of environmental pollution,action and remedies, bioremediation and biosensors, 5. Aware of Conservation procedures of forest and wild life and the need 6. To Know the sources of crude drugs ,active principals, biochemical pathways of preparation of the metabolites to be used.
BOTANY **PGSemIII** **BOT-302 (Th)**	Genetics and molecular biology	1. The Students enable to acquire the knowledge about Cell organelles, Cell membrane, functions; Chromosome structure, Cell division etc 2. To Know Mendellian principle and its extensions, gene structure, concept, mapping,extrachromosomal inheritance , mutation, recombination etc. 3. They aware about Quantitative genetics. Population genetics and genetic background of cancer induction 4. They aware about structure of DNA, RNA and protein , their processing and control of gene expression 5. They will understand genetic driftand speiaction; genotype frequency in a population.
BOTANY **PGSemIII** **BOT-303 (Th)**	Special paper: Plant Taxonomy and Ecology	1. Students get deep knowledge about History of Taxonomy with contributions of eminent Taxomists, Codes and Congess. 2. Nomenclature procedures, principles validity and rejection of names, Typifications. 3. The students gain knowledge abot Data sourses used in taxonomy, Tools in taxonomy. Cladistic study , study of plant orders 4. Detais and elaborative knowledge about ecosystem functioning, factors, concept of species and community, diversity measurement,hydrosphere, atmosphere, biosphere function, alleochemicals and toxicology , Env movements.
BOTANY **PGSemIII**	Special paper: Microbiology	1. Students will be acquainted with the basic concept of prokaryotes, their taxonomy, their

BOT-303 (Th)		differentiation from eukaryotes and biosafety regulatory framework for prokaryotes. How Microbiology developed and what is the scope of the various branches of the subject. 2. Describe how microorganisms are used as *model systems* to study basic biology, geneticsand ecology. 3. Explain why microorganisms are *ubiquitous in nature*; inhabiting a multitude of habitats and occupying a wide range of ecological habitats. 4. This particular paper will also help in understanding the enzymes kinetics and classification. This paper also deals with water-its microbiology which is different from wastewater. Management of wastewater using various techniques. Student will have the basic background of handling wastewater and its treatment. Besides this student will be acquainted with the deterioration or transformation caused by microbes and its management which is again an important field of Microbiology
BOTANY **PGSemIII BOT-304 (Th)**	Choice based subject (CBCS): Applied Botany	1. Students become aware about i.different Environmental pollutions, souces, effects, remedies, Acts and Laws, ii,Environmental movements, bodies and programmes
BOTANY **PGSemIII (Pr)BOT-305**	Ecology and Genetics	1.Students learn to study vegetation practically in field, measuring density abundance, IVI etc, Diversity indices; in Laboratory soil analyses. 2. Students learn in hand preparastion of Stains, fixatives, treating agents of genetics study. Different staining procedures and cellular stage study 3. They learn Statistical analyses of biological experiments
(BOTANY **PGSemIII Pr)BOT-306**	Special paper: plant taxonomy and Ecology	1. The students will get an in-hand training for performing plant dissection and description from fresh specimens, needed for preparing Flora and other taxonomic literature, vegetation and biodiversity study. 2. An excursion to know the vegetation types, plant types, species collection ,identification and preservation. 3. They learn to solve nomenclature problems, Soil and plant analyses. 4. Study of vegetation and community in details.

BOTANY **PGSemIII (Pr)BOT-306**	Special paper: Microbiology	Student will be equipped with the knowledge to handle microbes and Various basic techniques to isolate, characterize the microbes morphologically will be known to them.
BOTANY **PGSemIVBOT-401 (Th)**	Plant breeding, Biostat , Palynology	Students get enriched with propagation techniques and crossing of horticultural plants, field crops, fruit crops and vegetables, 2. Development of cultivars and commercial hybrids, induced breeding. 3. Application of biotechnology 4. They learn Statistical analyses of biological experiments 5. Study of pollen, application of palynology
BOTANY **PGSemIV BOT-402 (Th)**	Biotechnology Tissue culture	The students will enable to know 1. PCR, DNA finger printing, cloning techniques, sequencing, genomics, gene therapy. 2. Cell and tissue culture techniques, utilities, significances 3. Food preservations food technology
BOTANY **PGSemIVBOT-403 (Th)**	Bioinformatics and Instrumentation	1. Students acquire knowledge about- Bioinformatics tools and their uses 2. Biological databases, sequence alignment 3. Applications
BOTANY **PGSemIVBOT-404 (Th)**	Special paper: Microbiology	1. This course acquaints students with various industrial and food products, their production techniques and Microbial leaching of metals. 2. Course acquaints students with the advanced concept of immunity, its application and methods of biotechnology . 3. Students are equipped with detailed fermentation technology.
BOTANY **PGSemIVBOT-404 (Th)**	Special paper: plant taxonomy and Ecology	1. Students get deep knowledge about literatures of Taxonomy with contributions of eminent Taxonomists, 5. Centre of origins and species concepts 6. The students gain knowledge about phytochorea, plant interactions, study of distribution of plant families. 7. Detais and elaborative knowledge about

		population ecology, pollution ecology , bioremediation, microbial ecology, ecotoxicology , Environmental acts.
BOTANY **PGSemIVBOT-405 (PR)**	Project	Students learn to investigate a research problem, work out following standard procedures, and the write up the full project dissertation and present the same
BOTANY **PGSemIVBOT-406 (PR)**	Special paper: Microbiology	This particular course deals with the working of various advanced techniques in Microbiology and Molecular Biology. Student will know the use of various advanced techniques for application in the field of bioinformatics
BOT-406 (PR)	Special paper: plant taxonomy and Ecology	1. The students will get an in-hand training for performing plant dissection and description from dried specimens, needed for preparing Flora and other taxonomic literature, vegetation and biodiversity study. 2. An excursion to know the vegetation types, plant types, species collection , identification and preservation. 3. They learn to asses pollutions in soil, air and effect on plants by Soil and plant analyses. Soil microbial flora analyses 4. Study of pollens of different plants

M.SC PHYSICS:

PSO: The student understands the basic rules of the material world. Student is also updated with the recent trends in the subject. Apart from building a sound base for various post graduate courses in Physics and related fields, the course is targeted towards the development of logical thinking, unbiased reasoning and self sufficient sturdiness. The emphasis of course is on applications in solving problems of interest to physicists.

Class/ Paper/Semester	Title	Course Outcome
Physics PG Core Paper-1 Semester-I	Methods of Mathematical Physics-I	This course helps the students to learn about basic theory of linear algebra including vector space and matrices which is basic building block of learning of quantum mechanics specially Heisenberg's formalism. Beside that theory of complex variable is also useful to analyze a function and evaluate different integral contaning various type of sigularity at their domain. Some special finction like Bessel and Lagurre polynomials also helps to solve the problems arising in different places like solution of spherical symmetry problem in quantum mechanics and the finding out the potential at any point due to charged geometical bodies like sphere, cylinders etc.
	Classical Mechanics-I	The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.
Physics PG Core Paper-2 Semester-I	Quantum Mechanics-I	This course gives an introduction to quantum mechanics, to describe the physics of small scales where experimental behavior cannot be explained by classical mechanics.
	Solid State Physics-I	Understand the basics of crystallography & semiconductor physics
Physics PG Core Paper-3 Semester-I	Electrodynamics	The concept of finding out retarded potential due to an accelarated chage particle and the power radiated from antenna has an importance in this context. The scattering and dispersion of light helps to understand some basic phenomena in nature. The confinment of charge particle is learned in theory of plasma. Lasltly, the theory of relativistic electrodynamics in the four vector formalism plays a vital role to redifine all the Maxwell's equations, gauge theory, charge density, current density and etc, having important application in theory of quantisation of electromagnectic fields.

	Molecular Spectroscopy and Laser Physics	Concept of different types of molecule is explined and also, their different energy levels are developed.
Physics PG Core Paper-4 Semester-I	Electrionics Analog-I	This course gives a basic radio communication system concept, dealing with different signals, antennas, radars, etc.
	Electronics Digital-I	This course offers extended and advanced digital circuits to implement different functions.
Physics PG Core Paper-5 Semester-I	Electronics Practical-I	This course aims to develop and design different digital and analog circuits practically.
Physics PG Core Paper-6 Semester-I	Language C & MATLAB	In this course, at first, students learn fundamentals of C & C++ Programming such as Introduction to programming, constants, variables and data types, operators and expressions, I/O statements,scanf and printf, c in and c out etc. Then they learn the application based programming in physics such. Also, the students are teached by fundamentals of Matlab for plotting, graphics, Polynomials & Curve fitting etc.
Physics PG Core Paper-7 Semester-II	Methods Mathematical Physics-II	In this course students can learn the solution of partial differential equations (PDEs) leads to solve heat diffusion equations. Theory of Green's function helps to solve non linear differential equation which is useful in electrostatic problems as well as scattering theory of quantum mechanics. Theory of Fourier and Laplace transform has its importance in many branches like quantum mechanics, signal processing in electronics and etc. Finally group theory has important applications to develop concept about symmetry operations in some geometrical structures as well as special groups has great importance in the context of particle physics.
	Classical Mechanics-II	This course offers to learn the rigid body motion with precession and gives a primary idea of space-time curvature.
Physics PG Core Paper-8 Semester-II	Quantum Mechanics-II	In this course students can learn symmetirc and conservation laws in quantum mechanics. Eigen vaues of general angular momentum and spin angular momentum has discussed. Addition of angular momenta and Clebsh Gordan coefficients are determined. The approximation method for bound states (such as stationary perturbation theory and time-dependent perturbation theory) is disdussed.

