

DIMORIA COLLEGE, KHETRI

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3RD CYCLE NAAC ACCREDITATION 2022

CRETERION II

Teaching-Learning and Evaluation

Student Performance and Learning Outcomes

2.6.1. Programme Outcome (POs) and Course Outcomes (COs) for all programmes offered by the institution are stated and displayed on website and attainment of POs and Cos are evaluated

Submitted to



National Assessment and Accreditation Council
An Autonomous Institution of the University Grants Commission

राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद्
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान

COURSE OUTCOME & PROGRAMME OUTCOMES

1. DEPARTMENT OF ANTHROPOLOGY:	
CBCS	
Programme outcome:	The B.A & B.Sc. (Hons) Anthropology offers holistic learning of approaches, methods and techniques of understanding human culture, lifestyles, biology and their interactions for studying ethnic groups and providing cultural solutions to their problems.
Course	Outcomes
<u>Paper: ANT-HC- 1016</u> Introduction to Biological Anthropology	<ul style="list-style-type: none"> • Students will learn about the genesis and development of biological anthropology • Learn about the aspects from which evolution and variation is studied
<u>Paper ANT-HC- 1026</u> Introduction to Socio-Cultural Anthropology	<ul style="list-style-type: none"> • The basic theoretical knowledge about social and cultural anthropology can be achieved • The knowledge of first-hand field data collection and analysis can be gained
<u>Paper ANT-HC- 2016</u> Archaeological Anthropology	<ul style="list-style-type: none"> • Students will be acquainted with archaeological background of prehistoric, proto-historic and historical evolution of human culture • Students will have practical understanding of prehistoric culture through tool technology and pottery technology
<u>Paper ANT-HC-2026</u> Fundamentals of Human Origin and Evolution	<ul style="list-style-type: none"> • Students will learn about the stages of human evolutionary development • Students will know about the fossil finds on the basis of which the evolutionary stages are identified
<u>Paper ANT-HC- 3016</u> Tribes and Peasants in India	<ul style="list-style-type: none"> • The anthropological knowledge and approach to study of tribes, villages and peasantry can be gained • The problems, prospects, development and Govt. policies for tribes, villages and peasants can be achieved
<u>Paper ANT-HC- 3026</u> Human Ecology: Biological and Cultural Dimensions	<ul style="list-style-type: none"> • The knowledge on human adaptation in ecology will be gained • The knowledge on urbanization and industrialization in human societies will be achieved
<u>Paper ANT-HC-3036</u> Biological Diversity in Human Populations	<ul style="list-style-type: none"> • The students will learn about markers for understanding biological diversity • Classical markers used for classifying races • Classification of Indian population
<u>Paper ANT-SE-3014</u> Tourism Anthropology	<ul style="list-style-type: none"> • The students will learn about the socio-cultural background of developing tourism • The students will learn the basics of eco-tourism and heritage tourism in the current situation

<p><u>Paper ANT-HC-4016</u> Theories of Culture and Society</p>	<ul style="list-style-type: none"> • The knowledge of the basic theories of culture in anthropology can be gained • The knowledge of the basic theories of society in anthropology can be gained
<p><u>Paper ANT-HC-4026</u> Human Growth and Development</p>	<ul style="list-style-type: none"> • Students will learn about concepts related with growth and stages of growth • Students will learn bio cultural factors that influence growth and development • Students will learn human body compositions
<p><u>Paper ANT-HC-4036</u> Research Methods</p>	<ul style="list-style-type: none"> • The knowledge on formulation of research design, application of methods and techniques in data collection will be obtained • The ethics of research will be understood for an effective research study
<p><u>Paper ANT-SE-4014</u> Public Health and Epidemiology</p>	<ul style="list-style-type: none"> • The students will learn different aspects of health diseases and principles of epidemiology
<p><u>Paper ANT-HC-5016</u> Human Population Genetics</p>	<ul style="list-style-type: none"> • Students will learn about mechanism which create variation in gene frequencies • Students will learn the method of assessing gene frequency variation • Students will learn how ecological factors which help maintain gene frequencies
<p><u>Paper ANT-HC-5026</u> Anthropology in practice</p>	<ul style="list-style-type: none"> • The knowledge about history and development of anthropology in India can be gained • The knowledge about the diversity of India and north-east India in particular, with problems of tribes and constitutional provisions for safe guarding their rights will be achieved
<p><u>Paper ANT-HE-5016</u> Indian Archaeology</p>	<ul style="list-style-type: none"> • The students will be familiar with the rich prehistoric past of the country • The students will understand the prehistoric foundation on which later course of history in the country developed
<p><u>Paper ANT-HE-5026</u> Anthropology of religion, politics and economy</p>	<ul style="list-style-type: none"> • The knowledge on the anthropological theories of religion, economies and political institutions will be gained • The knowledge on the interrelationships between religion, economies and political institutions will be achieved
<p><u>Paper ANT-HC-6016</u> Forensic Anthropology</p>	<ul style="list-style-type: none"> • Students will learn about distinguishing human from non-human skeletal remains

	<ul style="list-style-type: none"> Students will learn about the techniques of making personal identification
Paper ANT-HC-6026 Anthropology of India	<ul style="list-style-type: none"> Students will learn about racial linguistic and ethnic dimension of Indian society Students will be familiar with the anthropological situation of the country
Paper ANT-HE-6016 Dissertation	<ul style="list-style-type: none"> The knowledge of conducting field work by applying anthropological methods will be gained The knowledge of data analysis and writing based on the collected data will be learned.
ANT-HE-6036 Demographic Anthropology	<ul style="list-style-type: none"> The students will learn about the basics of demography and demographic theories The students will learn about the tools used for population change
Non-CBCS	
Paper-M 101 General Anthropology	<ul style="list-style-type: none"> It provides student the knowledge of Anthropology in general and about its subject matter in relevance to the present world.
Paper-M 102 Physical Anthropology	<ul style="list-style-type: none"> It provides students the knowledge about the genesis and development of biological anthropology and about the aspects of origin, evolution and variation studies of man.
Paper-M 201 Prehistoric Anthropology	<ul style="list-style-type: none"> It provides an understanding archaeological background of prehistoric, protohistoric and historical evolution of human culture.
Paper-M 202 Social and Cultural Anthropology	<ul style="list-style-type: none"> It the basic theoretical knowledge about socio- cultural anthropology and provides the knowledge of empirical data collection in the field and their analysis.
Paper-M 301 Physical Anthropology	<ul style="list-style-type: none"> It provides knowledge about evolutionary changes of human skeleton, introduces with the genetic aspects of man and also the knowledge about the markers for understanding the biological diversity of human being and the markers of racial classification and the knowledge about the racial elements of N.E. India.
Paper-M 302 Social Anthropology	<ul style="list-style-type: none"> It provides knowledge about concept of marriage, family, kinship and kin-based groups, concept of property and rules of inheritance, mechanism of social control, political organization and law in primitive societies.
Paper-M 401 Prehistoric Anthropology	<ul style="list-style-type: none"> It provides the students' knowledge and understanding about stone tools and bone tools of Paleolithic period, tools of Pleistocene and Holocene geological periods along with the methods of archaeological classification.
Paper-M 402	<ul style="list-style-type: none"> It provides students' knowledge and understanding about brief

Social Anthropology(Culture, Language & Arts)	<p>history of the theoretical schools of cultural anthropology, relationship between environment, habitat and culture, different economic organizations of primitive societies, concepts and factors of socio-cultural changes.</p> <ul style="list-style-type: none"> • It also provides the knowledge of basic concepts of language, arts, literature and performing arts (music, dance and drama)
Paper-M501 Physical Anthropology (Human Evolution)	<ul style="list-style-type: none"> • Students learn about the stages of human evolutionary development and about the fossil finds on the basis of which the evolutionary stages are identified.
Paper-M502 Prehistoric Anthropology	<ul style="list-style-type: none"> • It makes students able to date the prehistoric artifact according to the chronological order. • Provides the knowledge of the geological ages of the earth and development of prehistoric culture in Africa, Europe and Middle East. It also provides the knowledge about Paleolithic art of Europe.
Paper-M 503 Social Anthropology (Anthropology of Religion)	<ul style="list-style-type: none"> • Provides the knowledge of anthropological theories religion and magic, concepts of supernatural power and influence of supernatural power on diseases and treatment in preliterate societies.
Paper-M504 Social Anthropology (Field Methodology, Tribes of North East India)	<ul style="list-style-type: none"> • It makes the students to gain the knowledge of first-hand data collection in the field work and their analysis to prepare a research-based field report. • It also provides knowledge about the distribution of different tribal communities in North East India state wise and the brief ethnographic knowledge of the tribal communities like Karbi, Khashi, Apatani, Ao Naga, Dimasa and Purum.
Paper-M 601 Physical Anthropology (Human Genetics)	<ul style="list-style-type: none"> • The students get the knowledge of the structure and function of human genome. • They get the knowledge of studying methods of genomic variation and they learn about the genomic diversity and human evolution
Paper-M 602 Prehistoric Anthropology	<ul style="list-style-type: none"> • It makes students acquainted with the prehistoric archaeology and its origin and development with methods and techniques of archaeological exploration and reconstruction of prehistoric lifeways. • It also provides the knowledge of stone age, metal age culture of India and about the knowledge of Neolithic revolution and the megalithic culture of N.E. India.
Paper-M 603 Social anthropology(Indian Anthropology)	<ul style="list-style-type: none"> • Provides students the knowledge of Indian Society including unity and diversity of Indian culture and society, nature of Indian

	<p>of traditional social system, India tribes, peasants, urban society, caste system etc.</p> <ul style="list-style-type: none"> • It also provides the knowledge of growth and development anthropology in India with special emphasis on social anthropology. • It also makes students familiar with contributions of the pioneers of Indian Anthropology.
<p>Paper-M 604 Applied Anthropology</p>	<ul style="list-style-type: none"> • It provides knowledge about the history and development of anthropology in India. • It provides the knowledge about application of social physical anthropological knowledge in different situations like planning, administration, welfare of scheduled castes and scheduled tribes, application in industry, paternity diagnosis, forensic science, race relation etc.

2. DEPARTMENT OF ASSAMESE:

CBCS

Course	Outcomes
<p>Paper: ASM-HC-1016 History of Assamese Literature-I</p>	<ul style="list-style-type: none"> • The student will know about Assamese Literature Pre-Sankar Era and Sankar Era.
<p>Paper: ASM-HC-1026 History of Assamese Literature-II</p>	<ul style="list-style-type: none"> • A clear idea about Sarit Sahitya, byabaharik Sahitya and Buranji Sahitya of history PreOrunodai and Orunodai Era. Also about the writer of Orunodai language and literature.
<p>Paper: ASM-AE-1014 Ability Enhancement Compulsory Course</p>	<ul style="list-style-type: none"> • Student will gain competence over the assamese language and will be able to chance their communicative skills.
<p>Paper: ASM-HC-2016 Linguistics</p>	<ul style="list-style-type: none"> • The student will know about Language, Linguistics and Branches of Linguistics, Phonology, Morphology, Morph and Syntax and Paniniya Dhara and Grick Dhara.
<p>Paper: ASM-HC-2026 Literary Criticism</p>	<ul style="list-style-type: none"> • The learner will know about the Assamese Literature and Criticism.
<p>Paper: ASM-HC-3016 Assamese Literature</p>	<ul style="list-style-type: none"> • The student will know about Assamese Tales, Prose, Poetry, Biography and Short Story.
<p>Paper: ASM-HC-3026 Introduction of Assamese Poem</p>	<ul style="list-style-type: none"> • The student will learn about Old Poetry and New Modern Assamese Poetry.
<p>Paper: ASM-HC-3036 Assamese Culture</p>	<ul style="list-style-type: none"> • The Learner will know about the Assamese Cultural Studies and Various Religion of Assam.
<p>ASM-CC-3016 Old Assamese Literature</p>	<ul style="list-style-type: none"> • They will learn about Old Assamese Literature in Prose, Poetry (Bargeet) & Drama (Ankiya Bhaowna).
<p>Paper: ASM-SE-3014 Skill Development</p>	<ul style="list-style-type: none"> • The student will learn about Translation from Assamese to English, English to Hindi and also learn about Proof Reading.

Paper: ASM-HC-4016 Comparative Indian Literature	<ul style="list-style-type: none"> The learner will learn about the Theory of Comparative Indian Literature and Indian Literature.
Paper: ASM-HC-4026 Assimilation Assamese Language	<ul style="list-style-type: none"> The student will know about the Assimilation of Assamese Language and also Aryan and Non-Aryan Language.
Paper: ASM-HC-4036 Assamese Prose	<ul style="list-style-type: none"> The student will know about History of Assamese Prose.
Paper: ASM-SE-4014 Skill Development	<ul style="list-style-type: none"> The student will learn How to Write Creative Writings.
Paper: ASM-HC-5016 Assamese Drama & Presentation Style	<ul style="list-style-type: none"> They will learn about History of Assamese Drama and the Presentation Style.
Paper: ASM-HC-5026 Assamese Grammar	<ul style="list-style-type: none"> They will learn about the History of Assamese Grammar, Branches of Grammar and Elements of Assamese Grammar.
Paper: ASM-HE-5016 Assamese Folk Literature	<ul style="list-style-type: none"> The student will learn about Folklore of Assamese.
Paper: ASM-HE-5036 Sankardev	<ul style="list-style-type: none"> The student will know about The Contribution of Shri Shri Sankardev.
Paper: ASM-HC-6016 Assamese Short Story & Novel	<ul style="list-style-type: none"> The student will know about History of Assamese, Short Story & Novel.
Paper: ASM-HC-6026 History of Assamese Script	<ul style="list-style-type: none"> The learner will learn about the Origin of Assamese Script
Paper: ASM-HE-6016 Lakshminath Bezbaroa	<ul style="list-style-type: none"> The student will learn about The Contribution of Lakshminath Bezbaroa towards the Assamese Society.
Paper: ASM-HE-6026 Banikanta Kakati	<ul style="list-style-type: none"> The student will learn about The Contribution of Banikanta Kakati towards the Assamese Society.
Paper: ASM-HE-6036 Assamese Children Literature	<ul style="list-style-type: none"> The student will know about the Assamese Children Literature.
Paper: ASM-HE-6046 Assamese Dialectology	<ul style="list-style-type: none"> The student will learn about the Assamese Dialect and Dialect Used in Assamese Literature.
Paper: ASM-HE-6056 Project Paper	<ul style="list-style-type: none"> They will learn about how to make Project (Folk Performing Art, Folk Literature and Folk Language).
Paper: ASM-HE-6056 Project Paper	<ul style="list-style-type: none"> They will learn about how to make Project (Folk Performing Art, Folk Literature and Folk Language).
Paper: ASM-1016	<ul style="list-style-type: none"> The student will know about Rise and Development of the Assamese Language.
Paper: ASM-1026	<ul style="list-style-type: none"> The student will know about History of Assamese Literature: 1889-2015.
Paper: ASM-1036	<ul style="list-style-type: none"> The learner will know about Study of Culture of Assam.
Paper: ASM-1046	<ul style="list-style-type: none"> The learner will know about History of Sanskrit Literature: History, Feature and Genres.

Paper: ASM-1054	<ul style="list-style-type: none"> The student will know about Creative Writing (Value Added Course).
NON-CBCS	
Course	Outcomes
<u>Paper code-M-104</u> History of Assamese Literature and script.	<ul style="list-style-type: none"> This paper will provide students with information about the history of Assamese literature, Folk literature of the Pre-Sankari era, literature of Sankari era and the origin and development of the Assamese script.
<u>Paper Code-M-105</u> Ancient Assamese Poetry	<ul style="list-style-type: none"> This paper is a source of information about the origin, development, characteristics of ancient Assamese poetry as well as the poetry of ancient poets.
<u>Paper Code-E-103</u> Assamese poetry	<ul style="list-style-type: none"> This paper is designed to help students learn about Assamese poetry.
<u>Paper code-M-204</u> History of Assamese literature (Uttar Sankari Era to Aabahan period)	<ul style="list-style-type: none"> This paper will provide students with information about the history of Assamese literature from the Northern Shankari era to the Awahan era.
<u>Paper code-M-205</u> Modern Assamese poetry	<ul style="list-style-type: none"> This paper is a source of inspiration of students to learn about Modern Assamese poetry and the poetry of this era.
<u>Paper Code-E-203</u> Assamese Prose	<ul style="list-style-type: none"> This paper is designed to help students learn about Assamese prose
<u>Paper code-M-304</u> Assamese Language	<ul style="list-style-type: none"> This paper is designed to help students learn about the origin and development of the Assamese language.
<u>Paper code –M-305</u> Lakshminath Bezbarua	<ul style="list-style-type: none"> This paper is a source of inspiration for students to learn about the special Poems, Bargeet and dramas of Sankardev.
<u>Paper Code-E-308</u> Assamese Drama	<ul style="list-style-type: none"> This paper is designed to help students learn about Assamese Drama
<u>Paper code-M-401</u> Assamese Grammar	<ul style="list-style-type: none"> This paper will help students learn about the history of Assamese grammar and its classification.
<u>Paper code-M-402</u> Introductory study of the Assamese nation and culture.	<ul style="list-style-type: none"> This paper will provide students with an introductory knowledge of Assamese race and culture.
<u>Paper code-M-403</u> Field Study	<ul style="list-style-type: none"> Through this paper students will be required to prepare short research papers on particular places, ethnics groups, festivals, etc. Under the supervision of teachers.
<u>Paper Code-E-408</u> Assamese short story, novel and essay	<ul style="list-style-type: none"> This paper is source of inspiration for students to learn about Assamese short stories, novels, essays etc.
<u>Paper Code-M-501</u> Old Assamese Drama	<ul style="list-style-type: none"> This paper will provide students with an introduction to old Assamese plays as well as special plays by old play wrights.