	Solid State Physics-II	This course deals with magnetism, dielectrics, ferroelectric and basic concept of superconductivity. Magnetism is very important because we use it to create electrical energy. In fact, most of the energy that we use today comes from rotating magnets. The study of dielectric properties concerns storage and dissipation of electric and magnetic energy in materials.Ferroelectricity is a characteristic of certain materials that have a spontaneous polarization and that can be reversed by external applied field. The most important advantage of superconductive materials is the use in the long-distance electricity transmission. Students can go through these topics and learn their properties for practical usefulness.
Physics PG Core Paper-9 Semester-II	Electrionics Analog-II	This course deals with a different kind of filter circuit used for many electronic devices. It also gives basic ideas of transmission lines.
	Electronics Digital-II	This course aims to understand and develop computer memory structure, deal with the microprocessor, and how arithmetic and logical operation performs.
Physics PG CBCS Paper-10 Semester-II	Introduction To Astronomy	Astronomy is the science which deals with the study of celestial bodies. It considers(a) their motions, both real and apparent, and the laws which govern those motions;(b) their forms, dimensions, masses, and surface features;(c) their nature, constitution, and physical condition; (d) their probable past history and future development. Astronomy is essentially an observational science rather than an experimental one. The discussions and interpretation of observations employs the use of mathematical analysis. Celestial bodies and celestial atmosphere provide natural laboratories for studying physical phenomena in exciting conditions which are occasionallyunderstood in our terrestrial location.Physical and mathematical theories are thus pushed to the limit to provide clarifications for the celestial phenomena that we observe.However, it is not essential to undergo any formal exercise in Astronomy at the undergraduate level; it helps the student to cultivate a general awareness in this field, from reading good articles and books and/or as an amateur astronomer.

Physics PG Core Paper-11 Semester-II	Electronics Practical-II	This course deals with flip flops and counter testing in the laboratory and implements some analog operation by OPAMP. It also gives basic ideas of performing arithmetic operations by the microprocessor.
Physics PG Core Paper-12 Semester-II	Advanced Practical-I	This course helps the student to learn about some advance level practical like the application of GM counter, production of plasma and study its different characteristics, use of different interferometer etc.
Physics PG Core Paper-13 Semester-III	Quantum Mechanics-III	The theory of scattering is extremely important in modern physics. It provides much of the basic data of nuclear physics i.e., much of what we know about the forces and interactions in atoms and nuclei has been learnt from scattering experiments. In the case of nuclear forces the form of the interaction between the particles is not known, and the experimental scattering data are used to derive information about what form of the force law is possible. Quantum scattering experiments make use of rather different experimental techniques. A collection of classical trajectories corresponding to unbound motions would, as a function of say the particle energy and impact parameter, also allow for a mapping of the scattering force.The probabilistic wave packet motion,and variations of the probability of scattering at different angles and energies still gives information on the nature of the scattering potential.
	Statistical Mechanics-I	This course hepls the students to learn basics of classical statistics including random walk problem, phase space, different kind of ensembles like microcanonical, canonical, grand canonical. The fluctuations of different thermodynamic quantity and finding out of generalised equation of state have also importance. Recapitulation of MB, BE and FD statistics are done using grand partition function. Lastly the theoy of density matrix is learnt to explore the quantum statistics.
Physics PG Core Paper-14 Semester-III	Applied Optics	Idea of signal processing through nonlinear optics in fibre-opti communication are explained. The students learn the basics of a fibre and different types of fibe.

	Nuclear Physics-I	The objective of this course is to provide elementary knowledge about the size and shape of nuclei, classification of nuclei according to their mass numbers, and the various important properties of alpha, beta, gamma decay.
Physics PG Core Paper-15 Semester-III	Special Paper-I	Understand the deep knowledge on band theory of solids, optical properies, X-ray diffarction, defect studies and behaviour of dielectrics in ac field.
Physics PG CBCS Paper-16 Semester-III	Matter and Material Science	This course aims to motivate students to research by dealing with different advanced materials and their applications.
Physics PG Core Paper-17 Semester-III	Advanced Practical-II	Practical work is an essential part of science education. To make it effective, we need to decide what we want students to learn from any particular lesson, and to consider the best approach for achieving that. To understand the processes that make science a reliable body of knowledge: experiment and observation; data analysis; prediction and falsification; and critical scrutiny by hands on practice of advanced experiments. Students will experience the wonder of seeing the path of charged particles change when they pass through a magnetic field, and realizing that even these invisible particles obey known laws of physics. To develop the ideas of counting system of GM counter through nuclear physics experiments.
Physics PG Core Paper-18 Semester-III	Special Practical-I	Practical work is an essential part of science education. To make it effective, we need to decide what we want students to learn from any particular lesson, and to consider the best approach for achieving that. To understand the processes that make science a reliable body of knowledge: experiment and observation; data analysis; prediction and falsification; and critical scrutiny by hands on practice of advanced experiments. Students will experience the wonder of seeing the path of charged particles change when they pass through a magnetic field, and realizing that even these invisible particles obey known laws of physics. To develop the ideas of counting system of GM counter through nuclear physics experiments.

Physics PG Core Paper-19 Semester-IV	Quantum Mechanics-IV	The objectives of this course are: 1. To demonstrate an understanding of the founding principles of relativistic quantum mechanics 2. To explain the existence of anti-particles 3. To demonstrate a working knowledge of Dirac matrices and their role in the Lorentz transformations of Dirac Spinors 4. To understand spin and positive/negative energy solutions 5. To solve relativistic one-body problems for spin-0 and ½ particles To identify particle interaction of an electron with electromagnetic field
	Statistical Mechanics-II	The learning of Bose-Einstein condensation helps to understand the phase transition in liquid He. Fermi dirac statistics has many applications like 2-D electron gas in magnetic field, specific heat of metal, susceptibility due to metalic electrons, photoelectric effect and thermionic emission. Theory of phase transition and Ising models has great importance in many areas of solid state physics.
Physics PG Core Paper-20 Semester-IV	Nuclear Physics-II	This course helps to learn a student the different nuclear models of a nuleus, element to element interaction in a nucleus and also, the various nuclear reactions.
	Particle Physics	The objective of this course is to provide basic knowledge about the four fundamental interactions, conservation of different quantum numbers in fundamental interactions, the quark structure of hadrons, properties of strange hadrons, concept of gauge theories of strong and electromagnetic interactions and a brief introduction of gauge theory of weak interaction, neutrino physics.
Physics PG Core Paper-21 Semester-IV	Material science	Aim to concept different techniques for material preparation and to learn various material characterization techniques.
	Semiconductor Devices	This course is mainly designed to give theoretical idea about the application of semiconductor in the field of communication, Microwave semiconductor devices, semiconductor Power devices, semiconductor Opto-electronic devices.

Physics PG Core Paper-22 Semester-IV	Special Paper-II	The course aims through a theoretical and experimental approach to give superconducting and magnetic properties insights into solid state physics.
Physics PG Core Paper-23 Semester-IV	Special Practical-II	This course deals with hands on practice of various topics involved in solid state physics. A large number of experiments to be performed by the students in different fields and that can give the better understanding of the theoretical study of condensed matter physics. Students can get the concept of crystallography, semiconductor, magnetism, dielectrics, ferroelectricity, spectroscopy, solar-cell etc. by performing these experiments as special practical include in this syllabus.
Physics PG Core Paper-24 Semester-IV	Project with Seminar and Grand Viva	Students are advised to design a practical something not included in the syllabus , applying all the concepts they have learnt take a proper reading and explain. This gives them a fascinating challenge, helping them to learn on their own and test their skill.

MSc MATHEMATICS

PSO: The students of PG after having two years of study in this programme enrich themselves in basics of mathematics (Applied and Pure) and related topics of concerned subject. They also develop their research acumen in related areas and new avenues for future research activities. Apart from these also become professionals, academicians and help the nation in contributing their expertise in planning and programmes.

Semester/ Paper	Title	Course Outcome
MTMPG101	Real Analysis	Expertise for research in the field Pure Mathematics. Function spaces: (The space of continuous functions): The Weierstrass Theorem, Trigonometric polynomials, Infinitely differentiable functions, Equicontinuity, Continuity and Category Algebra of Lattices, The Stone-Weierstrass Theorem. Functions of Bounded Variation: Functions of bounded variations, Helly's First theorem Riemann Stieltjes Integration in $\mathbb{R}$.: Weights and Measures, The Riemmain-Stiltjes integral, the space of integrable functions, integrals of bounded variation, Integrators of bounded variation. The Riemann Integral, The Riesz Representation Theorem Norms and Normed spaces: Norms and Normed spaces, Banach spaces, Hilbert spaces Lebesgue measure and Integral: Outer measure, measurable functions(Lebesgue), The Lebesgue integral, Convergence theorem, Littlewood's other principles and modes of convergence Lebesgue vs. Riemman, dependence on a parameter, -Spaces, More on Modes of convergence, differentiation.
MTMPG102	Linear Algebra	Expertise for research in the field of Mathematics and different National Examination: Vector spaces, Euclidean space, Unitary space, orthonormal basis, Gram-Schmidt orthogonalization process. Linear transformation in and Matrix representation of linear transformations, matrix of linear, rank and nullity, annihilator of a subset of a vector space, Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms. Inner product spaces, Spectral Theorem, Orthonormal basis. Eigen vectors, spaces spanned by eigen vectors, similar and congruent matrices, characteristic polynomial, minimal polynomial, diagonalization, diagonalization of symmetric and Hermitian matrices, Cayley-Hamilton theorem, reduction of a matrix to normal form, Jordan Canonical form. Quadratic form, Reduction to normal form and classification of quadratic forms, Sylvester's law of inertia, simultaneous reduction of two quadratic forms, applications to Geometry & Mechanics
MTMPG103	Classical Mechanics & Special Theory of Relativity	Expertise for research work in the field of theoretical Physics: Motion of a system of particles: Constraints. Degrees of Freedom, Generalized coordinates. Holonomic and non-holonomic system. Principle of virtual work. D'Alembart's Principle. Lagrange's equations. Plane pendulum and spherical pendulum. Cyclic co-ordinates. Coriolis force. Motion relative to rotating earth. Calculus of Variation : Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations. Principle of stationary action. Hamilton's principle. Deduction of Lagrange from Hamilton's principle. Brachitochrone problem. Lagrange's equations

		from Hamilton's principle. Invariance transformations. Conservation laws. Noether's theorem. Infinitesimal transformations. Space-time transformations. Legendre transformation. Hamiltonian. Hamilton's equations. Poisson bracket. Canonical transformations. Liouville's theorem. Hamilton-Jacobi equation for Hamilton's principle function. Solution of harmonic oscillator problem by Hamilton-Jacobi method. Small Oscillations: Small oscillation about equilibrium. Lagrange's method. Normal co-ordinates. Oscillations under constraint. Stationary character of a normal mode. Small oscillation about the state of steady motion. Normal coordinates Orientation and displacement of a rigid body. Eulerian angles. Caylay-Klein parameters. Inertia tensor. Eigenvalues of the inertia tensor. Principal axis transformation. Euler equations of motion. Motion of a free about a fixed point. Special theory of relativity :-Postulates of special relativity. Lorentz transformation. Consequences of Lorentz transformation. Force and energy equations in relativistic mechanics.
MTMPG104	Complex Analysis	Students are Expertise in the field of Mathematics in Complex Plane: Complex Topology, Multivalued Functions, Power Series, Complex Integration, Singularites, Residue Calculus, Linear fractional transformation**s.**
MTMPG105	Unit-I: Graph Theory	Expertise in the modern field of Research: Fundamental Concepts : Basic Definitions. Graphs, Vertex degrees, Walks, Paths, Trails, Cycles, Circuits, Subgraphs, Induced subgraph, Cliques, Components, Adjacency Matrices, Incidence Matrices, Isomorphisms. Graphs with special properties : Complete Graphs. Bipartite Graphs. Connected Graphs, k-connected Graphs, Edge-connectivity, Cut-vertices, Cut-edges. Eulerian Trails, Eulerian Circuits, Eulerian Graphs : characterization, Hamiltonian (Spanning) Cycles, Hamiltonian Graphs : Necessary condition, Sufficient conditions (Dirac, Ore, Chvatal, Chvatal-Erdos), Hamiltonian Closure, Traveling Salesman Problem. Trees : Basic properties, distance, diameter. Rooted trees, Binary trees, Binary Search Trees. Cayley's Formula for counting number of trees. Spanning trees of a connected graph, Depth first search (DFS) and Breadth first search (BFS) Algorithms, Minimal spanning tree, Shortest path problem, Kruskal's Algorithm, Prim's Algorithm, dijkstra's Algorithm. Chinese Postman Problem. Coloring of Graphs : Vertex coloring : proper coloring, k-colorable graphs, chromatic number, upper bounds, Cartesian product of graphs, Structure of k- chromatic graphs, Mycielski's Construction, Color-critical graphs, Chromatic Polynomial, Clique number, Independent (Stable) set of vertices, Independence number, Clique covering, Clique covering number. Perfect graphs : Chordal graphs, Interval graphs, Transitive Orientation, Comparability graphs. Edge-coloring, Edge-chromatic number, Line Graphs.
	Unit-II: Discrete Mathematics	Expertise in the field of applied Computefr Science : Mathematical induction. Principle of inclusion and exclusion. Pigeon hole principle. Finite combinatorics. Generating functions. Par-titions. Recurrence relations. Linear difference equations with constant coefficients. Partial and linear orderings. Chains and antichains. Lattices. Distributive lattices. Complementation. Alphabets and strings. Formal languages and phrase structure grammars. BNF notation. Derivations. Language generated by a grammar. The Chomsky hierarchy: Regular, Context -free, Context-sensitive, and arbitrary grammars. Finite state machines. Nondeterministic finite automata. Regular languages. Closure properties.

		Kleene's theorem. Regular expressions. Pumping lemma. Al-gorithms for regular grammars. Introduction to the theory of Context-free languages, push-down automata, and parsing.
MTMPG106	Computer Programming	Expertise in the field of Computer Programming in C: Review of basic concepts of C programming, Arrays, structure and union, Enum, pointers, pointers and functions, pointers and arrays, array of pointers, pointers and structures, strings and string handling functions, Dynamic memory allocation: using of malloc(), reallc(), calloc() and free(), file handling functions: use of fopen, fclose, fputc, fgets, fputs, fscanf, fprintf, fseek, putc, getc, putw, getw, append, low level programming and C preprocessor: Directive, #define, Macro Substitution, conditional compilation, #if, #ifdef, #ifndef, #else, #endif. Programming in MATLAB: The MATLAB workspace, data types, variables, assignment statements, arrays, sets, matrices, string, time, date, cell arrays and structures, introduction to M – file scripts, input and output functions, conditional control statements, loop control statements, break, continue and return statements.
	Computer Lab	Expertise in the Computer Programming.
MTMPG201	Abstract Algebra	In the field of research work in Pure Mathematics : Groups: Groups, Subgroups, Homomorphism, Normal subgroup, Quotient groups, Isomorphism theorems, Symmetric groups, Alternating and dihedral groups, Structure of finitely generated abelian groups, Group actions and its applications, Sylow theorems, solvable groups. Rings: Rings and homomorphism theorems, Prime ideals and maximal ideals, Jacobson radical and Nil-radical. Chinese reminder theorem. Polynomial rings and power series rings. Division algorithm. Roots and multiplicities, resultant and discriminant, Elementary symmetric functions and the main theoream on symmetric functions. Factorization in polynomial rings. Eisenstein criterion. Unique factorization domains. Modules: Modules, Homomorphisms and exact sequences. Free modules. Ranks of a free module (over commulative rings). Hom and tensor products. Chain conditions on modules. Noetherian rings and Hilbert basis theorem. Structure theorem for modules over PID's. Fields: Field extensions and elementary Galois theory.
MTMPG202	Numerical Analysis	Expertise of the student in the field of Research Problems by using this subjects Symbolic operators and their relations. Interpolation: Hermite interpolation, Cubic spline interpolation. Lagrange's bivariate interpolation.

		Approximation of functions. Chebyshev polynomial: Minimax property. Curve fitting by least square method. Use of orthogonal polynomials. Economization of power series. Numerical integration: Newton-Cotes formulae-open type. Romberg integration, Gaussian quadrature: Gauss-Legendre, Gauss-Chebyshev Integration by Monte Carlo method, Multiple integrals. Roots of polynomial equation: Bairstow method. Solution of a system of non-linear equations by fixed point method and Newton-Raphson methods. Convergence and rate of convergence. Solution of a system of linear equations: LU decomposition method. Solution of tri-diagonal system of equations. Ill-conditioned linear systems. Relaxation method. Eigenvalue problem. Power method. Jacobi's method. Solution of ordinary differential equations: Runge-Kutta method to solve a system of equations and second order IVP. Predictor-corrector method: Milne's method, Adam-Basforth-Moultan method. Stability. Solution of second order boundary value problems: finite difference and finite element method, Shooting method. Solution of Partial differential equations: Finite difference scheme. Parabolic equation: Crank-Nicolson method. Iteration method to solve Elliptic and hyperbolic equations, stability.
MTMPG203	Theory of Ordinary Differential Equations	Gathering knowledge in Mathematics : System of Linear Differential Equation : System of linear differential equations in Normal form, Homogeneous linear system. Wronskian; Characteristic Equation and Characteristic Values. Second order linear differential equations: Uniqueness Theorem. Characteristic Equation and Characteristic Values, Boundary Conditions, Sturm -Liouville Systems, Fourier Convergence Theorem. Green's Function : Green's Functions and its properties, Sturm-Liouville theory; Boundary value problems. Special Function : Equation of Fuchsian type; Series solution by Frobenius method; Hypergeometric equation. Hypergeometric functions. Series solution near zero. one and infinity. Integral formula for the hypergeometric function. Differentiation of hypergeometric function. The confluent hypergeometric function. Integral representation of confluent hypergeometric function. Legendre equation: Legendre functions, Generating function, Legendre functions of the first kind and second kind, Laplace integral, Orthogonal properties of Legendre polynomials, Rodrigue's formula, Schlaefli's integral.