<u>Paper code-M-502</u> Old Assamese story literature	<ul style="list-style-type: none"> This paper will provide students with an introduction to old Fictional literature as well as knowledge about old Fictional literature in Particular.
<u>Paper code- M-503</u> Brajabuli Gitigucha	<ul style="list-style-type: none"> This paper will provide students with an introduction with an introduction to Brajabuli literature as well as special lessons on Brajabuli literature.
<u>Paper code- M-504</u> Pali Prakrit literature and Grammar	<ul style="list-style-type: none"> This paper will provide students with knowledge about the origin, development and grammar of Pali Prakrit literature.
<u>Paper code-M-505</u> Literary Criticism	<ul style="list-style-type: none"> This paper will help students to gain knowledge about criticism of oriental and western literature.
<u>Paper code-M-506</u> The Nature of Language	<ul style="list-style-type: none"> This paper will provide students with a brief introduction to the world's language families as well as knowledge about language classification and language change.
<u>Paper code-M-601</u> Modern Assamese Drama	<ul style="list-style-type: none"> This paper will provide students with knowledge of the genere of Modern Assamese drama as well as special modern drama.
<u>Paper code-M-602</u> Modern Assamese Fiction Literature	<ul style="list-style-type: none"> This paper is a source of inspiration for students to learn about modern Assamese fictional literature.
<u>Paper code-M-603</u> Studies in Modern Indian Literature	<ul style="list-style-type: none"> This paper will provide students with a general introduction to Modern Indian literature as well as special lesions in Assamese, Bengali and Hindi literature.
<u>Paper Code-M-604</u> Assamese short stories and novels	<ul style="list-style-type: none"> This paper will provide students with information about the genre of Assamese short stories and novels as well as special Assamese short stories and novels.
<u>Paper Code-M-605</u> Sanda- Alangkar	<ul style="list-style-type: none"> This paper will provide students with a general introduction to rhythm as well as an introduction to various Assamese rhythms.
<u>Paper Code-M-606</u> Introduction of linguistics	<ul style="list-style-type: none"> This paper will provide students with knowledge about the introduction to linguistics.

3.DEPARTMENT OF BOTANY:

CBCS

Course	Outcomes
<u>Paper-BOT-HC-1016</u> Phycology and Microbiology	<ul style="list-style-type: none"> The students will be made aware of the various groups of organisms, Bacteria, viruses, algae. Through field study they will be able to see these plants grow in nature and become familiar with the biodiversity. to my knowledge students should create their small digital reports where they can capture the zoomed in and

	<p>zoomed out pictures as well as videos in case they are able to find some rare structure or phenomenon related to these organisms.</p> <ul style="list-style-type: none"> • Students would have understanding of the classification, characteristics features, cell structure and growth and reproduction in viruses, bacteria, and various groups of marine and fresh water algae and their ecological and economic importance
<p><u>Paper-BOT-HC-1026</u> Biomolecules and Cell Biology</p>	<p>This course will be able to demonstrate foundational knowledge in understanding of:</p> <ul style="list-style-type: none"> • The relationship between the properties of macromolecules, their cellular activities and biological responses • Understanding of Cell metabolism, chemical composition, physiochemical and functional organization of organelle. • Contemporary approaches in modern cell and molecular biolog
<p><u>Paper-BOT-HC-2016</u> Mycology and Phytopathology</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Understand the world of fungi, lichens and pathogens of plants • Appreciate the characteristics of the fungi and lichens • Understand the ecological and economic significance of lichen • Understand the application of mycology in various fields of economic and ecological significance • Understand the economic and pathological importance of fungi, bacteria and viruses • Identify common plant diseases and their control measures
<p><u>Paper-BOT-HC-2026</u> Archegoniate</p>	<ul style="list-style-type: none"> • The students will be made aware of the group of plants that have given rise to land habit and the flowering plants. • Through field study they will be able to see these plants grow in nature and become familiar with the biodiversity. to my knowledge students should create their small digital reports where they can capture the zoomed in and zoomed out pictures as well as videos in case they are able to find some rare structure or phenomenon related to these plants.
<p><u>Paper-BOT-HC-3016</u> Morphology Anatomy and of Angiosperm</p>	<ul style="list-style-type: none"> • Knowledge of various cells and tissues, meristem, epidermal and vascular tissue system in plants. • Various aspects of growth, development of the tissues and differentiation of various plant organs. Knowledge of basic structure and organization of plant parts in angiosperms. • Correlation of structure with morphology and functions.

<p><u>Paper-BOT-HC-3026</u> Economic Botany</p>	<ul style="list-style-type: none"> • After studying Economic Botany, students would have first hand information of plants used as food, the various kinds of nutrients available in the plants. The dietary requirements of proteins, fats, amino-acids, vitamins etc that can be met by plants. The students will learn to perform the micro-chemical tests to demonstrate various components. • The students will learn about the use of fibre plants, beverages, fruits and vegetables that are integral to day to day life of plants. Students will learn to explore the regional diversity in food crops and other plants and their ethno-botanical importance as well.
<p><u>Paper-BOT-HC-3036</u> Genetics</p>	<ul style="list-style-type: none"> • To generate interest among the students in Genetics and make them aware about the importance and opportunities in higher education and research, the first unit should be Introductory dealing with how this area has revolutionized all aspects of our life from its growth from Mendel to Genetic Engineering. • Modes of inheritance of traits/ phenotypes and Phenotype-genotype corelation are the basic learning.
<p><u>Paper-BOT-SE-3014</u> Biofertilizers</p>	<ul style="list-style-type: none"> • Understand the concept of different biofertilizers and their utilization.
<p><u>Paper-BOT-HC-4016</u> Molecular Biology</p>	<ul style="list-style-type: none"> • Understanding of nucleic acid, organization of DNA in prokaryotes and Eukaryotes, DNA replication mechanism, genetic code and transcription process. • Processing and modification of RNA and translation process, function and regulation of expression. • Application in biotechnology
<p><u>Paper-BOT-HC-4026</u> Plant Ecology and Phytogeography</p>	<ul style="list-style-type: none"> • It acquaints the students with complex interrelationship between organisms and environment; make them understand methods to studying vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography. This knowledge is critical in evolving strategies for sustainable natural resource management and biodiversity conservation.
<p><u>BOT-HC-4036</u> Plant Systematics</p>	<ul style="list-style-type: none"> • Understanding of systematics its importance in bioresource utilization and biodiversity management. Nomenclature pattern, Phylogeny, Classification systems of the plants.
<p><u>Paper-BOT-SE-4024</u> Floriculture</p>	<ul style="list-style-type: none"> • Develop conceptual understanding of gardening from historical perspective. Analyse various nursery management practices with routine garden operations.
<p><u>BOT-HC-5016</u> Reproductive Biology of Angiosperms</p>	<p>Student would have an understanding of</p>

	<ul style="list-style-type: none"> ● Induction of flowering and molecular and genetic aspects of flower development. ● Pollen development, dispersal and pollination ● Ovule development and fertilization, ● Endosperm development and its importance alternation pathways of reproduction ● Student would be able to apply this knowledge for conservation of pollinators and fruit development
<p><u>Paper-BOT-HC-5026</u> Plant Physiology</p>	<ul style="list-style-type: none"> ● The students are able to correlate morphology, anatomy, cell structure and biochemistry with plant functioning. The link between theory and practical syllabus is established, and the employability of youth would be enhanced. The youth can also begin small-scale enterprises.
<p><u>Paper-BOT-HE-5016:</u> Natural Resource Management:</p>	<p>At the end of the course the students will be able to,</p> <ul style="list-style-type: none"> ● Understand the concept of different natural resources and their utilization. ● Critically analyse the sustainable utilization land, water, forest and energy resources. ● Evaluate the management strategies of different natural resources. ● Reflect upon the different national and international efforts in resource management and their conservation.
<p><u>Paper-BOT-HE-5026:</u> Horticultural Practices and Post-Harvest Technology:</p>	<p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> ● Understand the concept of different types of horticultural crops, their conservation and management ● Examine the various branches of horticulture, fruit and vegetable crops, floriculture, medicinal and aromatic plants. ● Critically evaluate different cultivation practices and disease management ● Reflect upon different Landscaping practices and garden design.
<p><u>BOT-HC-6016</u> Plant Metabolism</p>	<p>Concept and significance of metabolic redundancy in plants.</p> <ul style="list-style-type: none"> ● Students will also be able to learn the similarity and differences in metabolic pathways in animals and plants. ● To have understanding of water and nutrient uptake and movement in plants, role of mineral elements, translocation of sugars, Role of various plant growth regulators, phytochrome cytochromes and phototropism, and flowering stimulus.
<p><u>BOT-HC-6026</u> Plant Biotechnology</p>	<ul style="list-style-type: none"> ● Learn the basic concepts, principles and processes in plant biotechnology.

	<ul style="list-style-type: none"> ● Have the ability of explanation of concepts, principles and usage of the acquired knowledge in biotechnological, pharmaceutical, medical, ecological and agricultural applications. ● Use basic biotechnological techniques to explore molecular biology of plants. ● Explain how biotechnology is used to for plant improvement and discusses the biosafety concern and ethical issue of that use.
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<p><u>Paper-BOT-HE-6016</u> Industrial and Environmental Microbiology:</p>	<p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> ● Understand the concept and role of microbes in industry and environment. ● Critically analyse the types of bioreactors and the fermentation process. ● Evaluate the role of microorganisms in industry and microbes in agriculture. ● Reflect upon different Landscaping practices and garden design. ● Develop skills on the remediation process of contaminated soils
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<p><u>Paper-BOT-HE-6026:</u> Analytical Techniques in Plant Sciences</p>	<p>On completion of this course the students will be able to:</p> <ul style="list-style-type: none"> ● Develop conceptual understanding of cell wall degradation enzymes and cell fractionation. ● Classify different types of chromatography techniques. ● Explain the principles of Light microscopy, compound microscopy, Fluorescence microscopy and confocal microscopy. ● Apply suitable strategies in data collections and disseminating research findings
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NON-CBCS

<p><u>Paper: M 101</u> Plant Kingdom, Algae and Fungi</p>	<ul style="list-style-type: none"> ● Understand the algal and microbial diversity along with its mode of nutrition, reproduction and its economic importance. ● Know the role of microbe in the maintenance of the ecological imbalance. 3. Know the importance of microbes in modern research and its application. ● Knowledge on the systematics of algae, bacteria and their various metabolic processes. ● Understand the difference between beneficial and harmful bacteria. ● 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
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Paper: M 102

Division of marks: Algae,
Fungi, Bryophytes,
Pteridophytes

- Develop the knowledge on algae, fungi, Bryophytes, Pteridophytes and their life cycles by having a clear observation of the models.
- Practical knowledge on the structure, reproduction of bacteria and it know the staining of the gram positive and gram-negative bacteria, thus further help in the differentiation among them.
- Understanding of soil microflora and its isolation procedure

Paper: M 201

Gymnosperms, Paleobotany
and Plant Anatomy

- Understand the gymnosperm diversity along with its mode of nutrition, reproduction and its economic importance.
- Know the overall cell wall and cell membrane, Origin, ultra-structure under Plant anatomy.
- Know the general account, anatomy General account, anatomy and reproduction of the living fossils.
- The process of fossilization.

Paper: M 202

Cell Biology

- Knowledge on the different bonding pattern among the chemical compounds and further understand the polar compounds.
- Understand the significance of pH, buffers and their role in biological metabolism.
- Understand the structure, types and importance of different biomolecules (Lipids, Carbohydrates, Nucleic Acids, Protein).
- Develop the concept on various bioenergetic reactions and its mechanism under various conditions.
- Understand the different redox reactions and the mechanism of ATP serving as the currency molecule.
- 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.
- Understand the structure and chemical composition of chromatin and concept of cell division.
- Gain knowledge about "Cell Science"
- Understand Cell wall Plasma membrane, Cell organelles and cell division.

Paper M301:

Ecology, Plant Geography,
Evolution

- Understand the structure of an ecosystem, functions and its various components.
- Develop understanding on Population and Community ecology along with its characteristics and structure.
- Gain knowledge on the measures to study population or community.

	<ul style="list-style-type: none"> ● Knowledge on the different physio geographic regions of India, factors serving for the geographic divisions and its vegetation. ● Understand the factors responsible for evolution and as a whole the mechanism for various evolutionary processes.
<p><u>Paper M302:</u> Instrumentation and Laboratory Techniques</p>	<ul style="list-style-type: none"> ● Knowledge on the different instruments and techniques used in understanding various biological mechanisms. ● Understand the application of biological techniques in modern research. ● Understand the working principle, types and uses of various biotechniques like microscopy, chromatography, spectrophotometry and various other microtechniques. ● Understand the importance of various instruments in performing various experiments in studying various organisms both micro and macro-organisms ● Basic knowledge on various solution preparations for laboratory use and use of different nutrient media for invitro maintenance of living cells. ● Knowledge on the various taxonomic techniques used in field study and various procedure of plant specimen preservation for further study.
<p><u>Paper: M 401</u> Morphology, Palynology, Embryology of Angiosperms</p>	<ul style="list-style-type: none"> ● Students will gain a clear understanding of the most advanced plant division i.e., Angiosperms. ● Understand the floral morphology of angiosperms and different theories related to the evolution of advanced leaf like or floral parts of the plants. ● Knowledge on the historical perspective of palynology and its aspects and prospects. ● Understand the process of development of micro and mega spores and its involvement in the process of plant development. ● Knowledge on the process of embryo development
<p><u>Paper: M 402</u> Plant Taxonomy</p>	<ul style="list-style-type: none"> ● Knowledge on the Objectives, Principles and Evolutionary Trends in Taxonomy. ● Understand the different system of taxonomic classification of plants proposed by different renowned taxonomist and the system of classification followed in the present. ● Knowledge on the principles and rules of binomial nomenclature i.e., ICBN. ● Understand the modern trend in plant taxonomy.

	<ul style="list-style-type: none"> ● Knowledge on the affinities, phylogeny, economic importance and comparative studies of different plant families both monocotyledons and dicotyledons
<p><u>Paper: M 501</u> Microbiology and Immunology</p>	<ul style="list-style-type: none"> ● Students will gain knowledge of the microbial world along with its diversity, nutrition, types and their occurrence. ● Understand the application of microbes in sustainable agriculture and environment free of pollutants. ● Knowledge on the significance of microbes for pollution management especially that of water, air and soil. ● Students will understand the mechanism of immunity and the interaction of antigen-antibody for the development of immune system in our body. ● Develop a sense of awareness regarding infectious disease caused by various harmful microbes.
<p><u>Paper: M 502</u> Plant Pathology and Lichen</p>	<ul style="list-style-type: none"> ● Students on the completion of this paper will gain a clear view of the plant disease causing pathogens and their life cycle. ● Students will know the symptoms of various plants diseases and thereby undertake different control measures to protect plants or crops from disaster. ● Knowledge on the different disease management and usage of various control agent's against various pathogens.
<p><u>Paper: M 503</u> Cytogenetics, Plant Breeding and Biometrics</p>	<ul style="list-style-type: none"> ● Students will understand the basic principles of cytogenetics and various mechanism of inheritance of characters generation after generation. ● Understand the various mechanisms of chromosomal abberations and structural changes followed by their significant role in the characteristics of an individual. 3. Gain a clear view of the mechanism of heredity and transfer of genetic material. ● Knowledge on the basic processes of plant breeding and crop development using different breeding techniques ● Understand the use of statistical tools and various biometric processes in biological data analysis.
<p><u>Paper: M 504</u> Applied Botany</p>	<ul style="list-style-type: none"> ● This paper completely dedicated for making the students understand about the useful and harmful microbes and their significance will help gain complete knowledge on the economic importance of microbes.

	<ul style="list-style-type: none"> ● Students will gain knowledge on the application of algae, fungi and bacteria as food, medicine, soil fertility and various commercial products. ● Understand the impact of deforestation and its role towards climate change. ● Knowledge on the different recent methods of plant propagation like layering, grafting, bonsai etc.
<p><u>Paper: M 601</u> Molecular Biology and Plant Biochemistry</p>	<ul style="list-style-type: none"> ● Students will know about the genetic organization of an organism and its expression, replication of genetic materials. ● Students will gain knowledge about mutation which is responsible genetic variations among organisms and various diseases caused by genetic mutations. ● Provide knowledge about various biomolecules and enzymes in cellular metabolism. ● Gain knowledge about various carbohydrates and their use in cellular metabolism.
<p><u>Paper: M 602</u> Bioinformatics, Computer Application and Biotechnology</p>	<ul style="list-style-type: none"> ● Students will know about in-silico application of biological data for betterment of human life. ● Increase student's knowledge about biological databases. ● This paper will provide knowledge about molecular phylogeny and drug development process to the students. ● This paper will introduce students with basic computer technologies. ● It enlightens students with the knowledge of development of new molecular biological techniques and their use for human benefit. ● It provides knowledge about plant tissue culture and transgenic production.
<p><u>Paper: M 603</u> Plant Physiology</p>	<ul style="list-style-type: none"> ● Understanding of physiological processes involved in the plant sciences. ● Knowledge on metabolic processes ● Mineral nutrition, energy conservation through photosynthesis, breakdown of stored foods through respiration. ● Provide knowledge on nitrogen metabolism with special reference to assimilation of nitrogen in amino acids and protein. ● Role of plant growth regulators and their application in agriculture and horticulture.

	<ul style="list-style-type: none"> • Growth and other related physiological aspects such as circadian rhythm, photoperiodism and vernalization. • Movements, responses to light, water and gravity.
Paper: M 604 Plant Resource Utilization	<ul style="list-style-type: none"> • Know the origin and evolution of crop plants with special reference to process of cultivation and utilization of products. • Knowledge on medicinal plants and pharmacognosy, preparation of crude drug and possibility of modification of drugs. • Dye yielding plants, method of cultivation and extraction of dye. • Beverages, timber yielding plants and fibre yielding plants • Ethnobotany- utilization of plants by various communities for their day-to-day life and their documentation

4. DEPARTMENT OF CHEMISTRY:

CBCS

Programme Outcome:	<ul style="list-style-type: none"> • To understand the basic facts and concepts in Chemistry • To understand the importance of Chemistry in daily life. • To develop a better understanding and reasoning of facts. • To skill-up for basic analytical tools. • To skill-up for various laboratory techniques used in pharmaceutical laboratories and chemical industries. • To make efficient for various spectrometric analyses
Course	Outcomes
Paper-CHE-HC-1016 INORGANIC CHEMISTRY-I	<p>On successful completion, students would have clear understanding of</p> <ul style="list-style-type: none"> • The concepts related to atomic and molecular structure, chemical bonding, periodic properties and redox behaviour of chemical. • Students will also have hands on experience of standard solution preparation in different concentration units and learn volumetric estimation through acid-base and redox reactions
Paper: CHE-HC-1026 PHYSICAL CHEMISTRY- I	<ul style="list-style-type: none"> • In gaseous state unit the students will learn the kinetic theory of gases, ideal gas and real gases. • In liquid state unit, the students are expected to learn the qualitative treatment of the structure of liquid along with the physical properties of liquid, viz, vapour pressure, surface tension and viscosity.
Paper: CHE-RC-1016 & Paper: CHE-HG-101 CHEMISTRY1	<ul style="list-style-type: none"> • After completion of this course the students will learn the atomic structure through the basic concepts of quantum mechanics. • They will understand the chemical bonding through VB and MO approaches. In organic part, the students are expected to learn

	basic ideas used in organic chemistry, stereochemistry, functional groups, alkanes, alkenes, alkynes etc.
Paper: CHE-HC-2016 ORGANIC CHEMISTRY- I	<ul style="list-style-type: none"> Students will be able to identify different classes of organic compounds, describe their reactivity and explain/analyze their chemical and stereo chemical aspects
Paper: CHE-HC-2026 PHYSICAL CHEMISTRY- II	<ul style="list-style-type: none"> In this course the students are expected to learn laws of thermodynamics, thermochemistry, thermodynamic functions, relations between thermodynamic properties, Gibbs Helmholtz equation, Maxwell relations etc. Moreover, the students are expected to learn partial molar quantities, chemical equilibrium, solutions and colligative.
Paper: CHE-RC/HG-2016 CHEMISTRY2	<ul style="list-style-type: none"> After completion of this course the students will learn periodic properties in main group elements, transition metals (3d series). They will also learn the crystal field theory in coordination chemistry unit.
Paper: CHE-HC-3026 ORGANIC CHEMISTRY-II	<ul style="list-style-type: none"> Students will be able to describe and classify organic compounds in terms of their functional groups and reactivity.
Paper: CHE-HC-3036 PHYSICAL CHEMISTRY-III	<ul style="list-style-type: none"> The students are expected to learn phase rule and its application in some specific systems. They will also learn rate laws of chemical transformation, experimental methods of rate law determination, steady state approximation etc
Paper: CHE-RC/HG-3016 CHEMISTRY 3	<ul style="list-style-type: none"> After completion of this course the students will be able to understand the chemical system from thermodynamic points of view. They will also learn two very important topics in chemistry- chemical equilibrium and ionic equilibrium
Paper: CHE-HC-4016: INORGANIC CHEMISTRY-III	<ul style="list-style-type: none"> On successful completion, students will be able name coordination compounds according to IUPAC, explain bonding in this class of compounds, understand their various properties in terms of CFSE and predict reactivity.
Paper: CHE-HC-4026 ORGANIC CHEMISTRY-III	<ul style="list-style-type: none"> Students shall demonstrate the ability to identify and classify different types of N-based derivatives, alkaloids and heterocyclic compounds/explain their structure mechanism and reactivity/critically examine their synthesis and reactions mechanism
Paper: CHE-HC-4036 PHYSICAL CHEMISTRY-IV	<ul style="list-style-type: none"> In this course the students will learn theories of conductance and electrochemistry.

	<ul style="list-style-type: none"> Students will also understand some very important topics such as solubility and solubility products, ionic products
Paper: CHE- RC/HG-4016 CHEMISTRY-4	<ul style="list-style-type: none"> After completion of this course the students learn solutions, phase rule and its application in specific cases, basics of conductance and electrochemistry. Students will also learn some important topics of organic and biochemistry- carboxylic acids, amines, amino acids, peptides, proteins and carbohydrates.
Paper: CHE-HC-5016 ORGANIC CHEMISTRY-IV	<ul style="list-style-type: none"> Students will be able to explain/describe the important features of nucleic acids, amino acids and enzymes and develop their ability to examine their properties and applications
Paper: CHE-HC-5026 PHYSICAL CHEMISTRY- V	<ul style="list-style-type: none"> After completion of this course the students are expected to understand the application of quantum mechanics in some simple chemical systems such as hydrogen atom or hydrogen like ions.
Paper: CHE-HE-5026 ANALYTICAL METHODS IN CHEMISTRY	<ul style="list-style-type: none"> On successful completion students will be have theoretical understanding about choice of various analytical techniques used for qualitative and quantitative characterization of samples.
Paper: CHE-HE-5066 INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	<ul style="list-style-type: none"> Students shall be able to explain the theoretical basis of different analytical techniques, identify the experimental requirements and compare/analyze the data/results thereof.
Paper: CHE-HC-6016 INORGANIC CHEMISTRY-IV	<ul style="list-style-type: none"> By studying this course the students will be expected to learn about how ligand substitution and redox reactions take place in coordination complexes. Students will also learn about organometallic compounds, comprehend their bonding, stability, reactivity and uses. They will be familiar with the variety of catalysts based on transition metals and their application in industry. On successful completion, students in general will be able to appreciate the use of concepts like solubility product, common ion effect, pH etc. in analysis of ions and how a clever design of reactions, it is possible to identify the components in a mixture..
Paper: CHE-HC-6026 ORGANIC CHEMISTRY-V	<ul style="list-style-type: none"> Students will be able to explain/describe basic principles of different spectroscopic techniques and their importance in chemical/organic analysis. Students shall be able to classify/identify/critically examine carbohydrates, polymers and dye materials.
NON-CBCS	

Paper M-101:
PHYSICAL CHEMISTRY

- The students are expected to learn the thermodynamics terms closed, open and isolated system, surrounding, energy, heat, internal etc.
- They will also be able to know about the state functions and differentials, relation between C_p and C_v , calculation of bond energy, thermochemical data etc.
- Besides, the students will also learn about the entropy change during various processes, Gibb's free energy, Maxwell's thermodynamics relations, second law and third law of thermodynamics etc.
- The students will learn the rate laws of chemical transformations, experimental methods of determining the rate of a reaction.
- Also, they will be able to understand different types of adsorption processes and basics of catalysis. After completion of this course, the students will be able to understand the chemical systems from thermodynamic point of view.

Paper M-102:
ORGANIC CHEMISTRY

- The primary objective of this course is to apprise students with introduction to organic compounds and their hybridization, bond angle, length and energies, hydrogen bonding and its effects, electron displacement, type of reagents and reaction intermediates. Acid-base behavior of organic molecules and factors affecting acidity / basicity of organic compound are also included. The different types of stereoisomerism – conformational, configurational, enantiomerism and diastereoisomerism, atropisomerism and their chemical behavior, different projection formulas are included.
- This course also includes different types of organic reactions like addition- electrophilic, nucleophilic and free radical, substitution - electrophilic, nucleophilic and free radical and free radical- β elimination and pyrolytic elimination along with their mechanisms.

Paper E-101:
GENERAL CHEMISTRY

- After completion of this course the students will learn the atomic structure through the basic concepts of quantum mechanics.
- They will understand the chemical bonding through VB and MO approaches. In states of matter part, students will learn about the postulates of the kinetic theory of gases, behaviour of real gases, structure of liquid and its properties and about of crystal structure of solid states including imperfection in solid.

Paper M-201:
PHYSICAL CHEMISTRY

- In gaseous state unit the students will learn the kinetic theory of gases, ideal gas and real gases. Besides they will also learn degrees of freedom, molecular basis of heat capacity etc. In liquid state unit,

	<p>the students are expected to learn the qualitative treatment of the structure of liquid along with the physical properties of liquid, viz, vapour pressure, surface tension and viscosity.</p> <ul style="list-style-type: none"> • In the molecular and crystal symmetry unit they will be introduced to the elementary idea of symmetry which will be useful to understand solid state chemistry and group theory in some higher courses. In the electrochemistry chapter, the students are expected to learn the theories of conductivity and electrochemistry. • They will have an idea on different electrochemical cells; fuel cell etc. student will also have an understanding on colligative properties of solutions
<p>Paper M-202: ORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • In this course conformational analysis of cycloalkanes, aliphatic hydrocarbons and their stability, topocity and criteria for establishing topocity, prostereisomerism are included. • The course also includes different types of both electrophilic and nucleophilic aromatic substitution reactions, mechanism and various factors affecting the type of reaction mechanism. General methods of preparation, physical properties • reactions and functional group transformations of compounds- saturated and unsaturated hydrocarbons, aromatic hydrocarbons, polynuclear hydrocarbons alkyl and aryl halides, 1° , 2° , 3° alcohols, aromatic and aliphatic amines, diols , triols, phenols , benzyl alcohols, aromatic and aliphatic carbonyl compounds, aromatic and aliphatic carboxylic acids, aromatic and aliphatic nitro compounds are also included.
<p>Paper E-201: GENERAL CHEMISTRY</p>	<ul style="list-style-type: none"> • Students are expected to learn the thermodynamics terms-closed, open and isolated system, surrounding, energy, heat, internal etc. • they will also be able to know about the state functions and differentials, relation between Cp and Cv, calculation of bond energy, thermochemical data etc. • In this course, the students are also expected to learn phase Rule and its application in some specific system. They will learn about the principle of fractional distillation and azeotrope.
<p>Paper M-301: INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • This course gives a theoretical understanding about the basic constituents of matter – atoms, ions and molecules in terms of their electronic structure and reactivity. • This also develops a basic quantum chemistry concept on structure and bonding. Student will learn the rules govern in writing the electronic configurations of any elements.

	<ul style="list-style-type: none"> • The second chapter describes the basic of bonding and the preliminary laws to describe the bonding between two atoms. Students will be able to draw Lewis's structure and explain the bonding with the help of valence bond theory, resonance, and hybridization. • They will be able to calculate the percentage ionic character of a covalent bond.
<p>Paper M-302: INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • After completion of this course student will be able to identify or determine the shape of a molecule by using VSEPR theory. • Students will be able to use the molecular orbital theory for homonuclear and heteronuclear diatomic, triatomic molecule and metals. • The students will also have the basic idea of ionic bonding. They will be able to identify the packing and crystal system of an ionic solid. They can find the Lattice energy of ionic solids using Born Haber cycle.
<p>Paper E-301: GENERAL CHEMISTRY</p>	<ul style="list-style-type: none"> • After completion of this course student will have an idea on periodic classification of elements in the periodic table and variation of periodic properties along the periods. They will know all oxides, hydroxides, oxyacid, halides with respect to group 1,2 and 13-17 groups of periodic table. • They will learn different physical and chemical reactivity shown by heavier p-block elements due to presence of vacant d-orbitals. This course also apprises students about the variety of compounds of the main group elements including oxides, hydrides, nitrides, interhalogens, noble gases and inorganic polymers. • Another part of this course deals with the transition metal chemistry. This also gives the basic idea of coordination chemistry. Various aspects like nomenclature, structure, bonding, variety and reactivity of the coordination compounds are included for the students to appreciate. • Students will learn the theories of conductance and electrochemistry. The students are also expected to understand the various parts of electrochemical cell, fuel cell and battery.
<p>Paper M-401: INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • This course gives an idea on periodic classification of elements in the periodic table and changes in properties along the periods and details of all the periodic properties and their variations in a group or a period.

	<ul style="list-style-type: none"> • This course provide familiarity to students with Periodic behavior of s and p block elements related to their electronic structure and their reactivity is included the principles governing their reactivity. Periodic properties like electronegativity, electron affinity, catenation properties etc. are discussed with respect to group 1,2 and 13-17 groups of periodic table. Different physical and chemical reactivity shown by heavier p-block elements due to presence of vacant d-orbitals are discussed.
<p><u>Paper M-402:</u> INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • This course apprises students about the variety of compounds of the main group elements including oxides, hydrides, nitrides, interhalogens, noble gases and inorganic polymers. • Another part of this course deals with the transition metal chemistry. This also gives the basic idea of coordination chemistry. • Various aspects like nomenclature, structure, bonding, variety and reactivity of the coordination compounds are included for the students to appreciate.
<p><u>Paper E-401:</u> GENERAL CHEMISTRY</p>	<ul style="list-style-type: none"> • This course is inducted to apprise students with aromatic and aliphatic hydroxyl compounds, carbonyl compounds, carboxylic acids, carbohydrates, fats and oils. They will be able to differentiate the organic compounds based on their functional groups. • In this course chemical kinetics and surface chemistry have been introduced. In this chapter student will learn the rate laws of chemical transformations, experimental methods of determining the rate of a reaction. • Students will be able to understand different types of adsorption processes and basics of catalysis. • In ionic equilibrium chapter students will learn about the ostwald's dilution law, role of buffer solution in chemical reactions and biological systems.
<p><u>Paper M-501:</u> QUANTUM CHEMISTRY</p>	<ul style="list-style-type: none"> • This course gives the introduction to quantum chemistry. The black body radiation and photoelectric effect, Compton effect are explained to give an idea of the origin of quantum mechanics. Schrodinger equation is discussed for one dimensional and three dimensional boxes. It has also been solved for hydrogen atom. The electron density is calculated from the Schrodinger equation for hydrogen atom. • Student will have idea on Schrodinger equation for hydrogen molecular ion by using Born Oppenheimer approximation. • This course provides an explanation of the Quantum mechanical treatment of chemical bonding. Students will be able to understand

	<p>the Valence bond theory and molecular orbital theory on the basis of wave-function. They will be able to calculate the energy of the MOs.</p> <ul style="list-style-type: none"> • Students will have the idea on Huckel pi Molecular orbital theory and able to calculate the energy and degeneracy of energy levels.
<p>Paper M-502: PHYSICAL CHEMISTRY</p>	<ul style="list-style-type: none"> • Students are expected to understand about the collision theory, activated complex theory, molecular beam techniques for studying fast reaction etc. • They will also get the basic idea about Laser and flash photolysis. In Photochemistry chapter they will learn about various photochemical processes like Fluorescence, Phosphorescence and bioluminescence etc. • Students are expected to learn about the photochemistry of air pollution. In phase equilibrium chapter the students are expected to learn phase Rule and its application in some specific system. In surface chemistry they will learn about adsorption, BET and catalytic activity of a surface.
<p>Paper M-503: ORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • In this course different types of molecular rearrangements viz Nucleophilic- Whitmore 1,2 Shift, Wagner-Meerwein, Wolff, Hofmann, Lossen, Curtius, Schmidt, Beckman, Favorskii, Baeyer Villiger, Electrophilic- Pinacol, Fries rearrangement (aromatic electrophilic substitution) Stevens (ion pairs in solvent cage/ radical pair) and Free radical-wittig are discussed in detail. Different oxidizing and reducing agents used in organic reactions along with their mechanism are also included. • This course is also inducted to apprise students with introduction to pericyclic reactions, different types of pericyclic reactions- electrocyclic, cycloaddition and sigmatropic, theories frontier molecular orbital method and conservation of orbital symmetry. • In this course polynuclear aromatics, nitro and amino compounds, organo S and organo P compounds, active methylene compounds and heterocyclic compounds – their synthesis, reactivities, structures and mechanisms are also included.
<p>Paper M-504: INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> • After completion of this course the student will learn about the advanced theory of bonding in coordination chemistry, i.e crystal field theory and molecular orbital theory. • Students will also acquire preliminary idea on organometallic chemistry and simple preparation of alkene, alkyne, allyl and cyclopentadienyl anion and arene complexes.

	<ul style="list-style-type: none"> ● They will have basic idea of the structure of those complexes. Some specific examples of homogeneous organometallic catalysis, viz., Wilkinson catalyst and other have been included in this course. Biological role of metal in terms of oxygen transport and medicine are also included and student will have an basic idea on those topic.
<p><u>Paper E-501:</u> GENERAL CHEMISTRY</p>	<ul style="list-style-type: none"> ● After completion of this course, they will learn the band theory of solids and they will be able to understand the electrical and thermal conductivity of various solids. ● In chemical analysis unit, student will learn about the principles of estimation of metals quantitatively and different types of separation techniques used in the laboratory. ● After completion of this course student will learn the basic principles and could be able to interpret the spectra for a simple molecule. ● They will be able to identify the number of signals of a given sample and draw the NMR spectra. Mass spectrometry is also included which gives the idea about molecular ion peak, base peaks etc. ● They will learn different part of mass spectrometer and method of ionization of a sample
<p><u>Paper M-601:</u> SPECTROSCOPY</p>	<ul style="list-style-type: none"> ● After completion of this course student will learn the basic principles and could be able to interpret the spectra for a simple molecule. In addition, spin resonance spectroscopy i.e. NMR and ESR are included. ● Students will be able to identify the number of signals of a given sample and draw the pattern for both NMR and ESR. Mass spectrometry is also included which gives the idea about molecular ion peak, base peaks etc. ● They will learn different part of mass spectrometer and method of ionization of a sample.
<p><u>Paper M-602:</u> PHYSICAL CHEMISTRY</p>	<ul style="list-style-type: none"> ● Students will be introduced to the elementary idea of crystal symmetry which is useful for advanced group theory. They will also learn about the conductivity of solids. ● Student will have a preliminary idea on polymer chemistry. They will be able to calculate weight average and other related parameter of a polymer.in the colloid chapter, student will learn surface active agent, micelle concentration etc. ● Students will be able to correlate the classical and quantum mechanics. Students will be able to familiar with the application of

	<p>statistical thermodynamics for calculation of heat capacity, residual entropy and equilibrium constants.</p> <ul style="list-style-type: none"> ● In data analysis, the students will know about the accuracy and precision, standard deviation etc. which are very important in quantitative analysis.
<p>Paper M-603: ORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> ● This course is designed to understand Theory of photochemistry: photophysical processes, electronic excitation, excited states, Jablonski diagram, Franck-Condon Principles, Fluorescence and phosphorescence, ETprocess, photosensitizers, Einstein's law of photochemical equivalence, quantum yield and photoreactions of benzophenone, photolytic Norrish type I & Norrish type II reactions, cis-trans isomerisation and dimerisation, cycloaddition of olefins. ● This course also introduces students to different types of polymers - Addition and condensation polymers, Preparation of vinyl polymers, synthesis of terylene, nylon and fibres--natural rubber, synthetic rubber, Urea formaldehyde resins. ● This course also introduces students to bioenergetics, biopolymers, nucleic acids, amino acids, enzymes. ● The primary objective of this course is to introduce students to the natural products which include terpenoids and alkaloids and their potential application. ● This course also includes fundamentals of drug design and development process, drugs for various diseases available in market, their mode of action and side effects.
<p>Paper M-604: INORGANIC CHEMISTRY</p>	<ul style="list-style-type: none"> ● After completion of this course student will be able to identify the electronic spectra of a transition metal complexes. ● They will learn the variation of electronic spectra of a complex based on the ligand field. ● With this course student can predict the reaction rates and have idea on factors affecting on associative and dissociative mechanism. ● Student will also learn about nuclear chemistry. They will understand the Nuclear cross reactions, Q values etc. The chemistry of Lanthanides and Actinides also included which give an idea of electronic configuration, oxidation states, lanthanide contractions, magnetic properties and electronic spectra of these elements.