		Bessel equation: Bessel function, Series solution of Bessel equation, Generating function, Integrals representations of Bessel's functions, Hankel functions, Recurrence relations, Asymptotic expansion of Bessel functions. Simple properties of solutions; Asymptotic Expansions; Solutions in terms of contour integration. Plane autonomous systems. The general solution of linear autonomous planer systems. Phase paths of linear autonomous planer systems. Liapunov stability of plane autonomous linear systems, Examples. structure of the solutions of n- dimensional linear systems, fundamental matrix, Properties of fundamental matrices, examples. Structure of the solutions of n-dimensional inhomogeneous linear systems, Examples. Stability and boundedness for linear systems. Stability of linear systems with constant coefficients. Stability of a class of non-autonomous linear systems in n dimensions. Gronwall's lemma. Stability of the zero solutions of nearly linear systems. Examples. Equations with periodic coefficients. Mathieu's equation, Hill's equation. Floquet's theory. Characteristic numbers, characteristic exponents. Examples. Wronskian. Stability regions of Mathieu's equation. Hill determinant. Examples
MTMPG204	CBCS: Introduction to Computer Application and Basic Statistical Analysis	Give some idea about mathematics of other department students Importance of computer application in sciences. Brief history of development of computer, computer generations, classification of computer-analogue, digital, Hybrid; micro, mini, mainframe and super computers. Computer hardware: basic components of computer-CPU, peripheral devices, computer ;Memory, ail computer buses. Software - Types of software -monitor program, operating system, utility program, application program, language processor. Computer languages - machine language, Assembly language, High-level languages. Problem solving and flow charts - symbols, structure, methods of drawing of flowcharts. Application of some softwares: – SPSS, MATLAB, WINEDIT(Latex) Unit: II BASIC STATICAL ANALYSIS Full Marks: 30 Definition and scope Population and sample, statistic and parameter, Frequency Distribution: Histogram, Frequency polygon, Ogive, Bar Diagram, Bubble plot Measures of central tendency, measures of dispersion, Measures of Skewness and Kurtosis. Probability, Random variable and its properties: : Expectations, variance, Probability distribution: Binomial, Poisson, and Normal Scatter diagram, Correlation and regression.

		Chi-square and Student's t- test and test of significance and their application in Bio-infonnatics.
MTMPG205	Unit I: Optimization Unit II: Fuzzy Sets and Their Applications	Gives the idea of Modern technology uses in the field of present scenario by using Revised Simplex Method (with and without artificial variables), Classical Optimization Techniques: Single variable optimization, Multi-variate optimization. Numerical Optimization Method: Steepest descent method. Non-linear Programming: Convex Programming, Lagrange Multiplier Method (for equality constraint) Dynamic Programming: concept, Principle of optimality, characteristics, Application-Shortes route problem only Inventory Control (Deterministic-EOQ model, EOQ with shortages, EPQ with and without shortages) Optimal Control: Method of calculus of variations, simple Applications (with equality constraint). Definition of Fuzzy sets .Alpha –set. Normality Extension Principle. Basic Operations like inclusion. Completion, Union and Intersection, Difference. Fuzzy numbers. Addition, Subtraction, Multiplication and division, triangular and trapezoid fuzzy numbers. Linear programming problem with fuzzy resources: Vendegay's approach Werner's approach L.P.P with fuzzy resources and objective: Zimmermann's approach. .P.P with fuzzy parameters' in the objective function. Definition of Fuzzy multi objective linear programming problems. A brief survey of the methodology of solving Fuzzy M.O.L.P. and fuzzy goal programming.
MTMPG206	Topology	Expertise in the field of Pure Mathematics , Axioms of set theory, partial order, Ordinality, Cardinality, Schroeder-Bernstein Theorem, Axiom of choice and its equivalents. Topological space. Examples, Base for a Topology, Sub - base, Neighborhood system of a point, Neighborhood base, Limit point of a set, Closed sets, Closure of a set, Kuratowski closure operator; Interior and boundary of a set, sub- space Topology, First and Second Countable Spaces. Continuous function over a Topological space. Homomorphism; Nets, Filters, Their convergence, Product Space, Projection Function. Open and Closed function. Quotient Spaces. Separation axioms 0 ; 1 ; 2 ; 3 ; 4 in Topological spaces. Product of 2 –SPACES,

		regular spaces, Normal spaces, Completely regular spaces. Tychonoff spaces, Urysohns Lemma in Normal spaces, Tietze extension Theorem. Embedding in cube. Urysohn's metrization Lemma. Open cover, Sub-cover, Compactness, Countable open cover, Lindeloff space, compact sets, Finite Intersection property, Tychonoff Theorem on product of compact spaces, Continuous image of a compact spaces, Locally compact spaces, One point compactification. Connected spaces, Separated sets, Disconnection of a space, Union of connected sets, Closure of a connected sets, Connected sets of reals, Continuous image of connected spaces, Topological product of connected spaces, components, Totally disconnected spaces, Locally connect spaces, Uniform Topology, 2 –property of uniformity, Interior and closure of a set in terms of uniformity, Uniformly continuous function. Product Uniformity. Tychnov theorem, Ist and IInd axiom of Countability, Metric spaces, Baire category theorem, Banach fixed point theorem.
MTMPG301	Functional Analysis	Expertise in the field of Pure Mathematics by using this concepts Complete Metric Spaces and Banach Space: Complete metric space, Completion of a metric space. Function Space C[a,b], Compactness in C[a,b], Ascoli-Arzela theorem. Normed spaces Continuity of linear maps, Bounded linear transformation. Set of all bounded linear transformation B(X,Y) from NLS X into NLS Y is a NLS. B(X,Y) is a Banach space if Y is a Banach space. Quotioent of normed linear spaces and it's consequences. Hahn-Banach Extension theorem and Its applications, Banach spaces. A NLS is Banach iff every absolutely convergent series is convergent. Conjugate space. Reflexive spaces Uniform Boundedness Principle and its applications. Closed Graph Theorem, Open Mapping Theorem and their applications. Inner product spaces: Hilbert spaces, Orthonormal basis. Complete Orthonormal basis. Cauchy-Schwarz inequality. Parallelogram law. Projection theorem. Inner product is a continuous operator. Relation between IPS and NLS. Bessel's inequality. Parseval's identity Strong and Weak convergence of sequence of operators. Reflexivity of Hilbert space. Riesz Representation Theorem for bounded linear functional on a Hilbert space. Definition of self adjoint operator, Normal, Unitary and Positive operators, Related simple theorem. Applications in differential and integral equations
MTMPG302	INTEGRAL TRANSFORMATIONS AND INTEGRAL EQUATIONS	Students are acquainted with knowledge of Fourier Transform: Properties of Fourier transform, Inversion formula, Convolution, Parseval's relation, Multiple Fourier transform, Bessel's inequality, Application of transform to Heat, Wave and Laplace equations. Laplace Transform: Laplace transform, Properties of Laplace transform, Inversion formula of Laplace transform(Bromwich formula), Convolution theorem, Application to ordinary partial differential equations and integral

		equations. Wavelet Transform: Time-frequency analysis. Multi-resolution analysis. Spline wavelets. Sealing function. Short-time Fourier transform. Wavelet series. Orthogonal wavelets. Applications to signal and image processing. Integral Equation: Formulation of integral equations, Integral equations of Fredholm and Volterra type, solution by successive substitutions and successive approximations. Resolvent Kernel Method. Integral equations with degenarate kernels. Abel's integral equation, Integral equations of convolution type and their solutions by Laplace transform, Fredholm's theorems. Integral equations with symmetric kernel, Eigenvalue and eigenfunction of integral equation and their simple properties. Fredholm alternative.
MTMPG304	History of Mathematics	As a part of inter disciplinary course, the students of other PG Departments grow knowledge in History of Mathematics, Ancient Mathematical Sources, Mathematics in Ancient Mesopotamia, The Numeral System and Arithmetic Operations, Geometric and Algebraic Problems, Mathematical Astronomy, Mathematics in Ancient Egypt, Geometry, Assessment of Egyptian Mathematics, Greek Mathematics, The Development of Pure Mathematics, The Pre-Euclidean Period, The Elements, The Three Classical Problems, Geometry in the 3rd Century BCE, Archimedes, Apollonius, Applied Geometry, Later Trends in Geometry and Arithmetic, Greek Trigonometry and Mensuration, Number Theory,Survival and Influence of Greek Mathematics Mathematics in the Islamic World (8th–15th Century), Origins, Mathematics in the 9th Century, Mathematics in the 10th Century, Omar Khayyam, Islamic Mathematics to the 15th Century The Foundations of Mathematics : Ancient Greece to the Enlightenment, Arithmetic or Geometry, Being Versus Becoming, Universals, The Axiomatic Method, Number Systems, The Reexamination of Infinity, Calculus Reopens Foundational The Philosophy of Mathematics: Mathematical Platonism, Traditional Platonism, Nontraditional Versions, Mathematical Anti -Platonism, Realistic Anti-Platonism, Nominalism, Logicism, Intuitionism, and Formalism, Mathematical Platonism: For and Against, The Fregean Argument for Platonism, The Epistemological Argument, Against Platonism
MTMPG305 (Special-IA)	Manifolds and Riemann Geometry	Differentiable Manifolds: Differentiable Manifolds, Tangent Vectors, the differential of a map, The tangent and cotangent bundles; submanifolds: the inverse and implicit function theorems, Vector fields, Distributions Tensors and Differentiable forms: Tensor product, Tensor fields and differential forms, Exterior derivation, differential ideals and Frobenius' theorem, Orientation of manifolds, covariant differentiation, Identities satisfied by the curvature and torsion tensors, The Koszul connection,

		connections and moving frames, Tensorial forms Riemannian Manifolds: Riemann metrices, Identities satisfied by the curvature tensor of a Riemmian manifold, Sectional curvature, Geodesics, exponential map, Normal coordinates, Volume form, the Lie derivative, The Hodge star operator, Maxwell's equations, consequences of the theorems of Stokes and of Hodge, The space of curvature tensors, conformal metrics and conformal connections
MTMPG305 (Special-IIA)	**SPECIAL PAPER I– OR ADVANCE OPTIMIZATION AND OPERATION RESEARCH**	Modified dual simplex. Large Scale Linear Programming: Decomposition Principle of Dantzig and Wolf. Parametric and post-optimal analysis: Change in the objective function. Change in the requirement vector, Addition of a variable, Addition of constraint, Parametric analysis of cost and requirement vector. Classical Optimization Technique: Multivariate optimization (with inequality constraints) Search Methods: Fibonacci and golden section method. Gradient Method: Method of conjugate directions for quadratic function, Davodon-Fletcher-Powell method. Methods of feasible direction and cutting hyperplane method. Integer Programming: Gomory's cutting plane algorithm, Gomory's mixed integer problem algorithm, A branch and bound algorithm. Goal Programming: Introduction, Difference between LP and GP approach, Concept of Goal Programming , Graphical Solution-method of Goal programming, Modified Simplex method of Goal Programming. Optimization for Several Variables: Algebraic approach, Algebraic geometrical approach, cost – different approach, Inequality approach.
MTMPG306 (Special-IB)	**THEORY OF RELATIVITY**	Special Relativity: Introduction, Space and Time in Prerelativity Physics and in Special Relativity, The Spacetime Metric, General Relativity. Curvature: Derivative Operators and Parallel Transport, Curvature, Geodesics, Methods of Computing Curvature. Einstein's Equation: The Geometry of Space in Prerelativity Physics; General and Special Covariance, Special Relativity, General Relativity, Linearized Gravity: The Newtonian Limit and Gravitational Radiation. The Schwarzschild Solution: Derivation of the Schwarzschild Solution, Interior Solutions, Geodesics of Schwarzschild: Gravitational Redshift, Perihelion Precession, Bending of Light, and Time Delay, The Kruskal Extension.

MTMPG306 (Special-IIB)	**OPERATIONAL RESEARCH MODELING – I**	Dynamic Programming: Introduction, Nature of dynamic programming, Deterministic process, Non-Sequential discrete optimization, Allocation problems, Sequential discrete optimization, Long -term planning problem, Multi- stage decision process, Application of dynamic programming in production scheduling. Inventory control: Inventory control –Price breaks and multi-item with constraints, -probabilistic (with and without lead time), Fuzzy and Dynamic inventory models, Basic concept of supply – chain management and two echelon supply chain model. Queuing Theory: Basic structure of queuing models, Poisson queues – M/M/1, M/M/C for finite and infinite queue length, Non-Poisson queue – M/G/1, Machine-Maintenance (Steady State). Network: PERT and CPM: Introduction, Basic difference between PERT and CPM, Steps of PERT/CPM Techniques, PERT/CPM network components and precedence relationships, Critical path analysis, Probability in PERT analysis, Project Time – Cost, Trade-off, Updating of the project, Resource allocation – resource smoothing and resource leveling. Replacement and Maintenance Models: Introduction, Failure Mechanism of items, Replacement of items deteriorates with time, Replacement policy for equipments when value of money changes with constant rate during the period, Replacement of Item that fail completely – individual replacement policy and group replacement policy, Other replacement problems – staffing problem, equipment. Simulation: Introduction, Steps of simulation process, Advantages and disadvantages of simulation, Stochastic simulation and random number – Monte Carlo simulation, Random number, Generation, Simulation of Inventory Problems, Simulation of Queuing problems, Role of computers in Simulation, Applications of Simulations.
MTMPG401	**PROBABILITY & MEASURE THEORY**	Students are acquainted with knowledge of Probability: Borel's Normal Number Theorem, Probability Measures, Existence and Extension, Denumerable Probabilities, Simple Random Variables, The law of Large Numbers, Gambling Systems, Markov Chains, Large Deviations and the Law of the Iterated Logarithm. Measure: General Measures, Outer Measures, Measures in Euclidean Space, Measurable Functions and Mappings, Distribution Functions. Random Variables and Expected Values: Random Variables and Distribution, Expected Values, Sums of Independent Random Variables, The Poisson Process, The Ergodic Theorem. Convergence of Distribution: Weak Convergence, Characteristic Function, The Central Limit Theorem, Infinitely Divisible Distributions, Limit Theorems in Rk, The Method of Moments. Derivatives and Conditional Probability: Derivatives on the Line, The Random – Nikodym Conditional Probability, Conditional, Martingales. Stochastic Processes: Kolmogorov's Existence Theorem, Brownian Motion, Nondenumerable Probabilities. Poisson Process.
MTMPG402	**Continuum**	Provides fair knowledge about Stress: Body force. Surface forces. Cauchy's

	Mechanics	stress principle. Stress vector. State of stress at a point. Stress tensor. The stress vector –stress tensor relationship. Force and moment equilibrium. Stress tensor symmetry stress quadric of Cauchy. Stress transformation laws. Principal stress. Stress invariant. Stress ellipsoid. Strain: Deformation Gradients. Displacement Gradient Deformation tensor. Finite strain tensors. Small deformation theory -infinitesimal strain tensor. Relative displacement. Linear rotation tensor. Interpretation of the linear strain tensors. Strength ratio. Finite strain interpretation. Principal strains. Strain invariant. Cubical dilatation . Compatibility equation for linear strain. Strain energy function. Hook's law. Saint –Venant's principal. Airy's strain function. Isotropic media. Elastic constrains. Moduli of elasticity of isotropic bodies and their relation. Displacement equation of motion. Waves in isotropic elastic media.
MTMPG403	**Cryptography**	Introduction: Overview of course. Classical Cryptography.Secret Key Encryption: Perfect Secrecy – One time pads, Stream ciphers and the Data, Encryption Standard (DES), The Advanced Encryption Standard (AES), Public Key Encryption: Factoring and the RSA encryption; Discrete log , Diffie-Hellman Key Exchange; ElGamal encryption. Digital Signatures : One-time signatures, Rabin and ElGamal signatures schemes, Digital Signature Standard (DSS). Hashing: Motivation and applications, Cryptographically Secure Hashing, Message Authentication Codes (MAC), HMAC. Network Security: Secure Socket Layer (SSL), IPsec Secret Sharing: Definition, Shamir's threshold scheme, Visual secret sharing schemes.
MTMPG404	**Project Work**	Students grow practical knowledge through dissertation Project
MTMPG405 (Special –IIIB)	**Algebraic Topology**	**The Fundamental group:** Homotopy of paths, The fundamental group, Covering spaces, The fundamental group of the circle, Retractions and fixed points, The fundamental theorem of algebra, The Borsuk-Ulam theorem, Deformation of Retracts and Homotopy type, The fundamental group of , Fundamental groups of some surfaces. **Separation theorems in the Plane:** The Jordan separation theorem, Invariance of Domain, The Jordan curve theorem, Imbedding graphs in the plane, The Winding number of a Simple closed curve, The Cauchy integral formula. **The Seifert-van Kampen theorem:** Direct sums of abelian groups, Free products of groups, Free groups, The Seifert-

		van Kampen theorem, The fundamental group of a wedge of circles, Adjoining a two-cell, The fundamental group of the torous and the Dunce cap.
MTMPG405 (Special –IIIA)	**Nonlinear Optimization**	**Optimization** : The nature of optimization and scope of the theory. The optimality criterion of Linear programming. An application of Farka's Theorem. Existence Theorem for Linear systems. Theorems of the alternatives. Optimality in the absence of differentiability, Slater's constraint qualification, Karlin's constraint qualification, Kuhn-Tucker's saddle point necessary optimality Theorem. Optimality criterion with differentiability and Convexity, Kuhn-Tucker's Sufficient optimality theorem, Duality in non-linear programming, Weak duality theorem, Wolfe's duality theorem, Duality for quadratic programming. **Quadratic Programming**: Wolfe's modified simplex method, Beale's method. Convex Programming. **Stochastic Programming** : Chance Constraint programming technique. **Geometric Programming** : Geometric programming (both unconstrained and constrained) with positive and negative degree of difficulty.. **Games**: Preliminary concept of Continuous Game, Bimatrix Games, Nash Equilibrium, Solution of bimatrix games through Quadratic Programming (Relation with Nonlinear Programming). Multi – objective Non – linear Programming: Introductory concept and Solution procedure.
MTMPG406(Special –IVB)	**Techniques of differential topology in relativity**	Causality: Orientibility, Causal curves, Achronal boundaries, Causality conditions, Cauchy developments, Global hyperbolicity, The existence of geodesics, The causal boundary of spacetime, Asymptotically simple spaces. The Cauchy problem in General Relativity: The nature of the problem, The reduced Einstein's equations, The initial data, Second order hyperbolic equations, The existence and uniqueness of developments for the empty space Einstein equations, The maximal development and stability. Spacetime singularities: The definition of singularities, Singularity theorems, The descriptions of singularities, Imprisonedness.
MTMPG406(Special –IVB)	**Operational Research Modeling-(II)**	Optimal Control: Performance indices, Methods of calculus of variations, Transversally Conditions, Simple optimal problems of mechanics, Pontryagin's principle (with proof assuming smooth condition), Linear

		regulator, Application of dynamic programming in proving Pontryagin's principle, Bang –bang Controls. Sequencing: Problems with n jobs two machines, n-jobs three machines and n-jobs, m-machines. Reliability: Concept, Reliability Definition , System Reliability, System Failure rate, Reliability of the Systems connected in Series or / and parallel. MTBF, MTTF, optimization using reliability, reliability and quality control comparison, reduction of life cycle with reliability, maintainability, availability, Effect of age, stress, and mission time on reliability. Information Theory: Introduction, Communication Processes–– memory less channel, the channel matrix, Probability relation in a channel, noiseless channel. A Measure of information- Properties of Entropy function, Measure of Other information quantities –– marginal and joint entropies, conditional entropies, expected mutual information, Axiom for an Entropy function, properties of Entropy function. Channel capacity, efficiency and redundancy. Encoding –– Objectives of Encoding. Shannon –– Fano Encoding Procedure, Necessary and sufficient Condition for Noiseless Encoding.