Paper E-601:
GENERAL CHEMISTRY

- Students are expected to learn about different process and chemicals involved in various industries.
- They will have knowledge about petroleum, fats, oil and detergents and their chemical synthesis and properties.
- With this course students are exposed to the various application of chemistry and their importance in daily life. Chemistry behind some biological functions incorporated to know chemical reactions.
- In the environmental chemistry, they will learn different factors effecting the environment and their chemical reactions, for example, ozone layer depletion.
- They will be knowing the chemical or molecular structure and function of DNA, RNA, protein, vitamins, alkaloids, steroids, hormones etc.

1. DEPARTMENT OF COMPUTER SCIENCE:

CBCS

Programme Outcome:

Student outcomes describe what students are expected to know and be able to do by the time of graduation. The Computer Science Department's Bachelor of Science program must enable students to attain, by the time of graduation:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- An ability to identify, formulate, and develop solutions to computational challenges.
- An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints.
- An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
- An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
- An ability to communicate and engage effectively with diverse stakeholders.
- An ability to analyze impacts of computing on individuals, organizations, and society.
- Recognition of the need for and ability to engage in continuing professional development.
- An ability to use appropriate techniques, skills, and tools necessary for computing practice.
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and

	<p>design of computational systems in a way that demonstrates comprehension of the trade-offs involved in design choices.</p> <ul style="list-style-type: none"> • An ability to apply design and development principles in the construction of software systems of varying complexity.
Course	Outcomes
<p>Paper: CSC-HC-1016 Programming Fundamentals using C/C++</p>	<p>Upon completion of this course, students will acquire knowledge about:</p> <ul style="list-style-type: none"> • Able to implement the algorithms and draw flowcharts for solving Mathematical problems. • Demonstrate an understanding of computer programming language concepts. • To be able to develop C programs on Windows and Linux platform. • Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. • Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. • Student must be able to define union and enumeration user defined data types. • Develop confidence for self-education and ability for life-long learning needed for Computer language.
<p>Paper: CSC-HC-1026 Computer System Architecture</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Explain the organization of basic computer, its design and the design of control unit. • Demonstrate the working of central processing unit and RISC and CISC Architecture. • Describe the operations and language of the register transfer, micro-operations and input- output organization. • Understand the organization of memory and memory management hardware. • Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.
<p>Paper: CSC-HC-2016 Programming in JAVA</p>	<p>On completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. • Read and make elementary modifications to Java programs that solve real world problems. • Validate input in a Java program. • Identify and fix defects and common security issues in code.

	<ul style="list-style-type: none"> • Document a Java program using Javadoc. • Use a version control system to track source code in a project.
<p><u>Paper: CSC-HC-2016</u> Discrete Structures</p>	<p>The course objective is to provide students with an overview of discrete mathematics. Students will learn about topics such as logic and proofs, sets and functions, probability, recursion, graph theory, matrices, Boolean algebra and other important discrete math concepts. On completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Use logical notation, Perform logical proofs, Apply recursive functions and solve recurrence relations, Determine equivalent logic expressions, Describe useful standard library functions, create functions, and declare parameters, Use graphs and trees, Apply basic and advanced principles of counting, Define sets and sequences, Calculate discrete probabilities, Design and evaluate Euler and Hamilton circuits
<p><u>Paper: CSC-HC-3016</u> Data Structures</p>	<p>On completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • To impart the basic concepts of data structures and algorithms • To understand concepts about searching and sorting techniques • To Understand basic concepts about stacks, queues, lists, trees and graphs • To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures
<p><u>Paper: CSC-HC-3026</u> Operating Systems</p>	<ul style="list-style-type: none"> • Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc., C1[Knowledge] • Analyze important algorithms e.g., Process scheduling and memory management algorithms C3 [Investigate]. • Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques.C5. Demonstrate the ability to perform OS tasks in Red Hat Linux Enterprise. P4. (Mechanism / Guided Response).
<p><u>Paper: CSC-HC-3036</u> Computer Networks</p>	<p>After successfully completing this course, students should be able to:</p> <ul style="list-style-type: none"> • Describe the general principles of data communication. • Describe how computer networks are organized with the concept of layered approach. • Describe how signals are used to transfer data between nodes.

	<ul style="list-style-type: none"> ● Implement a simple LAN with hubs, bridges and switches. ● Describe how packets in the Internet are delivered. ● Analyse the contents in a given data link layer packet, based on the layer concept. ● Design logical sub-address blocks with a given address block. ● Decide routing entries given a simple example of network topology ● Describe what classless addressing scheme is. ● Describe how routing protocols work. ● Use C programming language to implement network programs. ● Design and implement a network protocol.
<p>Paper: CSC-SE-3024 Programming in Python</p>	<p>Upon successful completion of this course, the student will be able to:</p> <ul style="list-style-type: none"> ● Define and demonstrate the use of built-in data structures “lists” and “dictionary”. ● Design and implement a program to solve a real-world problem. ● Design and implement GUI application and how to handle exceptions and files. ● Make database connectivity in python programming language.
<p>Paper: CSC-HC-4016 Design and Analysis of Algorithm</p>	<p>By the end of course through lectures, readings, home works, lab assignments and exams, students will demonstrate: - The abilities</p> <ul style="list-style-type: none"> ● To apply knowledge of computing and mathematics to algorithm design. ● to analyse a problem and identify the computing requirements appropriate for its solution. to design, implement, and evaluate an algorithm to meet desired needs and ● To apply mathematical foundations, algorithmic principles, and computer science theory to the modelling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices. - An ability to apply design and development principles in the construction of software systems of varying complexity. - An ability to function effectively as a member of a team in order to accomplish a common goal. - Recognition of the need for and an ability to engage in continuing professional development. - An ability to use current techniques, skills, and tools necessary for computing practice.
<p>Paper: CSC-HC-4026 Software Engineering</p>	<p>After the completion of the course students will be able to:</p>

	<ul style="list-style-type: none"> ● An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics ● An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors ● An ability to communicate effectively with a range of audiences ● An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts ● An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives ● An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions ● An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
<p>Paper: CSC-HC-4036 Database Management System</p>	<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> ● Describe the fundamental elements of relational database management systems ● Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. ● Design ER-models to represent simple database application scenarios ● Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. ● Improve the database design by normalization. ● Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. Course Specific Outcome of CSC-SE-4034(R Programming) ● Install R and R Studio and create R script and be able to save your work in R project

	<ul style="list-style-type: none"> • Be able to differentiate between different R data structures such as: string, number, vector, matrix, data frame, factor, date and time object, and many more • Be able to access elements from R objects, and be able to reshape R objects • Write R program for executing repetitive tasks using loops and vectorized code • Write own user defined functions and create simulations inside R environment • Visualize data using base R graphics
<p><u>Paper: CSC-HC-5016</u> Internet Technology</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Various technologies involving data transfer though internet. • Protocols used in internet technologies. • Present day scenario of internet uses-ethics. • Configure LAN, WAN, network protocols. • Analyze a web page and identify its elements and attributes. • Create web pages using XHTML and Cascading Style Sheets. • Build dynamic web pages using JavaScript (Client-side programming). • Create XML documents and Schemas. • Build interactive web applications using AJAX
<p><u>Paper: CSC-HC-5026</u> Theory of Computation</p>	<p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> • To use basic concepts of formal languages of finite automata techniques. • To Design Finite Automata for different Regular Expressions and Languages. • To Construct context free grammar for various languages. • To solve various problems of applying normal form techniques, push down automata and Turing Machines
<p><u>Paper: CSC-HE-5026</u> Numerical methods</p>	<p>The objectives of the course are to make the students,</p> <ul style="list-style-type: none"> • To develop the mathematical skills of the students in the areas of numerical methods. • To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, finding eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs and dealing with statistical problems like testing of hypotheses.

	<ul style="list-style-type: none"> ● To lay foundation of computational mathematics for post-graduate courses, specialized studies and research. ● Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations. ● Apply various interpolation methods and finite difference concepts. ● Work out numerical differentiation and integration whenever and wherever routine methods are not applicable. ● Work numerically on the ordinary differential equations using different methods through the theory of finite differences. ● Work numerically on the partial differential equations using different methods through the theory of finite differences.
<p><u>Paper: CSC-HE-5036</u> Project Work/Dissertation</p>	<p>The students are lowed to work on any project based on the concepts studied in core/ elective or core based elective courses. Some outcomes are:</p> <ul style="list-style-type: none"> ● To experiance the real-world problem and try to learn to solve the problem. ● Learn the software (platform) thoroughly to solve the problem. ● To get the professional job in IT industry.
<p><u>Paper: CSC-HC-6016</u> Artificial Intelligence</p>	<p>Upon successful completion of this course, the student shall be able to:</p> <ul style="list-style-type: none"> ● Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. ● Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. ● Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. ● Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool. ● Demonstrate proficiency in applying scientific method to models of machine learning. ● Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.
<p><u>Paper: CSC-HC-6026</u> Computer Graphics</p>	<ul style="list-style-type: none"> ● Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

	<ul style="list-style-type: none"> • Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. • Use of geometric transformations on graphics objects and their application in composite form. • Extract scene with different clipping methods and its transformation to graphics display device. • Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. • Render projected objects to naturalize the scene in 2D view and use of illumination models for this.
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<p>Paper: CSC-HE-6046 Data Mining</p>	<p>Students who complete this course should be able to</p> <ul style="list-style-type: none"> • Design schema for real time data warehousing applications. • Process raw data to make it suitable for various data mining algorithms. • Discover and measure interesting patterns from different kinds of databases. • Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data. • Use various data mining tools such as weka, etc.
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NON-CBCS

<p>Programme outcome</p>	<p>Student outcomes describe what students are expected to know and be able to do by the time of graduation. The Computer Science Department's Bachelor of Science program must enable students to attain, by the time of graduation:</p> <ul style="list-style-type: none"> • An ability to apply knowledge of computing and mathematics appropriate to the discipline. • An ability to identify, formulate, and develop solutions to computational challenges. • An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints. • An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals. • An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession. • An ability to communicate and engage effectively with diverse stakeholders. • An ability to analyse impacts of computing on individuals, organizations, and society.
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	<ul style="list-style-type: none"> • Recognition of the need for and ability to engage in continuing professional development. • An ability to use appropriate techniques, skills, and tools necessary for computing practice. • An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computational systems in a way that demonstrates comprehension of the trade-offs involved in design choices. • An ability to apply design and development principles in the construction of software systems of varying complexity.
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Course	Outcome
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<p><u>Paper: M-101</u></p> <p>Introduction to Computer Fundamentals and Programming in C</p>	<p>Upon completion of this course, students will acquire knowledge about:</p> <ul style="list-style-type: none"> • Able to implement the algorithms and draw flowcharts for solving Mathematical problems. • Demonstrate an understanding of computer programming language concepts. • To be able to develop C programs on Windows and Linux platform. • Ability to design and develop Computer programs, analyses, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. • Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. • Student must be able to define union and enumeration user defined data types. • Develop confidence for self-education and ability for life-long learning needed for Computer language.
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<p><u>Paper: M-102</u></p> <p>Basic Electronics</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Explain the organization of basic computer, its design and the design of control unit. • To study the basis of Semi-Conductor and devices and their application of different areas • Compare design issues, advantages, disadvantages and limitations of basic electronics. • Demonstrate the working of central processing unit and RISC and CISC Architecture. • Describe the operations and language of the register transfer, micro-operations and input- output organization. • Understand the organization of memory and memory management hardware.
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	<ul style="list-style-type: none"> ● Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.
<p><u>Paper: M-201</u> ICT Hardware</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> ● To indicate the names and functions of hardware ports and parts of the mother board. ● To identify the names and distinguishing features of different Input and Output devices. ● To describe how the CPU process data and instructions and control the operations of all other devices. ● To identify the names, distinguishing features, and units of measuring different kinds of memory and storage devices. ● To search own PC for the various hardware components it contains, assembling and disassembling and rehearing etc.
<p><u>Paper: M-202</u> Discrete Mathematics</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> ● Write an argument using logical notation and determined if the argument is valid or not. ● Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique describe. ● Understand the basic principle of Sets, Operations in Sets and proof the basic sets equalities. ● Demonstrate and understanding the relations and functions and be able to determine their properties. ● Determine whether a function is 1-1. Onto or bijective. ● Demonstrate different traversal methods of trees and Graphs. ● Model problems in Computer Science using Graphs and Trees. ● Demonstrate the concepts of Matrices as well as Permutation and Combination.
<p><u>Paper: M-301</u> Data Structure</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> ● Understand the dynamic memory management, data types, algorithm O-notation. ● Understand the basic data structures like Arrays, Stack, Queue, Link Lists. ● Describe the Hash function and concepts of Collision and its resolution methods. ● Solve problems involving Graphs, Trees and Heap. ● Apply algorithms and solving problems like sorting, searching, insertion and deletion of data.
<p><u>Paper: M-302</u> Computer Organization and Architecture</p>	<p>Upon completion of this course, the students will be able to:</p>

	<ul style="list-style-type: none"> • To Understand the structure, functions and characteristics of Computer system. • To understand the design of various functional units and components of Computers. • To identify the elements of modern instruction sets and their impact on processor design. • To explain the function of each element of memory hierarchy. • To identify and compare different methods for Computer I/O.
<p><u>Paper: M-401</u> Operating System</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc., C1[Knowledge] . • Analyze important algorithms eg. Process scheduling and memory management algorithms C3 [Investigate]. • Categorize the operating system’s resource management techniques, dead lock management techniques, memory management techniques.C5. Demonstrate the ability to perform OS tasks in Red Hat Linux Enterprise. P4. (Mechanism / Guided Response).
<p><u>Paper: M-402</u> Data Base Management System</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Describe the fundamental elements of relational database management systems • Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. • Design ER-models to represent simple database application scenarios • Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. • Improve the database design by normalization. • Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
<p><u>Paper: M-501</u> Object Oriented Programming</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Identify importance of object-oriented programming and difference between structured oriented and object-oriented programming features. • Able to make use of objects and classes for developing programs. • Able to use various object-oriented concepts to solve different problems.

<p>Paper: M-502</p> <p>Computer Oriented Numerical Methods and Statistical Techniques</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • To develop the mathematical skills of the students in the areas of numerical methods. • To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, finding eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs and dealing with statistical problems like testing of hypotheses. • To lay foundation of computational mathematics for post-graduate courses, specialized studies and research. • Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations. • Apply various interpolation methods and finite difference concepts. • Work out numerical differentiation and integration whenever and wherever routine methods are not applicable. • Work numerically on the ordinary differential equations using different methods through the theory of finite differences. • Work numerically on the partial differential equations using different methods through the theory of finite differences. Course Specific Outcome of CSC-HE-5036 (Project Work/Dissert.
<p>Paper: M-503</p> <p>Computer Networks</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • To identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics • To apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors • To communicate effectively with a range of audiences • To recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts • To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives • To develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions • To acquire and apply new knowledge as needed, using appropriate learning strategies.
<p>Paper: M-504</p> <p>Microprocessor and</p>	<p>Upon completion of this course, the students will be able to:</p>

<p>Assembly Language Programming</p>	<ul style="list-style-type: none"> • Describe the general architecture of a micro-computer system and architecture & Organization of 8085 and 8086 microprocessor and understand the difference between 8085 and advanced microprocessor. • Understand and realize the interfacing of memory and various I/O devices with 8085 microprocessors. • Understand and classify the instruction sets of 8085 microprocessor and distinguish the use of different instruction and apply it in Assembly Language Programming. • Understand the architecture and operation of programable interface devices and realize the programming and interfacing of it with 8085 microprocessors.
<p>Paper: M-601 Automata Theory and language</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • To use basic concepts of formal languages of finite automata techniques. • To Design Finite Automata for different Regular Expressions and Languages. • To Construct context free grammar for various languages. • To solve various problems of applying normal form techniques, push down automata and Turing Machines
<p>Paper: M-602 Web Technology</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Various technologies involving data transfer though internet. • Protocols used in internet technologies. • Present day scenario of internet uses-ethics. • Configure LAN, WAN, network protocols. • Analyze a web page and identify its elements and attributes. • Create web pages using XHTML and Cascading Style Sheets. • Build dynamic web pages using JavaScript (Client side programming). • Create XML documents and Schemas. • Build interactive web applications using AJAX.
<p>Paper: M-603 System Administration Using Unix</p>	<p>Upon completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Understand the roles and responsivities of a Unix system Administrator. • Instal and configure the Linux Operating system. • Manage the resources and security of Computer running Linux at a basic level. • Make effective use of Unix utilities and Scripting languages. • Configure and manage simple TCP/IP networks services of a Linus system

**Post-Graduate Department of
Economics (CBCS)**

Programme Specific Outcome

- To provide students a well-founded educational base as well as well-resourced learning environment in Economics.
- To provide structured curricula which support the academic development of students and to acquire knowhow on Methodology of Economics as a branch of social sciences.
- To provide and adapt curricula that prepares our graduates for employment and further study as economists and also to apply methods and theories of Social Sciences to contemporary Issues.
- To provides the students with the opportunity to pursue courses that emphasizes quantitative and theoretical aspects of Economics.
- To provide students with the opportunity to focus on applied and policy issues in Economics with the understanding of various quantitative and qualitative economic models.
- To provide programmers that allows the students to choose from a wide range of economic specialization and familiarise with different branches of economics.
- The programme also emphasizes on conducting Social and Economic Researches

Courses	Outcomes
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<p><u>ECO-HC-1016</u> Introductory Microeconomics</p>	<p>This course is designed to expose the students to the basic principles of microeconomic theory. The course will illustrate how microeconomic concepts can be applied to analyse real-life situations.</p>
<p><u>ECO-HC-1026</u> Mathematical Methods for Economics-I</p>	<p>This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. This course, means for illustrating the method of applying mathematical techniques to economic theory in general.</p>
<p>Semester II</p>	
<p><u>ECO-HC-2016</u> Introductory Microeconomics</p>	<p>This course aims to introduce the students to the basic concepts of Macroeconomics. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.</p>
<p><u>ECO-HC-2026</u> Mathematical Methods for Economics-I</p>	<p>This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.</p>
<p>Semester III</p>	

<p><u>ECO-HC-3016</u> Intermediate Microeconomics I</p>	<p>The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Here, mathematical tools are used to facilitate understanding of the basic concepts. This course looks at the behaviours of consumers and producers, and also covers the behaviours of the competitive firms.</p>
<p><u>ECO-HC-3026</u> Intermediate Macroeconomics I</p>	<p>This course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.</p>
<p><u>ECO-HC-3036</u> Statistical Methods for Economics</p>	<p>This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It then develops the notion of probability, followed by probability distributions of discrete and continuous random variables and of joint distributions. This is followed by a discussion on sampling techniques used to collect survey data. The course introduces the notion of sampling distributions that act as a bridge between probability theory and statistical inference. The semester concludes with some topics in statistical inference that include point and interval estimation.</p>
<p><u>ECO-HC-4016</u> Intermediate Microeconomics II</p>	

	<p>This course is a sequel to Intermediate Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers general equilibrium and welfare, imperfect markets and topics under information economics.</p>
<p><u>ECO-HC-4026</u> Intermediate Macroeconomics II</p>	<p>This course is a sequel to Intermediate Macroeconomics I. In this course, the students are introduced to the long run dynamic issues like growth and technical progress. It also provides the micro-foundations to the various aggregative concepts used in the previous course.</p>
<p><u>ECO-HC-4036</u> Introductory Econometrics</p>	<p>This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models</p>
<p>Semester V</p>	
<p><u>ECO-HC-5016</u> Indian Economy I</p>	<p>Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.</p>
<p><u>ECO-HC-5026</u> Development Economics</p>	<p>This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.</p>
<p><u>ECO-HE-5026</u> Money and Financial Markets</p>	

	This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discuss the interest rate, monetary management and instruments of monetary control.
<u>ECO-HE-5036</u> Public Finance	Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities. The paper is divided into two sections, one dealing with the theory of public economics and the other with the Indian public finances.
Semester - VI	
<u>ECO-HC-6016</u> Indian Economy-II	This course examines sector-specific policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list will have to be updated annually.
<u>ECO-HC-6026</u> Development Economics-II	This is the second module of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.
DISCIPLINE SPECIFIC ELECTIVE (DSE) PAPERS: ECONOMICS GROUP-I	

ECO-HE-5026:
Money and Financial Markets

This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discusses interest rates, monetary management and instruments of monetary control. Financial and banking sector reforms and monetary policy with special reference to India are also covered.

ECO-HE-5036:
Public Finance

This course is a non-technical overview of government finances with special reference to India. The course does not require any prior knowledge of economics. It will look into the efficiency and equity aspects of taxation of the centre, states and the local governments and the issues of fiscal federalism and decentralization in India. The course will be useful for students aiming towards careers in the government sector, policy analysis, business and journalism.

**DISCIPLINE SPECIFIC ELECTIVE (DSE) PAPERS: ECONOMICS
GROUP-II**

ECO-HE-6016:
Environmental Economics

This course focuses on economic causes of environmental problems. In particular, economic principles are applied to environmental questions and their management through various economic institutions, economic incentives and other instruments and policies. Economic implications of environmental policy are also addressed as well as valuation of environmental quality, quantification of environmental damages, tools for evaluation of environmental projects such as cost-benefit analysis and environmental impact assessments. Selected topics on international environmental problems are also discussed.

ECO-HE-6026:
International Economics

This course develops a systematic exposition of models that try to explain the composition, direction, and consequences of international trade, and the determinants and effects of trade policy. It then builds on the models of open economy macroeconomics developed in courses 08 and 12, focusing on national policies as well as international monetary systems. It concludes with an analytical account of the causes and consequences of the rapid expansion of international financial flows in recent years. Although the course is based on abstract theoretical models, students will also be exposed to real-world examples and case studies.

Generic Elective in Economics I:

ECO-HG-1016:
Principles of
Microeconomics I

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Generic Elective in Economics II:

INTRODUCTORY
MACROECONOMICS

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Generic Elective in Economics III (a):

INDIAN ECONOMY-I

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points.

Generic Elective in Economics III (b):

MONEY AND BANKING

This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discusses interest rates, monetary management and instruments of monetary control. Financial and banking sector reforms and monetary policy with special reference to India are also covered.

Generic Elective in Economics III (c):

ENVIRONMENTAL ECONOMICS

This course introduces students to concepts, methods and policy options in managing the environment using tools of economic analysis. This course should be accessible to anyone with an analytical mind and familiarity with basic concepts of economics. Since several environmental problems are caused by economic activity (for instance, carbon emissions, overharvesting of renewable resources and air and water pollution as a by-product of industrial activity), this course examines different approaches to adjusting behaviour through economic institutions such as markets and incentives as well as through regulation, etc. It also addresses the economic implications of environmental policies through practical applications of methods for valuation of environmental goods and services and quantification of environmental damages. Conversely, the impact of economic growth on the environment is also addressed under the rubric of sustainable development. Environmental problems and issues from the Indian and international context (especially global warming) are used to illustrate the concepts and methods presented in the course. The course will be useful for students aiming towards careers in the

	government sector, policy analysis, business, journalism and
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	international organizations.
Generic Elective in Economics IV (a):	
INDIAN ECONOMY-II	This course examines sector-specific policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence.
Generic Elective in Economics IV (b):	
ECONOMIC HISTORY OF INDIA 1857-1947	This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.
Generic Elective in Economics IV(c):	
PUBLIC FINANCE	This course is a non-technical overview of government finances with special reference to India. The course does not require any prior knowledge of economics. It will look into the efficiency and equity aspects of taxation of the center, states and the local governments and the issues of fiscal federalism and decentralization in India. The course will be useful for students aiming towards careers in the government sector, policy analysis, business and journalism.

Department of Economics (NON CBCS)

Programme Specific Outcome

- To provide students a well-founded educational base as well as well-resourced learning environment in Economics.
- To provide structured curricula which support the academic development of students and to acquire knowhow on Methodology of Economics as a branch of social sciences.
- To provide and adapt curricula that prepares our graduates for employment and further study as economists and also to apply methods and theories of Social Sciences to contemporary Issues.
- To provides the students with the opportunity to pursue courses that emphasizes quantitative and theoretical aspects of Economics.
- To provide students with the opportunity to focus on applied and policy issues in Economics with the understanding of various quantitative and qualitative economic models.
- To provide programmers that allows the students to choose from a wide range of economic specialization and familiarise with different branches of economics.
- The programme also emphasizes on conducting Social and Economic Researches

Semester-I	
Courses	Course Outcomes
<p><u>Paper: M 104</u> MICROECONOMICS I</p>	<p>This course is designed to expose the students to the basic principles of microeconomic theory. The course will illustrate how microeconomic concepts can be applied to analyze real-life situations.</p>
<p><u>Paper: M 105</u> MACROECONOMICS</p>	<p>This course aims to introduce the students to the basic concepts of Macroeconomics. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.</p>
Semester II	
<p><u>Paper: M 204</u> MICROECONOMICS II</p>	<p>This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. In this course, advanced microeconomics concepts such as Market structure, theory of distribution, welfare economics and financial microeconomics are taught.</p>

<p><u>Paper: M 205</u> MACROECONOMICS-11</p>	<p>This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. In this course, students are familiarized with Goods and money market equilibrium, Business cycles, Quantitative theory of money and Inflation.</p>
<p>Semester III</p>	
<p><u>Paper: M 304</u> ELEMENTARY MATHEMATICS FOR ECONOMICS</p>	<p>This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. This course, means for illustrating the method of applying mathematical techniques to economic theory in general</p>
<p><u>Paper: M 305</u> THE MONETARY SYSTEM</p>	<p>This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discuss the interest rate, monetary management and instruments of monetary control.</p>

	This course is a sequel to Elementary Mathematics For Economics. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning.
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Semester IV

<u>Paper: M 404</u> MATHEMATICAL APPLICATIONS IN ECONOMICS	This course is a sequel to Elementary Mathematics For Economics. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning.
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<u>Paper: M 405</u> INTRODUCTIONS TO DEVELOPMENT ECONOMICS	This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.
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Semester V

<u>Paper: M 501</u> ELEMENTS OF PUBLIC FINANCE	Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities. The paper is divided into two sections, one dealing with the theory of public economics and the other with the Indian public finances.
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<u>Paper: M 502</u> BASIC STATISTICS FOR ECONOMICS	This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It then develops the notion of probability, followed by probability distributions of discrete and continuous random variables and of joint distributions. This is followed by a discussion on sampling techniques used to collect survey data. The course introduces the notion of sampling distributions that act as a bridge between probability theory and statistical inference. The semester concludes with some topics in statistical inference that include point and interval estimation.
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<u>Paper: M 502</u> ELEMENTARY ECONOMETRICS	This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models
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<p><u>Paper: M 503</u> INTRODUCTION TO ENVIRONMENTAL ECONOMICS</p>	<p>This course focuses on economic causes of environmental problems. In particular, economic principles are applied to environmental questions and their management through various economic institutions, economic incentives and other instruments and policies. Economic implications of environmental policy are also addressed as well as valuation of environmental quality, quantification of environmental damages, tools for evaluation of environmental projects such as cost-benefit analysis and environmental impact assessments. Selected topics on international environmental problems are also discussed.</p>
<p><u>Paper: M 504</u> INTERNATIONAL TRADE: THEORY AND POLICY</p>	<p>This course develops a systematic exposition of models that try to explain the composition, direction, and consequences of international trade, and the determinants and effects of trade policy. It then builds on the models of open economy macroeconomics developed in courses 08 and 12, focusing on national policies as well as international monetary systems. It concludes with an analytical account of the causes and consequences of the rapid expansion of international financial flows in recent years. Although the course is based on abstract theoretical models, students will also be exposed to real-world examples and case studies.</p>
<p><u>Paper: M 505</u> HISTORY OF ECONOMIC THOUGHT I</p>	<p>This course aims at to provide a historical development of the Economics discipline over a period of time. The course provides information about mercantilism, physiocrats, development in classical period and socialist thought.</p>
<p><u>Paper: M 506</u> DEVELOPMENT POLICY AND THE INDIAN ECONOMY</p>	<p>This is the second module of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.</p>
<p>Semester – VI</p>	
<p><u>Paper: M 601</u> PUBLIC ECONOMICS</p>	<p>This course is the sequel of M501 and provides a study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal and advanced analysis of government taxation and expenditures.</p>
	<p>This is a course on statistical methods for economics is the extension of the</p>

<p>PAPER: M 602 APPLIED STATISTICS (For Arts)</p>	<p>same in 5th semester. . It introduces some of the applied statistical concepts such as Index numbers, time series analysis and vital statistics which have wide practical applications in economics discussions. It also provides an unit of sample survey.</p>
<p>Paper: M 602 ECONOMETRIC METHODS (For Science)</p>	<p>This course is the extension of the Econometrics Methods introduced in 5th semester for science students having major in economics. It provides an recent development in the discipline such as problems associated with OLS estimation, lag models and dummy variables and time series analysis</p>
<p>Paper: M 603 ECONOMICS OF NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT</p>	<p>This course is the sequel of the paper introduction of Environmental Economics where economics of natural resources and sustainable development and sustainable use of natural resources are tried to be familiarised among the students. Here economic principles are applied to natural resources and their management through various economic institutions, economic incentives and other instruments and policies.</p>
<p>Paper: M 604 INTERNATIONAL ECONOMICS</p>	<p>The second part of this paper develops a systematic exposition of models that try to explain the composition, direction, and consequences of international trade, and the determinants and effects of trade policy. It then builds on the models of open economy macroeconomics developed in courses 08 and 12, focusing on national policies as well as international monetary systems. It concludes with an analytical account of the causes and consequences of the rapid expansion of international financial flows in recent years.</p>
<p>Paper: M 605 HISTORY OF ECONOMIC THOUGHT II</p>	<p>This course is the second part of the History of Economic thought where the remaining part of the development of the discipline is deliberated. In this course some of the famous schools such as marginalist school, Austrian school and neo- classical economics are considered. Moreover, an outline of the Keynesian economics and views of some of Indian economic thought are also discussed.</p>
<p>Paper: M 606 PLANNING FOR DEVELOPMENT: INDIA AND THE NORTHEAST</p>	<p>This course discussed about development of planning in India. The course gives an idea about india's position in global economy and India's contribution to FDI outflos and inflows. The last unit give emphasis on the economy of North East India which tries to give an overall idea about the North East economy.</p>

SYLLABUS 1ST

SEMESTER

ER-101 : CONCEPTS IN ECOLOGY, BIODIVERSITY AND ECO-

RESTORATION ER-102 : POPULATION ECOLOGY

ER-103 : BIO-STATISTICS AND COMPUTER

APPLICATION ER-104 : PEDOLOGY

ER-105: PRACTICALS BASED ON ER-101 TO ER-104

The basic outcome of the 1st semester syllabus is that the student will learn the basics of ecology, biodiversity, bio statistics, computer application as well as soil science in depth with the relevant practical's and field studies. some of the statistical software are also there like SPSS.

2ND SEMESTER

ER-201:TRADITIONAL SOCIETIES AND THEIR ISSUES

ER-202:ENVIRONMENTAL PLANNING AND

IMPACT ASSESSMENT ER-203:REMOTE

SENSING ,GIS AND GPS

ER-204:RESTORATION ECOLOGY AND ETHICS

ER-205:PRACTICAL BASED ON ER-201 TO ER-204

The basic outcome of the 2nd semester syllabus is that the students will learn :

a) concept of traditional societies, types of traditional societies in north-east in India and their lifestyle with some traditional agricultural practices.

b) concepts and stages of Environmental Impact Assessment in India with various laws and policies related with Environment protection, pollution, wildlife, Biodiversity etc.

c)Basic concepts of Remote Sensing, Geographical Information System and global positioning system with their application in the various fields of Environment and ecological issues of protection and conservation.

d)Basics of Restoration Ecology theory and principals with their steps for different types of ecosystems and some theories on Environmental ethics with their applications.

e)Practical's based on traditional societies of north east India, EIA drafts, study of degraded ecosystem and its parameters, GIS and GPS applications.

3RD SEMESTER

ER-301: AGRO-ECOSYSTEM AND MANAGEMENT

ER-302: FOREST-LANDSCAPE AND MANAGEMENT

ER-303: WATERSHED AND SOCIO-ECOLOGICAL MANAGEMENT

ER-304: ECOLOGICAL ECONOMICS AND SUSTAINABLE

DEVELOPMENT ER-305: PRACTICALS BASED ON ER-301

TO ER-304

The basic outcome of the 3rd semester syllabus is that the students will learn

the:

- a) Concepts of agro ecosystem and their management in North-East India
- b) concepts of Forest and Landscape management and various ecological parameters associated with it.
- c) concepts of watershed management and its conservation parameters as well as soil and water conservation practices.
- d) Basic concepts of Ecological Economics and sustainable development.
- e) Practicals based on agro-ecosystem, forest and its parameters study, watershed management designing etc.

4TH SEMESTER

ER- 401: ADVANCES IN ECO-RESTORATION

ER-402: OPTIONAL PAPER 1

ER-403: OPTIONAL PAPER 2

ER-404: DISSERTATION WORK

ER-405: FIELD VISIT TO DEGRADED ECOSYSTEM

OPTION PAPER- ANY ONE TO BE TAKEN FROM a) TO d) AND HAVE TWO PAPERS

- a) WETLAND RESTORATION
- b) MINELAND RESTORATION
- c) GRASSLAND MANAGEMENT
- d) WILDLIFE HABITAT RESTORATION

The basic outcome of the 4th semester syllabus is that the students will learn the concepts of:

- a) some advancement in the field of ecological restoration with its application in the various field of ecological study

b) Different types of ecosystems and their restoration practices which includes:

- Wetland habitats and their restoration steps.
- Mining land and their restoration steps.
- Grassland ecosystem and their restoration steps.
- Wildlife habitats and their restoration designing with steps.

DEPARTMENT OF EDUCATION

(CBCS)

SEMESTER I

ED- HC-1016: PRINCIPLES OF EDUCATION

Course Outcome:

- To acquaint the students with the sound principles of education.
- To acquaint the students with the important concepts of Education, Curriculum, Democracy, Discipline and Freedom.
- To develop knowledge about different aims of Education, various types of curriculum, correlation of studies and Forms of discipline.

ED-HC-1026: PSYCHOLOGICAL FOUNDATIONS OF EDUCATION

Course Outcome:

- To make the students understand the relationship between education and psychology.
- To explain the need of educational psychology in teaching learning process.
- To describe the nature and theories of learning and role of motivation in learning.
- To understand the concept of memory, forgetting, attention and interest.

ED-HG/RC-1016: FOUNDATIONS OF EDUCATION

Course Outcome:

- To acquaint with the principles of education.
- To gain knowledge about different various Forms and Aims of Education.
- To understand the concept and importance of Discipline and Freedom.
- To acquire knowledge about the concept of emotional and national integration and international understanding.

SEMESTER II

ED- HC -2016: PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATION OF EDUCATION

Course Outcomes:

- To know the concept of philosophy and its relationship with education.
- To understand the educational implications of different Indian schools of philosophy.
- To understand the educational implications of different Western schools of philosophy.
- To know the concept of sociology and its relationship with education.
- To develop understanding about the concept of educational sociology, social groups and socialization.

ED- HC- 2026: DEVELOPMENT OF EDUCATION IN INDIA-I

Course outcome:

- To recount the concept of Ancient Indian education system
- To describe the education system in Ancient India, particularly Vedic Education
- To examine the education system in Medieval India.
- To analyse the education system during British Period

ED- HG/RC- 2016: PSYCHOLOGY OF ADOLESCENTS

Course outcome:

- To enable the students to understand the period of adolescence
- To enable the students to understand the significance of the adolescence period in human life
- To enable the students to know about various problems associated with this stage
- To enable the students to understand the development aspects of adolescence, importance of adolescence period and problems associated with this stage.

SEMESTER III

EDU- HC- 3016: DEVELOPMENT OF EDUCATION IN INDIA-II

Course Outcome:

- To understand the Educational situation during the time of Independence
- To explain the recommendations and educational importance of different Education Commission and Committees in post Independent India
- To analyse the National Policy on Education in different tomes
- To accustom with the recent Educational Development in India

EDU- HC- 3026: EDUCATIONAL TECHNOLOGY AND TEACHING METHODS

Course Outcome:

- To make the students understand the objective of educational technology in teaching learning process
- To acquaint the students with innovations in the field of education through technology
- To make the students understand about various methods and devices of teaching

- To acquaint students with levels, effectiveness of teaching and classroom management
- To make the students understand the strategies of effective teaching as a profession.