MSC GEOGRAPHY

Programme Specific Outcome (PSO):

The M.Sc. in Geography program offers students the opportunity to advance their career aspirations through advanced study in the classroom and in the field. The programme in Geography is tailored to meet the students' specific educational, research and professional goals in mind. It focuses on spatial studies, qualitative as well as quantitative, and emphasizes on human-environment relationship.

PSO.1. Design and conduct independent research in their chosen field in the discipline
PSO.2. Demonstrate knowledge of concepts, methods, and theories designed to enhance understanding of the natural world and human society.
PSO.3. Communicate the results and significance of their research in both written and oral form
PSO.4. Evaluate how historical events have been influenced by, and have influenced, physical and human geographic factors in local, regional, national, and global settings.
PSO.5. Examine social and environmental processes, with a particular focus on space and place, critical theory, practical application, analysis and intervention in chosen field within the discipline of Geography
PSO.6. Evaluate causes, consequences, and possible solutions to persistent, contemporary, and emerging global issues.
PSO.7. Follow established ethical guidelines for research and teaching
PSO.8 .Have an in-depth understanding of and mastery of the literature in, at least one particular geographic subfield.
PSO.9. Classify processes of environmental change and evaluate the relationship between human beings and their surroundings, bringing to bear knowledge from many disciplines.
PSO.10. **A geographer has better job opportunities in government departments, Cartographer, Researcher, Teacher/Professor, Competitive Examinations, Government employer, GIS specialist, Climatologist, Transportation Manager, Surveyor, GPS Surveyors.**

PAPER-WISE COURSE OUTCOMES (CO)

Class/Paper/ Semester	Title	Course Outcome
SEM – I GEOPG-101	GEOTECTONIC AND GEMORPHOLOGY	This course will develop knowledge of the Earth as a four-dimensional dynamic system. Also, students can learn Earth forms and processes. The outcomes of this course are: 1) explaining the Fundamentals of Geotectonic; 2) understanding crustal mobility and tectonics; with special emphasis on their role in landform development; 3) establishing the relationships between landforms, processes, and underlying structure; 4) assess how different scales of time and space affect geomorphological processes; 5) explain and apply geomorphological methods used in research today.
GEOPG-102	CLIMATOLOGY AND HYDROLOGY	1) Students will learn the process of interaction between the atmosphere and the earth's surface. 2). They understand how the planetary and periodic wind and pressure belt related to each other. Also they understand how to develop the tropical cyclones; El Nino and La Nina 3) Students learn about the climate and how it changes and better understand the atmospheric condition that causes weather patterns and temperature changes over time also effect on physical and cultural activities of human life. 4) On successful completion of this course, students should be able to understand the mean global

		atmospheric circulations and disturbances, world climate systems, climatic variability and change. 1. At the end of the semester students will different physical aspects of water as a natural resource. 2. They will learn some strategies of water resource management. 3. Learn Also about the conservation of water. 4. Students can compute critical flow and critical depth in floodplain hydraulics. 5. Students can delineate watersheds and stream polylines from digital elevation data.
GEOPG-103	SOCIAL AND CULTURAL GEOGRAPHY	1. Evaluate the social issues such as- racism, cast conflict, social distance. 2. Understand the causes of social inequality and their impact on society. 3. Students can understand indicators of social well-being and quality of life. 4. Discuss about the social space, social groups and intra-urban mobility. 5. They can define the cultural region of the world. 6. Students can learn about different aspects, components elements and criteria of cultural geography.
GEOPG-104	GEOGRAPHICAL THOUGHT	1. This should enable the student to critically look at the contents of other courses at Postgraduate level as logically integrated with the broad currents of thought the subject has witnessed in the distant and recent past. 2. Students will demonstrate an advanced understanding of the historical development of geographical thought. 3. They can understand the major current philosophical and theoretical debates in geography. 4. Students will demonstrate an understanding of current research within the breadth of geography, as well as more in depth knowledge of research in their specialty areas. 5. Students will develop a solid understanding of the concepts of “space," “place” and “region” and their importance in explaining world affairs.
GEOPG-105	TECHNIQUES IN PHYSICAL GEOGRAPHY	Students will demonstrate their knowledge of physical geography and the methods and techniques for observing, measuring, recording, and reporting on geographic phenomena. Also, they will be able to correlate the knowledge of physical geography with human geography.
GEOPG-106	TECHNIQUES IN HUMAN GEOGRAPHY	They will be able to acquire the knowledge of Human Geography and will correlate it with their practical life. Also, gain knowledge about measuring inequality by Location Quotient, and also measuring regional disparity by HDI, GDI, and PI Indexes.
SEM-II GEOPG-201	SOIL AND BIO GEOGRAPHY	1. Students will get familiarized with interface between biology & ecology and pedology 2. Able to Geography converging and forming biosphere and lithosphere 3. Students will be able to discuss about ecosystem services and soil systems 4. Able to apply interaction of biotic and abiotic resources. 5. They can identify ecological aspects of environment 6. Development of necessary knowledge on soil and biotic world and various lab techniques of soil analysis

GEOPG-202	POPULATION AND SETTLEMENT GEOGRAPHY	.1) Build an idea about urban and rural settlements, and its relationship with environment and also different theories related to settlement geography. 2). Know about classification and morphology of settlements. 3). Understand the trends and patterns of world urbanization. 4). Know about different theories of urban growth. . 5) Gain knowledge different aspects of population geography. 6). Develop an idea about the concept of Migration.
GEOPG-203	REGIONAL GEOGRAPHY	1. Students will get an introduction to the main regions of the India in terms of both their uniqueness and similarities. 2. Students will be exposed to historical, economic, cultural, social and physical characteristics of India. 3. Students will learn the relationships between the global, the regional and the local, particularly how places are inserted in regional and global processes. 4. In addition to the ability of understanding and reading maps, students will develop cartography skills and will be able to create maps on their own. 5. Students will be introduced to demographic, social and cultural attributes such as migration, social relations and cultural identity. .
GEOPG-204(CBCS)	ENVIRONMENTAL CONCERNS IN GEOGRAPHY WITH SPECIAL REFERENCE TO INDIA	Students can represent a critically important set of analytical tools for assessing the impact of human presence on the environment by measuring the result of human activity on natural landforms, global warming and cycles etc. Students also develop efforts and skill to reduce or avoid the potential losses from hazards and disaster, assure prompt and appropriate assistant to the victims of a hazards and disaster and achieve a rapid and effective recovery
GEOPG-205	TECHNIQUES IN GEOGRAPHY	This course gives hands on training for using various statistical software for data analysis and graphs and diagrams
GEOPG-206	STATISTICAL TECHNIQUES IN GEOGRAPHY	1. Keeping in view the nature of data and purpose of study, students would be able to make a rational choice amongst listed various statistical methods. 2. Demonstrate understanding of basic concepts of probability and statistics embedded in their courses. 3. Show proficiency in basic statistical skills embedded in their courses. 4. Students shall know how to organize, manage, and present data. 5. Students shall know how to organize, manage, and present data. 6. Demonstrate ability to write reports of the results of statistical analyses giving summaries and conclusions using nontechnical language.
SEM-III GEOPG-301	URBAN GEOGRAPHY	Urban Studies provides a broadly interdisciplinary understanding of how urban dynamics shape both global interdependence and local spaces. It emphasizes how cities are increasingly critical to the organization of economic, social, and cultural activities that shape and transform human experience. This course will develop the concept of an urban region. The main outcomes of this course are: 1) Discussing the processes of urbanization and urbanism; 2) Understanding the structure of a city region. 3) Understanding the causes of various problems of an urban region. 4) Find out the appropriate policies and planning for betterment of the urban centre. 5). Learning of use of latest RS and GIS technology in urban geography.

GEOPG-302	POLITICAL GEOGRAPHY	1) Develop the political thought of border, boundary, buffer, and frontier in the mind of students. 2) Develop the understanding of geopolitical strategies of the countries. 3) Emphasize the geo political role of GATT, WTO, NATO, BRICS, and SAARC in sustaining the universal peace and security. 4) Creates awareness among the students about Indian Nationalism, Regionalism, and Federalism. 5) Gives the reasons for terrorism in India and its challenges.
GEOPG-303	FUNDAMENTALS OF POPULATION GEOGRAPHY	1. Understand the distribution of population. 2. Population distribution and its problems. 3. Population dynamics 4. Understand and aware about the population policies & its importance. 5. Learn about migration models and it's on economy, society and environment.
GEOPG-304 (CBCS)	CONTEMPORY ISSUES IN GEOGRAPHY	This course will develop the knowledge of important natural and anthropogenic problems and issues. The main objectives of this course are: 1) Cause and effects and management of Tsunami and cyclone. 2) Understanding of changing demography of India. 3) Implication of multi-level planning in India. 4) Explaining the status, problems and relative measures for crime and poor reproductive and child health in India
GEOPG-305	REMOTE SENSING AND GIS TECHNIQUES	1. Students will demonstrate knowledge of the foundations and theories of geographic information systems (GIS) and Remote Sensing (RS) and use the tools and methods of GIS. 2. Students will demonstrate their knowledge of physical geography and the methods and techniques for observing, measuring, recording and reporting on geographic phenomena. 3. Students will demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution. 4. Student will be familiar with modern techniques in Geography. 5. Students will be prepared to apply their skills in professional careers.
GEOPG-306		1) Develop basic understanding of handling and use of Census and SRS data. 2) Grow their analytical capacities with exercise the vital rates through statistical data analysis. 3) Develop their own presentation skills by preparation and presentation of a term paper
SEM IV GEOPG-401	ENVIRONMENTAL GEOGRAPHY	1) Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving. 2) Concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. 3) Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. 4) Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales. 5) Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes. 6) Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. 7) Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and

		written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.
GEOPG-402	**Special paper** ADVANCE POPULATION GEOGRAPHY	.1.Understand the history of population, methodology of population geography, sources & types of population data. 2. Get knowledge of population theories 3. Understand the framework for fertility analysis, reproductive health 4. Investigate current issues and problems in India. 5 .Et knowledge of different types of population problems e.g. Zero, under & decline population. Population and human development.
GEOPG-403	APPLICATIONS IN ENVIRONMENTAL GEOGRAPHY	Students will be able to state an original research question appropriate for environmental geographical analysis.1.Students will be able to state how a research project contributes to an existing body of geographic literature. 2. Students will be able to implement legitimate geographic methodology such as co-relation, map interpretation, measurement of noise pollution, survey techniques etc. 3. Students will be able to explain and assess the results of original geographic research with the help of learning book review, literature survey and term paper.
GEOPG-404	DISSERTATION(SPECIAL PAPER) WORK AND REPORT	1)By the end of the dissertation work and report the students should be able to:1.Describe a relevant area of career development, career coaching, coaching or work-related learning studies.2.Identify research methods.3.State research questions.4.Identify literature for review.5.Critically analyse and evaluate the knowledge and understanding in relation to the agreed area of study.6.Integrate theory and practice.7.Develop responses on the basis of the evaluation and analysis undertake.8.Apply knowledge and understanding in relation to the agreed area of study.9.Communicate in written form by integrating, analysing and applying key texts and practices.10.Demonstrate advanced critical research skills in relation to career development or work-related learning studies.
GEOPG-405	DISSERTATION(SPECIAL PAPER) PRESENTATION AND VIVA	Students will be able to: 1.Deal with nerves and think more positively about public speaking. 2. Consider ways of grabbing the listener's attention, holding their interest, and concluding strongly3.Use body language and tone of voice to enhance their presentations. 4. Use slides and visual aids effectively5.Deliver an enthusiastic and well-practised presentation!
GEOPG-406	GRAND VIVA IN GEOGRAPHICAL ISSUES	The students get the overall knowledge of the in the relevant field of Geography acquired over 2 years of study in the post-graduate program. Viva will be conducted in 4th semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their Post-graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both in the academic and the professional sector Most importantly students need to be aware of the entire syllabus right from the first year. Be thorough with at least the content in that particular subject; recall all the units and prepare for probable questions

M.Sc COMPUTER SCIENCE

PSO: Students are provided with the opportunities to develop competency in the field of computer science and encourage them to make a mark in the much sought after IT industry. They also get the basics of research and vital courage for higher studies. Guest lectures, case studies and presentations are organized from time to time to give an insight into the latest development and happenings in the industry and research.

Class/Paper/ Semester	Title	Course Outcome
MSc/COSPG-101/ Sem-I	DISCRETE STRUCTURES	Writing an argument using logical notation and determining if the argument is or is not valid as well as the ability to write and evaluate a proof. Getting some basic knowledge of sets, probability, graphs etc.
MSc/ COSPG-102/ Sem-I	DESIGN AND ANALYSIS OF ALGORITHMS	Learning to argue the correctness of algorithms using inductive proofs and invariants, analyzing running times of algorithms using asymptotic analysis.
MSc/COSPG-103/ Sem-I	ADVANCED COMPUTER ARCHITECTURE	Understanding the concept of pipelining, instruction set architectures, memory addressing, the various models, etc. Learning the performance of multi-core processors using SPEC benchmarks and several advanced optimizations to achieve cache performance.
MSc/COSPG-104/Sem-I	OBJECT ORIENTED PROGRAMMING	Learning the object-oriented programming approach (the top-down and bottom-up approach), and apply the concepts of object-oriented programming to write codes.
MSc/COSPG-05/ Sem-I	ALGORITHMS LAB	Understanding the complexities of various problems, analyzing the efficiency and correctness of algorithms and designing algorithms using the dynamic programming, greedy method, Backtracking, Branch and Bound strategy, etc.
MSc/COSPG-106/ Sem-I	ADVANCED JAVA AND ANDROID PROGRAMMING LAB	Learning the basic concept of java programming, code writing, small projects based on java, and understanding the underlying design of android along with some app development techniques.
MSc/COSPG-201/Sem-II	ADVANCED DATABASE MANAGEMENT SYSTEMS	Understanding the following: - Query optimization. - Parallel and distributed database systems. - New database architectures and query operators.
MSc/COSPG-202/Sem-II	THEORY OF COMPUTATION AND AUTOMATA	Learning some formal mathematical models of computation along with their relationships with formal languages like regular languages and context free languages, Students can learn that not all problems are solvable by computers.

MSc/COSPG-203/Sem-II	ADVANCED SOFTWARE ENGINEERING	Developing the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
MSc/COSPG-204 (CBCS)/Sem-II	DATASTRUCTURES THROUGH C	Learning how to analyze algorithms, checking algorithm correctness, summarizing searching and sorting techniques, describing different data structure like stack, queue, linked list, graphs, etc.
MSc/COSPG-205/Sem-II	DATABASE MANAGEMENT SYSTEMS LAB	Applying the basic concepts of Database Systems and Applications. Implementing basics of SQL and construct queries using SQL in database creation along with a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
MSc/COSPG-206/Sem-II	SOFTWARE ENGINEERING LAB	Students can acquire the generic software development skill through various stages of software life cycle with Basic Structural Modeling, Advance Structural Modeling, UML, designing Test cases, Test Suits, Rational Unified Process etc.
MSc/COSPG-301/Sem-III	ARTIFICIAL INTELLIGENCE	Learning some advanced technologies that allow machines to sense, comprehend, and these technologies improve productivity and lower costs.
MSc/COSPG-302/Sem-III	DIGITAL IMAGE PROCESSING	Reviewing the fundamental concepts of a digital image processing system, analyzing the images in the spatial and frequency domain, learning the techniques for image enhancement and image restoration, etc.
MSc/COSPG-303/Sem-III	ELECTIVE-I	This provides the facility of having a glimpse of some IT and research ready subjects which are very vital for the rapid changing technologies to cope up with future demands.
MSc/COSPG-304 (CBCS)/Sem-III	DATABASE MANAGEMENT SYSTEMS	Understanding the fundamental elements of relational database management systems, relational data model, entity-relationship model, relational database design, relational algebra and SQL. Also learning normalization concepts along with some design techniques such as ER-diagram, DFD, etc.
MSc/COSPG-305 /Sem-III	DIGITAL IMAGE PROCESSINGLAB	Learning the relevant aspects of digital image representation and their practical implications, implementing the concepts like preprocessing,

		thresholding, 2-D convolution, the 2-D DFT, color processing, restoration techniques, etc. by using either of MATLAB or python.
MSc/COSPG-306 /Sem-III	PROJECT-I	This enables the students to choose a project based on research or IT. Research related projects include literature survey, project plan and report sections. Whereas IT based software projects include design and coding.
MSc/COSPG-401 /Sem-IV	DATA ANALYTICS	Learning the basics of text data analysis, machine learning techniques like regression, classification, clustering, ranking, etc. along with natural language processing techniques and big data.
MSc/COSPG-402/ Sem-IV	ELECTIVE-II	Students can learn some advance subjects which are based on future technologies and can help students to get some vital experience of research and IT based technologies beforehand.
MSc/COSPG-403/ Sem-IV	CRYPTOGRAPHY & NETWORK SECURITY	Learning how to provide security of the data over the network, do research in the emerging areas of cryptography and network security, implementing various networking protocols, etc.
MSc/COSPG-404/ Sem-IV	SEMINAR AND GRAND VIVA	Learning how to present a seminar which is very important for IT and research. Grand viva provides a chance to final year students to recap the subjects learnt throughout the course.
MSc/COSPG-405/ Sem-IV	COMPUTING LAB	Students can learn the basics of R programming and socket programming with practical experience.
MSc/COSPG-406/ Sem-IV	PROJECT-II	This paper is extension of PROJECT-I, including detail implementation, viva and project report.

MSc PHYSIOLOGY

PSO: The students are exposed to the advanced concepts of Human Physiology and Immunology and other advance fields of the concerned subject (viz. Molecular Cell Biology, Biomedical Instrumentation, Biochemical Techniques, Community Health & Nutrition etc) to orient them towards identifying problems and ask questions about unanswered and unexplored questions of Physiology.