EDU-HC-3036: VALUE AND PEACE EDUCATION

Course outcome:

- To understand the concept and meaning of value.
- To become aware about the role of educational institutions in building a value based society.
- To understand the meaning and concept of peace and its importance in human life.
- To understand the meaning and importance of peace education and its relevance at national and international level.
- To identify the different issues/ challenges in imparting peace education.
- To identify the strategies and skills in promoting peace education at institutional level.

EDU-HG/RC-3016: GUIDANCE AND COUNSELLING

Course outcome:

- To help the students to understand the concept, need and importance of Guidance and Counselling
- To enable the students to know the different types and approaches to Guidance and Counselling
- To acquaint the students with the organization of guidance service and school guidance clinic
- To enable the learners to understand the challenges faced by the teacher as guidance

SKILL ENHANCEMENT COURSE

EDU-SEC- 3014: PUBLIC SPEAKING SKILL

Course outcome:

- After completing this course, students will be able to acquire the capacities of public speaking skill.
- To understand the concept and Nature of Personality

SEMESTER IV

ED- HC -4016: GREAT EDUCATIONAL THINKERS

Course Outcomes:

- To enable the students to learn the Philosophy of life of different Educational Thinkers and their works.
- To enable the students to learn about the views of thinkers in educational context.
- To enable the students to learn about relevance of some of their thoughts at present day context.

EDU- HC- 4026: EDUCATIONAL STATISTICS AND PRACTICAL

Course Outcomes:

- To develop the basic concept of Statistics,
- To be acquainted with different statistical procedures used in Education.
- To develop the ability to represent educational data through graphs.
- To familiarize the students about the Normal Probability Curve and its applications in Education.

EDU-HC-4036: EMERGING ISSUES IN EDUCATION

Course Outcomes:

- To make the students acquaint with major emerging issues national, state, and local
- To acquaint the students with the various issues in education that are emerging in the recent years in the higher education system
- To address the various problems and challenges of education in India at all levels.

EDU-HG/RC-4016: HISTORY OF EDUCATION IN INDIA

Course Outcomes:

- To analyse the education system during British Period
- To understand the Educational situation during the time of Independence
- To explain the recommendations and educational importance of different Education Commission and Committees in post Independent India
- To analyse the National Policy on Education in different tomes
- To accustom with the recent Educational Development in India

SKILL ENHANCEMENT:

EDU-SE-4014: WRITING BIODATA AND FACING AN INTERVIEW

Course Outcomes:

- After completing this course, students will be able to write a bio-data scientifically and will develop confidence to face different types of interviews.

SEMESTER V

EDU-HC-5016: MEASUREMENT AND EVALUATION IN EDUCATION & PRACTICAL

Course Outcome:

- To enable the students to understand the concept of measurement and evaluation in education.
- To acquaint the students with the general procedure of test construction and characteristics of a good test.
- To develop an understanding of different types of educational tests and their uses.
- To acquaint the students about personality test, and aptitude tests.

EDU-HC-5026: GUIDANCE AND COUNSELLING

Course Outcome:

- To help the students to understand the concept, need and importance of Guidance and Counselling
- To enable the students to know the different types and approaches to Guidance and Counselling
- To acquaint the students with the organization of guidance service and school guidance clinic
- To enable the learners to understand the challenges faced by the teacher as guidance worker.

DISCIPLINE SPECIFIC ELECTIVE

EDU-DSE-5016: CONTINUING EDUCATION

Course Outcome:

- To know the concept, objectives, scope and significance of continuing education in the context of present scenario.
- To understand about different aspects and agencies of continuing education.
- To realize different methods and techniques as well as issues of continuing education.

- To know the meaning of open education and realise the importance of open school and open universities in continuing education.

EDU-DSE-5026: DEVELOPMENTAL PSYCHOLOGY

Course Outcome:

- To enable the students to understand the basic concepts relating to development
- To acquaint the students about heredity and environmental factors affecting pre-natal development
- To enable the students to understand the development aspects during infancy and childhood
- To enable the students to understand the development aspects of adolescence, importance of adolescence period and problems associated with this stage.

EDU-DSE-5036: HUMAN RIGHTS EDUCATION

Course Outcome:

- To explain the basic concept, nature and scope of human rights
- To describe the meaning, nature, principles, curriculum and teaching methods of human rights education at different levels of Education.
- To know the role of United Nations on human rights
- To understand enforcement mechanism in India
- To know the role of advocacy groups

EDU-DSE-5046: TEACHER EDUCATION IN INDIA

Course Outcome:

- To explain the Concept, Scope, Aims & Objectives and Significance of teacher education
- To acquaint with the development of Teacher Education in India
- To acquaint with the different organising bodies of teacher education in India and their functions in preparation of teachers for different levels of education
- To acquaint with the innovative trends and recent issues in teacher education, and be

EDU-RG-5016: DISTANCE EDUCATION

Course Outcome:

- To enable the students to understand the concept of distance education and its growth in India and Assam
- To acquaint the students with the growing need and importance of distance education.
- To acquaint the students with the different forms and methodologies applied in distance

education

- To enable the students to understand different programmes of distance education
- To acquaint the students with different instructional strategies of distance education

EDU-SE-5014: EXTENSION ACTIVITIES

Course Outcome:

- After completing this course, students will be able to do extension activities.

SEMESTER VI

EDU-HC-6016: EDUCATION AND DEVELOPMENT

Course Outcome:

- To understand relation between education and development
- To know the educational development in the post globalization era
- To understand the role of education in community development
- To understand the education for human resource development
- to make aware about economic and political view through education

ED- HC -6026: PROJECT

Course Outcome:

- To explain the process of conducting a Project.
- To understand the student how to prepare a Project Report.

DISCIPLINE SPECIFIC ELECTIVE

EDU-DSC-6016: MENTAL HEALTH AND HYGIENE

Course Outcome:

- Acquaint with the fundamentals and development of mental health and the characteristics of a mentally healthy person.
- Understand the concept and importance of mental hygiene and its relationship with mental health.
- Acquire knowledge about the principles, factors promoting mental health and the role of home, school, and society in maintaining proper mental health.
- Learn the meaning and problem of adjustment and also the different adjustment mechanisms.

EDU-DSC-6026: SPECIAL EDUCATION

Course Outcome:

- Understand the meaning and importance of special education
- Acquaint with the different policies and legislations of special education
- Familiarize the students with the different types of special children with their characteristics

- Enable the students to know about different issues, educational provisions and

support services of special education

EDU-DSC-6036: EDUCATIONAL MANAGEMENT

Course Outcome:

- Develop an understanding of the basic concept of educational management.
- Enable the students to know about the various resources in education
- Enable the students to understand the concept and importance of educational planning.
- Enable the students to know about the financial resources and financial management in education.

EDU-DSE-6046: WOMEN AND SOCIETY

Course Outcome:

- Know the changing role of women in India
- Understand gender discrimination in Indian society
- Make the students understand the constitutional provisions for women and their rights.
- Make the students understand women empowerment
- Develop an awareness and sensitivity towards women

EDU-RG-6016: MENTAL HEALTH AND HYGIENE

Course Outcome:

- Acquaint with the fundamentals and development of mental health and the characteristics of a mentally healthy person.
- Understand the concept and importance of mental hygiene and its relationship with mental health.
- Acquire knowledge about the principles, factors promoting mental health and the role of home, school, and society in maintaining proper mental health.
- Learn the meaning and problem of adjustment and also the different adjustment mechanisms.

SKILL ENHANCEMENT:

EDU-SE-6014: DEVELOPING TEACHING SKILL

Course Outcome:

- After completing this course, students will be able to develop understanding about different teaching skills which are used in classroom transaction.

First Semester
(Major)
Foundation of Educational
Theories and Principles
Paper: M 1.01 (Credits-8)

Course Outcome:

- To be acquainted with 'scientific' and sound principles of education.
- To understand the concept, nature and scope of education
- To gain knowledge about different aims of education.
- To be familiarized with different dimensions of education such as the learner, the teacher and the curriculum.
- To acquire knowledge about the concept of discipline and freedom.

Educational Psychology
Paper: M.1.02 (Credits-8)

Course Outcome:

- To enable the students to understand the relation between education and psychology and different methods of educational psychology.
- To enable the students to understand learning, process, memory, attention, instinct and emotion.
- To acquaint the students with the concept of personality, type and trait theories.
- To understand the concept of intelligence - nature and different theories.
- To understand the nature of creative talent and processes and of creative individuals and the implication for indentifying and nurturing such talent.

(General Course)

Foundation of Educational
Theories and Principles
Paper: 1.01 (Credits-6)

Course Outcome:

- To be acquainted with scientific and sound principles and theories of education.
- To understand the concept, nature and scope of education.
- To gain knowledge about different aims of education.
- To be familiarized with different dimensions of Education such as the learner, the teacher and the curriculum.
- To acquire knowledge about the concept of discipline and freedom.

Second Semester
(MAJOR)
Development of Education in India
Paper: 2.01 (Credits-8)

Course Outcome:

- To acquaint the students with the ancient and medieval system of education in India.
- To help the students to understand the development of education in India during the British Period.
- To acquaint the students with the development of education in India during post independence period.
- To enable the students to understand the development of education in Assam.
-

Sociological Foundations of Education

Paper: 2.02 (Credits-6)

Course Outcome:

- To acquaint the students with education as a social process.
- To inculcate the knowledge of Education from the social perspective.
- To understand education as a determinant of social change and development.
- To develop social habits and attitudes in the students and to make them socially adjustable.

(General Course)

Educational Psychology

Paper: 2.01 (Credits-6)

Course Outcome:

- To enable the students to understand the relation between education and psychology and different methods of educational psychology.
- To enable the students to understand learning process, memory, attention, instinct and emotion.
- To acquaint the students with the concept of personality, type and trait theories.
- To understand the concept of intelligence - nature and different theories.

Third Semester

(MAJOR)

Emerging Issues and Education

Paper-(M) 3.01 (Credits-8)

Course Outcome:

- To develop awareness and understanding about different literacy programmes, women empowerment, Human rights, globalization, vocationalization of secondary education.
- To develop in students basic understanding regarding students' indiscipline –its causes and remedies.
- To acquaint the students about the need and importance of national integration and international understanding and the role of education in promoting them.
- To acquaint the students with meaning, importance and means of life skill education.
- To develop understanding about concept, importance, methods and programmes of Peace Education.

Measurement and Evaluation in Education

Paper: 3.02 (Credits-8)

Course Outcome:

- To help the students to acquire knowledge of the concept of measurement and evaluation in education.
- To develop an understanding of different types of educational tests and their uses.
- To acquaint the students with the characteristics of a good measuring instrument and the procedure of constructing educational and psychological tests.
- To acquaint the students about intelligence test, personality test, aptitude, interest and attitude test, and educational achievement test.

(General Course)

Development of Education in India

Paper: 3.01 (Credits-8)

Course Outcome:

- To acquaint the students with the ancient and medieval system of education in India.
- To help the students to understand the development of education in India during the British Period.
- To acquaint the students with the development of education in India during post-independence period.
- To acquaint the students with the development of education in Assam.

Fourth Semester

(MAJOR)

Educational Technology

Paper: 4.01 (Credits-8)

Course Outcome:

- To enable the students to understand the concept and scope and objectives of Educational Technology.
- To acquaint the students about teaching technology, behavioural technology and instructional technology.
- To make the students understand about communication, process, and teaching aids system approach and use of computer and internet in educational technology.
- To acquaint the students with innovations in Education through Educational Technology –Team Teaching, E-Learning and E-Library

Environmental Education and Population Education

Paper: M.4.02 (Credits-8)

Course Outcome:

- To enable the students to understand the concept, scope and importance of environmental education.
- To enable the students to understand the programmes of environmental education at different levels of education.
- To make the students aware of environmental stressors and knowledge on disaster management education.

(General Course)
Sociological Foundations of Education
Paper: 4.01 (Credits-8)

Course Outcome:

- To acquaint the students with education as a social process.
- To inculcate the knowledge of Education from the social perspective.
- To understand education as a determinant of social change and development.
- To develop social habits and attitudes in the students and to make them socially adjustable.

Fifth Semester
(MAJOR)
Philosophy of Education
Paper: M.5.01 (Credits-6)

Course Outcome:

- To make students understand how philosophical ideas have influenced educational ideas.
- To acquaint with the relationship between philosophy and education.
- To acquire knowledge about the three major philosophies of education — Idealism, Naturalism and Pragmatism.
- To familiarise with the Indian schools of philosophical thought — Vedic, Buddhist and Islamic thought.

Educational Thinkers - Oriental and Occidental
Paper: 5.02 (Credits-6)

Course Outcome:

- To enable the students to understand the philosophy of life of different educational thinkers and their contribution to present day educational thought.
- To enable the students to learn about the views of the Western and Indian thinkers on aim, curriculum, method of teaching, discipline and role of teacher.

Teacher Education
Paper: 5.03 (Credits-6)

Course Outcome:

- To acquaint the learner with the concept, aims, scope and development of teacher education in India.
- To develop understanding about the different policies and practices and quality assurance in Teacher education along with the needs and importance of in-service training programmes.
- To acquaint the learner with skilled based and competency based teacher education.
- To develop understanding about professional ethics and accountability of teacher.
- To acquainted the learner with different organizations involved in teacher education.

Teaching – Learning Method and Pedagogy
Paper: 5.04 (Credits-6)

Course Outcome:

- To acquaint the students with the teaching learning process, the principles, maxims fundamental or teaching.

- To develop an understanding of the various methods and devices of teaching.
- To acquaint students with levels, strategies and models of teaching.
- To understand about teaching effectiveness and classroom management.
- To develop a positive attitude towards the teaching profession.

Statistics in Education

Paper: 5.05 (Credits-6)

Course Outcome:

- To enable the students to understand the basic concept of statistics.
- To acquaint the students with different statistical procedures used in Education.
- To give detailed knowledge about Descriptive Statistics
- To familiarize the students about the Normal Probability Curve and its applications in Education.

Practical paper

Paper: 5.06 (Credits-6)

Course Outcome:

- To enable the students to understand the concept of experimental psychology.
- To understand the methods of conducting various psychological experiments and tests.
- To develop scientific attitude amongst students.

(General Course)

Emerging Issues and Education

Paper: 5.01 (Credits-8)

Course Outcome:

- To acquaint the learner with the emerging issues in education.
- To develop awareness and understanding about different literacy programmes, women empowerment, Human rights, globalization, vocationalization of secondary education.
- To develop in students basic understanding regarding students indiscipline –its causes and remedies.
- To acquaint the students about the need and importance of national integration and International understanding and the role of education in promoting them.

Educational Measurement and Educational Statistics

Paper: 5.02 (Credits-8)

Course Outcome:

- To help the students to acquire knowledge of the concept of measurement and evaluation in education.
- To develop an understanding of different types of educational tests and their uses.
- To acquaint the students with the characteristics of a good measuring instrument and the procedure of constructing educational and psychological tests.
- To help the students to be acquainted with the concept and application of statistics in Education.

(MAJOR)

Developmental Psychology

Paper: 6.01 (Credits-6)

Course Outcome:

- To enable the students to understand the basic concepts relating to development.
- To acquaint the students about heredity and environmental factors affecting pre-natal development
- To enable the students to understand the development aspects during infancy and childhood.
- To enable the students to understand the development aspects of adolescence, importance of adolescence period and problems associated with this stage.

Continuing Education and Distance Education

Paper: 6.02 (Credits-6)

Course Outcome:

- To enable the students to understand the concept of continuing education and its relevance to the changing society.
- To acquaint the students with methods and techniques of continuing education.
- To make the students understand the development of Adult Education in India, Kinds of Adult Education Programme in India and the major problems conforming adult education.
- To enable the students to understand the meaning, characteristics, merits and demerits of distance education and its growth in India.
- 5) To acquaint the students with the different forms of instructional strategies in distance education.

Special Education

Paper: 6.03 (Credits-6)

Course Outcome:

- To help the students to understand the meaning and importance of special education.
- To acquaint the students with the different government policies and legislations regarding persons with disabilities
- To familiarise the students with the different types of special children with their behavioural characteristics.
- To enable the students to know about the different issues, education provisions and support services of special children.

Guidance and Counselling

Paper: 6.04 (Credits-6)

Course Outcome:

- To enable the students to understand the concept, nature, scope, need and importance of guidance.
- To enable the students to understand the meaning, purpose and functions of different types of guidance.
- To enable the students to understand about the different types of guidance programmes and their organization.

- To enable the students to understand the meaning, nature, objectives, need and importance, types, steps, and techniques to counselling.

Educational Management and Administration

Paper: 6.05 (Credits-6)

Course Outcome:

- To enable the students to understand the basic concepts of management, organization and administration
- To provide knowledge on Types, Principles and Functions of Educational Management
- To infuse knowledge on educational supervision, institutional planning and educational administrative structure of India in general and Assam in particular.

Project Work

Paper: 6.06 (Credits-6)

Course Outcome:

- To understand the students how to prepare project work.
- To provide knowledge about the various steps and procedure of project work.

(General Course)

Educational Technology

Paper: 6.01 (Credits-8)

Course Outcome:

- To enable the students to understand the concept and scope and objectives of Educational Technology.
- To acquaint the students about teaching technology, behavioural technology and instructional technology.
- To make the students understand about communication process, teaching aids, system approach and use of computer and internet in educational technology.

Environmental and Population Education

Paper: 6.02 (Credits-8)

Course Outcome:

- To enable the students to understand the concept scope and importance of environmental education.
- To enable the students to understand the programmes of environmental education at different levels of education.
- To make the students aware of environmental stressors and disaster management education.

**Department of English
(CBCS)**

Paper 1: ENG-HC-1016 Indian Classical Literature

1. This paper introduces students to a selection of literature of India in English
2. This paper encourages students to think laterally about literature of the world and the possibility of cultural exchange

Paper 2: ENG-HC-1026 European Classical Literature

1. This paper seeks to enlighten the students about the rich European classical literature
2. It seeks to familiarise students about the European classical literature to the study of representative texts belonging to the classical period

Ability Enhancement Course (For Honours and Regular) (Compulsory for both Arts and Science)

Paper 1: English/MIL Communication (ENG-AE-1014: English Communication)

The Paper aims to train the students in the four language skills of Listening, Speaking, Reading and Writing. It also acquaints the students with the process of analyzing a text and also develops grammatical competence and creative writing skills.

REGULAR

Compulsory Core: ENG-CC-1016 English I

The aim of this course is to provide the student an opportunity to read and respond to representations of issues in contemporary life and culture in the English language. The selection of texts is aimed to present themes and topics that are stimulating, insightful and informative.

SEMESTER II

HONOURS

Paper 3: ENG-HC-2016 Indian Writing in English

This paper on Indian Writing in English introduces students to the historical development of this body of writing- the challenges faced by early writers, the growing sense of accomplishment in the writing of different forms and the interpretation of individual and collective experience in colonial and postcolonial India.

Paper 4: ENG-HC-2026 British Poetry and Drama: 14th to 17th Centuries

This paper aims to familiarize the students with the two major forms in British literature from the 14th to the 17th centuries – poetry and drama, apart from acquainting them with the contexts that generated such literatures.

REGULAR

Paper: Compulsory Core: ENG-CC-2016 English II

The aim of this course is to provide the student an opportunity to read and respond to representations of issues in contemporary life and culture in the English language. The selection of texts is aimed to present themes and topics that are stimulating, insightful and informative.

HONOURS

Paper 5: ENG-HC-3016 History of English Literature and Forms

This paper introduces students to the History of English Literature and the major literary forms. It adopts a chronological approach to the study of poetry, drama, fiction and non-fictional prose, showing the development of each form as it moves through the various periods of English literature and its expansion into global English writing.

Paper 6: ENG-HC-3026 American Literature

This paper seeks to acquaint the students with the main currents of American literature in its social and cultural contexts. The texts incorporated in the paper are a historical reflection of the growth of American society and of the way the literary imagination has grappled with such growth and change.

Paper 7: ENG-HC-3036 British Poetry and Drama: 17th and 18th Centuries

This paper aims to familiarize the students with British literature in the 17th and 18th centuries, a time-period which sees the emergence and establishment of greatly diverse kinds of writings. The selected texts may encourage the students to look at the economic, political and social changes in (primarily) Britain during this period, such as the shifts from the Puritan Age to the Restoration and Neoclassical periods.

Skill Enhancement Course (For Honours and Regular) Paper 1:

ENG-SE-3014 CREATIVE WRITING

The students in this course will focus on three creative genres, fiction, non-fiction and poetry. The emphasis will be to build proficiency in readings and writings. The course encourages active class participation and lots of writings and hence will develop creative writing skills of the students.

REGULAR

Compulsory Core: ALT-CC-3016 Alternative English I

This paper would seek to acquaint students with the major genres of English literature through texts which are landmarks of each genre. The texts have been carefully chosen to effectively represent the distinctive qualities of a particular genre. Moreover, students are encouraged to read the prescribed texts in their social and cultural contexts.

SEMESTER IV

Paper 8: ENG-HC-4016 British Literature: The 18th Century

This paper aims to familiarize the students with British literature in the 18th century. A very interesting age in which reason and rationality dominated, this age saw the publication of some of the best novels and works of non-fictional prose and poetry in the English language. Though it was not predominantly an age of drama yet one cannot but pay attention to the few plays of the century. The texts in the course are representative of the age and to some extent representative of the forms as well. The selected texts hope to give the students an overview of the age and the writings that the age produced

Paper 9: ENG-HC-4026 British Romantic Literature

The nineteenth century begins with the triumph of the Romantic imagination, expressing itself most memorably in the poetry of Blake, Burns, Wordsworth, Coleridge, Shelley, and Keats. The poetry of the age fashions itself partly in revolt to the spirit of the previous age, with very different ideas about the relationship between humans and nature and the role of the poet taking hold. This paper includes selections from works of major Romantic poets which address these issues, enabling students to appreciate the essence of the Romantic vision.

Paper 10: ENG-HC-4036 British Literature: The 19th Century

The middle and later parts of the 19th century sees the novel coming into its own, although Jane Austen has already established the prestige of the novel form through her incisive explorations of the complexity of human motive and conduct, especially in their worldly affairs. This paper will expose the students to the ground-breaking efforts of the poets as well to the works of fiction writers who manage to consolidate and refine upon the achievements of the novelists of the previous era. Austen to Rossetti represents a remarkable literary development and range of works, addressing a very diverse array of social preoccupations.

Skill Enhancement Course (For Honours and Regular) Paper 2:

ENG-SE-4014 Translation: Principles and Practice

This course is designed to give students basic skills in translation. It introduces students to the field of translation studies and gives them training in practical translation.

REGULAR

Compulsory Core: ALT-CC-4016 Alternative English II

The course has been designed to familiarise students with different forms of literature, texts and their contexts. The select texts would enable them to understand literary representations and a writer's engagement with the social, cultural and political milieu.

SEMESTER V

Paper 11: ENG-HC-5016 British Literature: The 20th Century

While literary modernity can trace its roots to the works of some European writers of the 19th century, in England, it is in the 20th century that the era of Modernism finds its voice in arts and literature. The works of the writers chosen for this paper are good introductions to the spirit of modernism, with its urgent desire to break with the codes and conventions of the past, experiment with new forms and idioms, and its cosmopolitan willingness to open itself up to influences coming from other shores. The paper goes beyond the High Modern period of the early century and the students will also get acquainted with the ethos of postmodernism through a reading of recent poetic and fictional works.

Paper 12: ENG-HC-5026 Women's Writing

This paper seeks to direct the students' attention to nineteenth and twentieth century writings by women living in different geographical and socio cultural settings. Students will get acquainted with the situationally distinct experiences of women articulated in a variety of genres-poetry, novels, short stories, and autobiography, while the selections from Mary Wollstonecraft-the only 18th century text prescribed, will acquaint students with the ideas contained in one of the earliest feminist treatises of the western world. Apart from an examination of the themes and styles in the prescribed texts, students will be required to engage themselves with the specificities of the contexts from which the texts emerged and also analyze the women writers' handling of the different genres to articulate their women-centric experiences.

Discipline Centric Elective (Any Two) Paper 1:

ENG-HE-5016 Popular Literature

Over the years popular literature has moved from the margins to earn for itself a fairly important place in the literary and critical consciousness. This paper seeks to highlight the nature of 'popular' literature as a genre and the critical ideas underpinning the theorization of popular literature. This will be done through a practical engagement with various texts falling under its ambit.

Paper 4: ENG-HE-5046 Nineteenth Century European Realism

The insistence on literary representation whose objective was to 'mirror' reality gained ground in nineteenth-century Europe across the different cultural spaces of the Continent. That is why varieties

of realism surfaced in the literary traditions which were as culturally divergent as Russia and Spain. This paper aims to provide an interesting sampling of the traditions that contributed to the growth and consolidation of European Realism in the nineteenth century. Study of these texts will also facilitate the understanding of the gradual movement towards modernism in the twentieth century which was, in many ways, both a response and a reaction to the major tendencies of European Realism.

SEMESTER VI

Paper 13: ENG-HC-6016 Modern European Drama

1. This paper aims at introducing students to the innovative dramatic works of playwrights from different locations in Europe.
2. The text prescribed here allows an understanding of the emergence of avant-garde movements and trends during the period of modernism

Paper 14: ENG-HC-6026 Postcolonial Literatures

1. This paper gives the students an opportunity to acquaint themselves with post-colonial literature across the world
2. The text prescribed holds a mirror to the reasonable, cultural differences as well as common situations of post-colonial conditions

Discipline Centric Elective (Any Two) Paper 7: ENG-HE-

6016 Literature and Cinema

1. This paper acquaints students and highlights the similarity of literature and cinema
2. It acquaints students with the achievements of Hollywood and Bollywood and their impact on society

Paper 9: ENG-HE-6036 Partition Literature

1. This paper acquaints student's with the poignancy of Partition literature of the Indian subcontinent
2. This paper is a pointer to colonialism, nationalism and associated homelessness and exile of the people of India and Pakistan

Department of English (Non-CBCS)

PROGRAMME OUTCOME

Student outcomes describe what students are expected to know and be able to do by the time of graduation. The English Department's Bachelor of Arts program must enable students to attain, by the time of graduation:

The BA English programme is designed to prepare students to understand and use the English language effectively, build vocabulary and introduce them to current ideas and issues as represented in some of the best examples of English writing. The idea is to offer students more matter more choices, and with the adoption of this philosophy. Attention has been paid to emerging 'voices', that is, voices originating in locations other than the West. Indian writing continues to receive the emphasis and importance it deserves, and this programme may see the consolidation of a vision predicted on promoting Indian culture- obviously through its literary manifestations. This is the case in all genres of writing: novel, drama, poetry and non-

fictional prose. The BA Programme is a preparatory step to higher studies in English and related disciplines, and therefore the students are exposed to Theory, the kind that will help to open up their intellectual horizons and give them glimpses of the rigour that is now increasingly demanded in English studies which is moving away from de-contextualized studies of a few 'great' isolated text.

Course Specific Outcome

Semester-I

(Paper-1)

The Social and Literary Context: Medieval and Renaissance

This paper acquaints students with the context of the English literary tradition. Students are expected to read and relates the circumstances that influenced, shaped and contributed to the process of literary productions from the medieval period to the renaissance.

(Paper-2)

Medieval and Renaissance: Poetry and Plays

In this paper students will study poetry and drama that emerged against the literary and historical context studied.

Semester-II

(Paper-3)

The Social and Literary Context: Restoration to the Romantic Age

The objective of this paper is to acquaint students with the context of the English literary. Tradition from the restoration of Charles- II and the reopening of the Theatres in 1660 to the age of romanticism. Students are expected to understand the circumstances the influenced, shaped and contributed to the process of literary production and topics identified in this paper are necessary and useful markers.

(Paper-4)

English Poetry, Drama and Fiction: Restoration to Romanticism

In this paper students will have the opportunity to study the literary text that reflects the socio-cultural and political interests. It also examines the ways in which takes part in and are produced by argent issues a time.

Semester-III

(Paper-5)

The Social and Literary Context: The Victorian World

This paper seeks to acquaint students with the context of the English literary tradition as it develops in the Victorian age. Students are expected to study the social and literary history of the Victorian world.

(Paper-6)
Victorian Poetry and Fictions

Students will here encounter the poetry that is characteristic of the Victorian period- forms like the dramatic monologue, the love poem, Pre-Raphaelite experiments in the beginnings of the modern poetry experiences in Hopkins.

Semester-IV

(Paper-7)
The Social and Literary Context: Modernism and After

This paper will acquaint students with the circumstances that shaped the processes of literary productions from the 18th century to the present

(Paper-8)
English poetry and Fictions: Modernism and After

This paper brings to the student a selection of the poetry and fiction of the modern and post-modern eras that is representative of important trends, critical shifts and formal experimentations.

Semester-V

(Paper-9)
Modern Drama - I

This paper will introduce students to 18th century English and European drama.

(Paper-10)
Modern Drama -II

The epoch of modern drama marks the proliferation of avant garde theory within the theater making it self-conscious, and experimental. The impact of contemporary philosophy, ideas and art movements like- existentialism, expressionism, impressionisms, Marxism and the Absurd reverberates in modern drama

(Paper-11)
The Essay in English: Addison to Dickens

This paper introduces students to the literary form of the essay through a selection of representative text from 18th and 19th century.

(Paper-12)
The Essay in English: The 28th Century

This paper introduces students to the developments in genre of the essay in the 28th century.

(Paper-13)
Life Writing: Biographic, Memoirs and Letters

This paper will enable to students to appreciate the elements of narrative in seemingly linear, transparent, straightforward account of significant people set down in memoirs, biographic and letters.

(Paper-14)
Women's Writing

This paper on writing by women introduces students to a body of literature that has emerges with growing feminist awareness of women's lives and their representations.

Semester-VI

(Paper-15)
Literary Criticism

This paper introduces students with some of the key ideas of western literary criticism from Graeco-Roman antiquity to the modern periods and expects them to examine the implications of ideas and orientations that have marked the history of literary criticism. The paper is designed to presents students with the opportunity to key concepts associated with the names of significance thinkers in this history

(Paper-16)
28th Century Criticism and Theory

This paper introduces students to key ideas and takes that will familiarize students with the intellectuals shifts the reading of culture, language and literature of 28th century and the emergences of theory and acquaint them with common concepts and notions that, they are likely to encountered in the reading of theory.

(Paper-17)
Nature

This paper seeks to explore the process through which language and literature are produced by the interconnections between both nature and culture; it addresses nature not just as a passive background in literary text but as a central present determining the dynamic interpretations of the text itself.

(Paper-18)

Western Mythology: Introducing Classical and Judeo- Christian Myth

This Course is an introduction to the study of classical and Judeo and Christian myth and their recurrence in later social, historical, cultural and literary context. It is expected to provide a gateway to the to the receptions of mythical of ideas and images in western art and cultures

(Paper-19)

Linguistics and Socio-Linguistics

This paper seeks to introduce students to linguistics as the scientific study of language and to familiarize them with its different branches as well as its key concepts. It will also acquaints students with the different levels of organizations

PG DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Study of environment and their management is a multidisciplinary field which systematically studies human interaction with the environment with the interests of solving complex environmental problems.

Students doing Post Graduation with M.Sc. in Environmental Management should be able to –

- Understand the basic environmental concept, properties, problems and their management.
- It helps us to identify the factors that may lead to environmental degradation and helps in future predictions that might affect the present and future generations.
- With the help of environmental management, students gain knowledge about how to maintain and improve environmental resources like air, soil, forest, water, fossil fuels etc.

The P.G. course program of environmental management comprises of two years degree course consisting four semesters.

M.Sc. - EM – 101 Basics of environment and its management

Program specific outcomes (PSOs)

PSO-1 The study of this paper strengthens students about environment and their scope in a broad scale.

PSO-2 In this unit the students will understand about environmental management.

PSO-3 The students will able to know the relationship between man and environment and population growth.

PSO-4 The students will able to learn about fundamentals of ecology.

PSO-5 In this unit the students will understand about different types of natural resources and their exploitation.

PSO-6 The course present and understand about different types of environmental risk and their hazards.

PSO-7 The students will able to learn about major environmental issues.

Course outcomes

CO-1 Meaning and scope of environment and different types of climatic zones of the world as well as India.

CO-2 Concept and scope of environmental management and its system approaches. CO-3 Relationship between human culture, livelihood and the environment.

CO-4 Meaning, types, structure and functional aspect of ecosystem.

- CO-5 Concept on natural resources and problems with over exploitation of resources. CO-6 Relationship between risk and hazards and their mitigation measures.
- CO-7 Some major environmental issues like green house gases, ozone layer depletion, acid rain etc.

M.Sc. - EM – 102 Environmental biology

Program Specific outcomes (PSOs)

- PSO-1 The study of this paper strengthens students' knowledge with respect to understanding the concept of Environmental Biology.
- PSO-2 The students will understand the community of ecosystem and their interactions. PSO-3 The students will able to learn the classification of plant and animal species.
- PSO-4 The students will learn about the environmental microbiology in contrast to soil and food microbiology.
- PSO-5 The students will understand the concept of airborne and aquatic microbes. PSO-6 The students will learn about the environmental Biotechnology and Biophysics.
- PSO-7 The students will able to learn about the Biochemistry in contrast to Nucleic Acids.

Course Outcomes

- CO-1 Describes various ecological habitats of flora and fauna.
- CO-2 Describes the ecological characteristics of different community in an ecosystem.
- CO-3 Describes the taxonomic classification of plants and animal species.
- CO-4 Describes mainly the role of microorganisms in the environment.
- CO-5 Describes the role and characters of airborne and aquatic microbes.
- CO-6 Describes about the genetic engineering and bio energetic.
- CO-7 Describes the role and importance of Nucleic acids.

M.Sc. - EM – 103 Environmental chemistry and pollution

Program specific outcomes (PSOs)

- PSO-1 This chapter deals with basic application of chemistry in environmental monitoring and abatement etc. Issues of different environmental problems are also a part of this chapter.
- PSO-2 This chapter focuses on kinetics of different reactions taking place in hydrosphere.

PSO-3 Concept of air pollutants and its hazards effects on flora and fauna is to be learning in this chapter.

PSO-4 Distinguishing of different water pollutant and their environmental significance is highlighted in this chapter.

PSO-5 Soil profile and its physico chemical qualities are major concern of this chapter.

PSO-6 This chapter deals with the non-material pollution, thermal pollution and radiation pollution.

PSO-7 This chapter explains how some daily usable chemicals are hampering to our surroundings.

Course Outcomes

CO-1 Describes general concept and scope of environmental chemistry.

CO-2 Describes simple reaction mechanisms and first, second and zero order reaction.

CO-3 Describes different types of air pollutants and their sources and their affect on environment.

CO-4 Describes different types of water pollutants, their sources and their effect on environment.

CO-5 Describes different types of soil properties, their pollution and their effect on the environment.

CO-6 Describes various types of pollution originated by non-material pollution such as noise pollution, thermal pollution and radiation pollution.

CO-7 Describes various types of cleaning agents and their chemical properties.

M.Sc.-EM –104 Environmental earth science and natural hazards management

Program specific outcomes (PSOs)

PSO-1 This paper deals with the fundamental knowledge on rocks, soil and minerals.

PSO-2 The students will able to understand about different types of earth processes and geo-dynamic processes.

PSO-3 The course present concept on general atmospheric processes.

PSO-4 The students will able to know different types of natural hazards and their mitigation measures.

PSO-5 This paper deals with the seismic hazards and their mitigation measures.

PSO-6 The students will able to know about flood hazards and man-made hazards.

PSO-7 This paper deals with slope instability, landslide hazards and cyclones and tsunamis.

Course Outcomes

CO-1 Classify rocks, soil and minerals on the basis of origin and their composition.

- CO-2 Describes different types of earth processes such as weathering of rocks, mass wasting etc and earth geo-dynamic process such as folds and faults.
- CO-3 Describes about general atmospheric processes, their sources, modification and classification. CO-4 Describes about different types of natural hazards and their risk and vulnerability.
- CO-5 Describes about earthquake and volcanic hazards and their zonations.
- CO-6 Describes about flood hazards and their assessment and man-made hazards such as occupational hazards and their mitigation measures.
- CO-7 This chapter deals with different types of mass movement and human activities on them.

M.Sc.-EM – 201: ENVIRONMENTAL SAMPLING AND DATA ANALYSIS

Program specific outcomes (PSOs)

PSO-1 This unit will give an overview of environmental systems and use of Statistics in solving environmental problems.

PSO-2 This unit will introduce students to the Basic probability rules and Fitting of probability distributions to environmental data.

PSO-3 This unit describes the Need and Purpose of sampling and different sampling techniques in environmental studies.

PSO-4 The unit helps students in understanding Bi-variate data and use of correlation and regression; and application of ANOVA to environmental data.