SEM	PAPER	UNIT	TOPIC NAME	COURSE OUTCOME
SEM-I (PG)	PHYPG- 101	UNIT-01	Bio Physical Principles, Enzymology & Chemistry of Bio-molecules	Biophysics is the study of physical phenomena and physical processes in living things, on scales spanning molecules, cells, tissues and organisms. Biophysicists use the principles and methods of physics to understand biological systems
		UNIT-02	Molecular Cell Biology & Signalling	Students will acquire knowledge about molecular mechanism of cell cycle and genetic disease; and understand molecular pathways of cancers, apoptosis, angiogenesis, and DNA repair
	PHYPG- 102	UNIT-03	System Physiology & Pharmacology	Helps to understand Cardio-respiratory dynamics as the prime mover of homeostasis, with special emphasis on diseases. Helps understand gastroenterology with special emphasis on ulcers, diarrhea, and cancers. It helps to understand body's detoxification mechanism, and dialysis. Basics of pharmacology.
		UNIT-04	Higher Neural Function	It enables students, in general, to better understand his 'Self' in relation to his biological, social, and cultural identity. The course has been aptly designed to build a student for future carrier in teaching, and research as well, in the light of modern advancement, and trends in neuroscience.
	PHYPG- 103	UNIT-05	Biomedical Instrumentation	Students adopt themselves to Biomedical Instrumentation
		UNIT-06	Electrophysiology and Special Senses	Clinical understanding of EEG and ECG in health and disease. Understanding the science of vision, hearing, and smell with special emphasis on patho-physiology.
	PHYPG- 104	UNIT-07	Biostatistics, Research Methodologies and Bio-Ethics	It is helping the budding researchers in clinical research and helps in presenting the scientific manuscript with relatively sophisticated statistical analyses of a complex set of medical data in renowned scientific journals
		UNIT-08	Computer Application in Biology and Bioinformatics	Bioinformatics is an interdisciplinary field that develops and applies computational methods to analyse large collections of biological data, such as genetic sequences, cell populations or protein samples, to make new predictions or discover new biology and helps in determining and depicting the biological data.
	PHYPG- 105	UNIT-09	Biochemical Techniques	Students adopt themselves to use of Biochemical Techniques
		UNIT-10	Experimental Physiology	Students able to perform, analyse and report on experiments and observations in physiology
	PHYPG- 106	UNIT-11	Statistical Applications in Biology	Basic statistical concepts help biologists correctly prepare experiments, verify conclusions and

				properly interpret results. Many biology courses of study require a course in biostatistics that covers such concepts as randomized trials, hypothesis testing and the use of statistical software. In simple terms each type of statistical test has one purpose: to determine the probability that your results could have occurred by chance as opposed to representing a real biological effect.
		UNIT-12	Computer Applications & Bioinformatics	Applied knowledge on Computer Applications & Bioinformatics

SEM-II (PG)	PHYPG- 201	UNIT-13	Exercise & Sports Physiology	Students will acquire knowledge of benefits of exercise, the types of exercise and the effects of exercise on different systems of the human body. They will also know the training programme and nutritional requirement for elite performance.
		UNIT-14	Community Health & Nutrition	Students will acquire knowledge of Community Health and Nutrition. Nutritional deficiency - malnutrition, and proper nutritional guideline. The types of communicable and non communicable diseases. Family planning etc.
	PHYPG- 202	UNIT-15	Molecular Biology	It deals with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development. This course will emphasize the molecular mechanisms of DNA replication, repair, protein synthesis
		UNIT-16	Biotechnology	Develop knowledge regarding the emerging areas of biotechnology and apply it to societal needs.
	PHYPG- 203	UNIT-17	Anthropometry and Community Health & Nutritional survey	To provide training to the students for anthropometric measurements, their importance and applications. Field based training will also be offered on health, diseases through community-based health survey to make them understand the actual forms of physiological problems in population in various socio-demographic backgrounds beyond classroom teaching.
		UNIT-18	Neuro-physiology & Advanced Physiology	Enables to acquire hands on practical experience for understanding neuro-anatomy and histology of neural tissue in particular. Generates idea to detect some sensory perceptions.
	PHYPG- 204 (CBCS)	UNIT-19	Life Style Management-I	It enables students to understand the scientific understanding of health and disease. It also makes them understand the beneficial role of “Life Style” in relation to nutrition, communicable, and non-communicable diseases. It educate students preventing drug abuse and addiction.
		UNIT-20	Life Style Management-II	This course educates students regarding how they could improve their life efficacy and expectancy through life style management through sports and allied nutritional therapies. It trains to avoid

				occupational health hazards.
	PHYPG- 205	UNIT-21	Bio-Analytical Techniques	Develop knowledge regarding the emerging areas of Bio-Analytical Techniques and apply it to societal needs.
		UNIT-22	Histology and Histochemistry	The designing of this course make students well acquainted with standard techniques in histology and histo-chemistry, and get them suited to do independent research and work in histo-pathological diagnostic laboratories, as well., for their professional carrier.
	PHYPG- 206	UNIT-23	Molecular Biology and Biotechnology	Gather in depth knowledge on the relationship between Molecular Biology and Biotechnology and make the most of the knowledge gained.
		UNIT-24	Article Reviews, Seminar & Viva Voce	Elevation of the ability to utilize literature search engines to find and collect primary scientific papers, review articles, book chapters, and other scientific literature; and increase the capacity to critically analyze these scientific works.

SEM	PAPER	UNIT	TOPIC NAME	COURSE OUTCOME
SEM-III (PG)	PHYPG- 301	UNIT-25	Ergonomics & Occupational Health	Knowledge on Ergonomics & Occupational Health helps the students in various ways in their daily life. Students will acquire knowledge of Ergonomics & Occupational Health. The physical and physiological requirement of work, work and productivity, factors affecting productivity. Occupational health hazards, new design of tools and machines to reduce Occupational health hazards and accidents. The guideline for Occupational health and safety.
		UNIT-26	Metabolic integration & Lifestyle Diseases	It enables the students in conceptualizing and understanding the pivotal role of "Life Style" management, in everyday life, especially based on traditional practices, to build a healthy individual. It helps to combat and manage stress, psychosomatic disorders, and a wide range of diseases owing to metabolic disintegration.
	PHYPG- 302	UNIT-27	Microbiology	Ideas on Microbiology helps the students to treat and prevent diseases which are caused by viruses, bacteria, protozoa and fungi. In medicine, for example, microbiology led to the discovery and development of: Antibiotics and Vaccines.
		UNIT-28	Immunology	It helps the students to get knowledge on immunology. Immunology includes the study of how the body fights infections from bacteria and viruses, and the development of medical interventions to treat and prevent diseases.
	PHYPG- 303 (SPECIAL PAPER)	UNIT-29	Biochemistry & Molecular Biology & Ergonomics & Sports Physiology	Molecular aspect of modern biology is to be understood by the students

		UNIT-30	Biochemistry & Molecular Biology & Ergonomics & Sports Physiology	Ensure the working situation is in harmony with the activities of the worker.
	PHYPG- 304 (CBCS)	UNIT-31	Human Health Disorders	Study of this topics helps the students for understanding biological processes of cells in health and disease.
		UNIT-32	Human Health Effects	Awareness of students on the effects of Human health
	PHYPG- 305	UNIT-33	Microbiology & Immunology	Develops knowledge of Microbiology & Immunology.
		UNIT-34	Human Experiments	It is essential for measurement of anthropometric data in nutritional survey. In this practical unit the students will be able to learn the different techniques of assessing physiological parameters related to posture, work and exercise. There is enough scope for the learners to develop skills for measuring different health related parameters of human.
	PHYPG- 306	UNIT-35	Special paper practical	
		UNIT-36	Special paper practical (Submission of Project Proposal)	Develop a familiarity with the scientific literature, an awareness of the theories, laws, and methods that govern scientific research.

SEM	PAPER	UNIT	TOPIC NAME	COURSE OUTCOME
SEM-IV (PG)	PHYPG- 401	UNIT-37	Molecular Endocrinology	Impart advanced knowledge in neuro-endocrinology in understanding health and diseases.
		UNIT-38	Reproductive Physiology	Procure advanced theoretical knowledge in male and female reproductive system with special reference to reproductive disorders, and their biological, socio-cultural relevance. Taught Comprehensive knowledge of motherhood, and environmental impact on reproductive cycle.
	PHYPG- 402	UNIT-39	Environmental Pollution & Toxicology	Appliciation of technologly expertise to redress the Environmental Pollution & Toxicology
		UNIT-40	Emerging Biology	Acquainted with the emerging areas of biology and apply knowledge to further research
	PHYPG- 403 (SPECIAL PAPER)	UNIT-41	Biochemistry & Molecular Biology & Ergonomics & Sports Physiology	Support comprehensive knowledge of bio-molecules and their chemistry and role as enzymes and cellular signalling, metabolism; and molecular role of DNA and RNA
		UNIT-42	Biochemistry & Molecular Biology & Ergonomics & Sports Physiology	Purpose of ergonomical study is to enhance workplace health, safety and work design issues through enhancing performance, productivity and prevent fatigue and injury

	PHYPG- 404 (CBCS)	UNIT-43	Endocrinology & Reproductive Physiology	Knowledge of Endocrinology & Reproductive Physiology and application on it in concerned areas
		UNIT-44	Assessment of Environmental Status	Practical knowledge grown through Assessment of Environmental Status
	PHYPG- 405	UNIT-45	Special Paper Practical	For practical knowledge
		UNIT-46	Special Paper Practical	For practical knowledge
	PHYPG- 406	UNIT-47	Class Teaching & Lab / Industrial Visit	Develop a familiarity with the scientific literature, and awareness of the theories, laws, and methods that govern scientific research
		UNIT-48	Project work and Seminar	