PSO-5 Hypotheses testing procedure and techniques has been introduced in this concept.

PSO-6 Bias, precision and accuracy and Analysis of trend in the environmental data has been introduced to the students.

PSO-7 This unit explains to the students the Time series analysis of environmental data.

Course Outcomes

- CO-1 Describes about general concept on environmental sampling and their analysis.
- CO-2 Describe probability rules and their distributions.
- CO-3 Describes different techniques of sampling systems.
- CO-4 Describes different methods of co relation, regression and ANOVA and their application in environmental data.
- CO-5 Describes different types of hypothesis testing.
- CO-6 Describes measurement of uncertainty to analyze errors of environmental data.

CO-7 Describes components of time series and their measurements.

M.Sc.-EM – 202 Analytical methods for environmental monitoring

Program specific outcomes (PSOs)

PSO-1 This paper deals with the different types of physico-chemical parameters of water and soil.

PSO-2 This paper deals with the sampling system and their preparation of air, water and soil.

PSO-3 This paper deals with the measurement and analysis of weather elements.

PSO-4 This paper deals with the theoretical information about instrumentations of metal ions.

PSO-5 This paper deals with the principle of separation techniques and their process of solvent extraction.

PSO-6 This paper deals with the principle, instrumentation and application of chromatography.

PSO-7 This paper deals with the general discussion about turbidity and nephelometry.

Course Outcomes

CO-1 Describes physico-chemical parameters such as pH, DO, BOD, etc and their measuring instruments.

CO-2 Describes different types of sampling systems and sampling equipment's and their preparation of air, water, and soil.

CO-3 Describes different types of weather elements, their measuring equipment's, data analysis and presentation.

CO-4 Describe theory, instrumentation of colorimetry and spectrophotometry.

CO-5 Describes different types of extraction reagents and practical application of separation techniques.

CO-6 Describes principles, instrumentation and application of colorimetry such as GC-MS.

CO-7 Describes principle and instrumentation of nephelometry and turbidity.

M.Sc. -EM – 203: MANAGEMENT PROCESS & ORGANIZATIONAL BEHAVIOUR

Program Specific outcomes (PSOs)

PSO-1 The course is designed to understand the basic meaning and nature of Management. PSO-2 The course deals with the management planning and organizing of an organization.

PSO-3 The students will be able to understand organizations' staffing, leading and controlling processes.

- PSO-4 The students will learn the fundamentals of an organizational behavior.
- PSO-5 The course deals with the dynamics of organizational behavior.
- PSO-6 The students will learn how an organizational system runs.
- PSO-7 The students will understand the organizational change and development.

Course Outcomes

- CO-1 Describes managerial characteristics and nature of management.
- CO-2 Describes planning and organizing processes for effective growth of an organization.
- CO-3 Describes the human resource management and the role of manager
- CO-4 Describes human relations and their interactions for effective organizing.
- CO-5 Describes leadership quality of manager and organizational conflicts.
- CO-6 Describes organizational structure and culture within an organization.
- CO-7 How an organization change and develop.

M.Sc.- EM – 204 Environmental law and management

Program specific outcomes (PSOs)

- PSO-1 This paper deals with the evolution and development of international environmental laws.
- PSO-2 This paper deals with the legal, administrative and constitutional provision for environmental protection in India.
- PSO-3 This paper deals with Evolution of environmental policy and their parameters.
- PSO-4 This chapter deals with environmental resources and concept and growth of the idea of sustainable development.
- PSO-5 This chapter deals with the management of the ecosystem.
- PSO-6 This paper deals with the study of industrial pollution and environmental management.
- PSO-7 This chapter deals with the methodology of pollution prevention and environmental quality management.

Course Outcomes

- CO-1 Describes different types of conventions to control the global environmental issues. CO-2 Describes various types of environmental laws to protect environment in India.
- CO-3 Describes about environmental policy and their role on public.

- CO-4 Describes general concept of sustainable development and their indicators.
- CO-5 Describes various types of management of ecosystem such as eco-tourism, heritage management etc.
- CO-6 Describes the management of pollution occurring from various industries.
- CO-7 Identify the pollution and their prevention methodology. Describes various types of standards regarding quality management.

M.Sc.- EM – 301: REMOTE SENSING AND GIS APPLICATION IN ENVIRONMENTAL MANAGEMENT

Program specific outcomes (PSOs)

- PSO-1 This unit will give foundation knowledge of Remote Sensing in Environmental Studies.
- PSO-2 This unit will introduce students to the principles of Thermal and Microwave Remote Sensing
- PSO-3 This unit describes the building blocks of Digital Image Processing in relation to GIS and Remote Sensing.
- PSO-4 The unit helps students in understanding principles and planning processes of Aerial Photography and Satellite Imageries.
- PSO-5 Fundamental concepts of Geographical Information System (GIS) has been introduced in this unit.
- PSO-6 Surveying techniques such as Leveling, Triangulation, Geodetic survey, Global Positioning System (GPS) etc. In relation to Environmental studies has been explained in this unit.
- PSO-7 This unit explains to the students the application of Remote Sensing and GIS in solving different environmental problems.

Course Outcomes

- CO-1 Describes general concept and physics of remote sensing.
- CO-2 Describes various radiation laws of thermal remote sensing and microwave remote sensing and different types of sensors used in remote sensing.
- CO-3 Describes principle and techniques of different digital images for rectification and restoration.
- CO-4 Describes the fundamentals of aerial photographs and their uses.
- CO-5 Describes the basic principles and terminology of geographical information system (GIS).
- CO-6 Describes various types of surveying methodologies and their applications.
- CO-7 Describes application of remote sensing and GIS in environmental management.

M.Sc.- EM – 302 Energy and environment

Program specific outcomes (PSOs)

- PSO-1 This paper deals with different forms of energy and their transformation.
- PSO-2 This paper deals with the energy gets from fossil fuels and nuclear plants.
- PSO-3 This chapter deals with the energies that form from the organic materials.
- PSO-4 The students will able to learn the harnessing of solar energy and their utilizations.
- PSO-5 The students will understand about the generation of hydroelectric power.
- PSO-6 This chapter deals with the geothermal and hydrothermal energy.
- PSO-7 Through this paper students will know about the energy conservation and economic from energy.

Course Outcomes

- CO-1 Describes different forms of energy and laws of thermodynamics.
- CO-2 Describe general concept of fossil fuel reserves and problem associated with the over exploitation.
- CO-3 Describe the composition of bio-mass and conversion processes of energy from the bio-mass.
- CO-4 Describes different types of solar collectors and concentrators.
- CO-5 Describes principles of generation of hydroelectric power and harnessing of tidal and wave energy.
- CO-6 Describes different types of energy gets from our earth crust and their harnessing system. CO-7 Describes conservation methods of energy and study of energy economics.

M.Sc.-EM – 303 Environmental modeling

Program Specific outcomes (PSOs)

- PSO-1 The course deals with the different kinds of environmental modeling and their concept.
- PSO-2 The students will learn different Air Quality Modeling.
- PSO-3 The students will understand the modeling of water quality.
- PSO-4 The course deals with the fundamentals of water quality modeling.
- PSO-5 The students will learn about different surface water modeling.
- PSO-6 The course deals with the elements of ground water modeling.
- PSO-7 The students will understand the impact of hazardous substance and their modeling.

Course Outcomes

- CO-1 Describe different model of environment and their concept and building procedures. CO-2 Describes different atmospheric models for pollution control.
- CO-3 Describes water resource management by water models.
- CO-4 What is CSTR? Mass Balance Approach? Steady unsteady system etc.
- CO-5 Describes characters of surface water bodies and models like DO, BOD.
- CO-6 About different elements of ground water modeling.
- CO-7 Impact of hazardous substance and their controlling via models.

M.Sc.- EM – 304 Basics of water supply and treatment

Program Specific outcomes (PSOs)

- PSO-1 This paper deals with the overview of water availability in India and their current status.
- PSO-2 The students will understand different types of schemes of water supply and their significance.
- PSO-3 The students will learn signification of aeration in water.
- PSO-4 This paper deals with the purpose and mechanism of coagulation and flocculation.
- PSO-5 This unit present and understand about sedimentation and filtration systems of water.
- PSO-6 This chapter deals with the different types of disinfection processes of water.
- PSO-7 The students will able to learn about tertiary treatment techniques of water.

Course Outcomes

- CO-1 Describes about water resources of India.
- CO-2 Describes planning and preparation of water supply projects.
- CO-3 Describes importance of aeration and aeration techniques.
- CO-4 Describes purposes and mechanisms of flocculation and coagulation and their design criteria.
- CO-5 Describes different types of sedimentation and filtration methods with special reference to sedimentation tanks.
- CO-6 Describes disinfection processes and factors effecting on disinfections.
- CO-7 Describes different types of tertiary treatment techniques such as adsorption, defluorination etc.

M.Sc.- EM – 401: ENVIRONMENTAL IMPACT ASSESSMENT & RISK ANALYSIS

Program Specific outcomes (PSOs)

PSO-1 This unit will give important concept and significance of Environment Impact Assessment in Environment protection.

PSO-2 This unit will introduce students to the different Impact Assessment Methodologies and management plans in EIA.

PSO-3 This unit describes the Risk assessment processes and its application to environmental management problems.

PSO-4 The unit helps students in understanding Air quality impact analysis methodologies and management principles

PSO-5 Fundamental concepts of Water Quality Impact Analysis and Water quality management has been introduced in this unit.

PSO-6 Principles of Noise Impact Analysis and Energy Impact Analysis has been explained in this unit.

PSO-7 This unit explains to the students the Vegetation and Wild Life Impact Analysis and Socioeconomic Impact Analysis in solving environmental problems.

Course outcomes

CO-1 Describe about environmental impact and their risk.

CO-2 Describes various framework and impact assessment methodology for environmental setting.

CO-3 Describes environmental risk analysis and fundamental ideas of hazards and risk.

CO-4 Describes quality of air and their impact analysis and mitigation measures.

CO-5 Describe water quality impacts analysis through quality modeling.

CO-6 Describe different types of analysis system to assessment noise and energy pollution.

CO-7 Describes assessment topics and mitigation measures some alternatives and assessment methodology for impact analysis of vegetation and wildlife as well as socio economic impacts.

M.Sc. -EM – 402 Air pollution management

Program Specific outcomes (PSOs)

PSO-1 The students will learn different atmospheric laws and air resource management system in a broad sense.

PSO-2 The student will understand different source of air pollution and their impacts.

PSO-3 The students will learn how meteorology plays role in air pollution.

PSO-4 The students will understand how pollutant disperses in the atmosphere.

PSO-5 The students will learn different guidelines of sampling and monitoring of air quality.

PSO-6 The students will understand different air pollution control techniques.

PSO-7 The course deals with vehicular pollution and indoor air pollution.

Course Outcomes

CO-1 Describes different laws regarding the air quality and concept of air resource management system.

CO-2 Describes different source of pollution and their impacts on man, animals and properties.

CO-3 Describes atmospheric thermodynamics and different meteorological scales.

CO-4 Describes diffusion of pollutant in the atmosphere by different theories.

CO-5 Describes whole sampling and monitoring procedures of air quality for the reduction of air pollution.

CO-6 Describe different techniques for the reduction of atmospheric pollution of both particulate and gaseous.

CO-7 Describe the sources and impacts of vehicular and indoor pollutants and their control strategies.

M.Sc.- EM – 403 Wastewater management

Program Specific outcomes (PSOs)

PSO-1 From this paper students will know about disposal standards for waste water in normal water.

PSO-2 This paper deals with the status of water quality in India.

PSO-3 The students will able to know some self-purification system of water.

PSO-4 The students will able to learn sewage water treatment system.

PSO-5 This paper deals with the various types of treatment technologies.

PSO-6 The students will understand about biological treatment.

PSO-7 This chapter deals with the anaerobic treatment technologies.

Course Outcomes

CO-1 Describes standards of waste water and estimation of sewage quantity.

CO-2 Assessment of factors responsible for the deterioration of water quality.

CO-3 Describes some self-purification system of waste in streams.

CO-4 Describes various units in sewage treatment plant and processes.

CO-5 Describe some treatment technologies such as screen chamber, primary settling tank, etc. CO-6 Describe about treatment technologies with biological growth and biological oxidation.

CO-7 Describes major anaerobic treatment technologies.

M.Sc.- EM – 404 Solid waste management and disposal

Program Specific outcomes (PSOs)

PSO-1 This chapter deals with different types of solid waste and their sources.

PSO-2 The students will able to know about properties of solid waste.

PSO-3 The students will able to learn various management processes of solid waste in India.

PSO-4 This paper deals with engineering system of solid waste management.

PSO-5 The students will understand about different types of composting systems.

PSO-6 This chapter introduced and helps students to understand about sanitary land filling.

PSO-7 The students will able to learn about the hazardous waste management.

Course Outcomes

CO-1 Describes different types of solid waste on the basis of their origin and their management.

CO-2 Describes physical and chemical composition of solid waste and their generation rate.

CO-3 Describes different methods involved in management of solid waste in India.

CO-4 Describes design specifications of primary waste collection tools for solid waste management.

CO-5 Describes different types of composting systems their mechanisms and their advantages and limitations.

CO-6 Describes methods of preparing sanitary land filling sites.

CO-7 Describes how to manage hazardous waste and their treatment technologies.

Department of Geography (CBCS)

Programme specific outcome and course specific outcome.

Student outcome describe what students are expected to know and able to after graduation.

Geography Major student will enable to do following things after graduation.

Course Name: Geomorphology (Core Course) Paper

Code: GGY - HC – 1016

Course outcomes

- The students will learn that the earth is unstable and it is undergoing constant changes due to dynamic earth's processes.
- The students will come to know about the meaning and scope of geomorphology as a major branch of Physical Geography.
- After gaining knowledge based on the contents embodied in this paper, the students will be able to realize the importance of geomorphological knowledge as applied in various developmental activities executed in different areas.

Course Name: Cartographic Techniques (Core Course) Paper

Code: GGY-HC-1026

Course outcomes

- Understanding the importance of various cartographic techniques in geographical study. General understanding of map type, map scale and map content.
- An acquaintance of different cartographic techniques for representation of various facets of physical and human geographic data of any area.

Generic Elective Papers

Course Name: Physical Geography Paper Code:

GGY-HG-1036

Course outcomes

- The students will learn that the earth is unstable and it is undergoing constant changes due to dynamic earth's processes.
- The students will come to know about the meaning and scope of geomorphology, which is a major branch of Physical Geography.

Syllabus of Honours Core Course

Course Name: Human Geography

Course outcomes

- The paper will be useful for students in developing ideas on human-environment issues that geographers usually address in the anthropocentric
- The paper will be useful for students preparing for UGC NET/SLET exams and other competitive exams including the civil services.

**Course Name: Climatology and Biogeography Paper Code:
GGY-HC-2026**

Course outcomes:

- The paper will be useful for students in developing ideas on climate related aspects of geographical analyses.
- The paper will help provide theoretical insights and perspectives to students if they wish to pursue a research programme in future.
- Students will develop a basic understanding of the introductory concepts in bio-geography

**Generic Elective Course for Honours Syllabus
of Generic Elective Course**

**Course Name: Human Geography
Paper Code: GGY-HG-2036**

Course outcomes:

- The paper will be useful for students in developing ideas on human- environment issues that geographers usually address in the Anthropocene.
- The paper will be useful for students preparing for various competitive examinations including the civil services.

Syllabus of Core Course

**Course Name: Economic Geography
Paper Code: GGY-HC-3016**

Course Outcomes:

- The paper will be useful for students in developing ideas on how geographical aspects organise economic space and will offer perspectives to students if they wish to pursue a research programme.
- The paper will be useful for students preparing for UGC NET/SLET exams and other competitive exams including the civil services.

**Course Name: Geography of India with Special Reference to N.E. India
Paper Code: GGY-HC-3026**

Course outcomes:

- The paper will be useful for students in developing understanding on Indian geography and its various dimensions.
- It will also be useful for students preparing for various competitive examinations including civil services.

Syllabus of Core Course

Course Name: Quantitative Methods in Geography

Paper Code: GGY-HC-3036

Course Outcomes:

- Thorough understanding of the statistical methods and techniques used in geographical studies;
- Understanding of tabulation, analysis and interpretation of geographical data.

Syllabus of Core Course

Name: Environmental Geography and Disaster Management

Paper Code: GGY-HC-4016

Course outcomes

- This paper will be useful for students in developing ideas on environmental issues including disasters that geographers usually address.
- This paper will be useful for students preparing for different competitive exams including the civil services.

Course Name: Population and Settlement Geography

Paper Code: GGY-HC-4026

Course outcomes

- The paper will be useful for students in developing ideas about spatio- temporal changes in the characteristics of population and settlement and the factors associated with them.
- The paper will be useful for students preparing for various competitive exams including the civil services

Course Name: Remote Sensing, GIS and GPS

Paper Code: GGY-HC-4036

Course outcomes

- The paper remains useful for students in developing skills in spatial data analysis if they wish to pursue a research programme.

- The paper will be useful for students preparing for different competitive exams including the civil services.

Syllabus of Skill Enhancement Course

Course Name: Advanced Statistical Techniques for Spatial Analysis Paper Code: GGY-SE-4044

Course outcomes

- It provides general understanding of geographical data and application of various statistical measures for their meaningful analysis.
- Acquiring basic knowledge about probability and normal distributions and their applications for sample data collection and analysis.
- Understanding the patterns and processes associated with various geographical phenomena through application of different statistical techniques.

Syllabus of Generic Elective Course

Course Name: Geography of India with Reference N.E. India Paper Code: GGY-HG-4066

- The paper will be useful for students in developing understanding on Indian geography and its various dimensions.
- It will also be useful for students preparing for various competitive examinations including civil services.

Syllabus of Honours Core Course

Course Name: Social and Political Geography Paper Code: GGY-HC-5016

Course outcome:

- This course will help equip the students to comprehend various social and political aspects of phenomena and their interface within the realm of geography.
- The paper will be very useful for students preparing for various competitive examinations including civil services.

Syllabus of Honours Core Course

Course Name: Field Techniques in Geography Paper Code: GGY-HC-5026

Course outcomes:

- This course will help students to proceed with a research problem and the steps she/he should adopt and the tools and craft to be employed for doing quality research.

- Students perceive fieldwork to be beneficial to their learning, because through it they experience 'geographical reality', and have deeper understanding of the subject.
- The students will have a chance to interact with respondents and collect data through questionnaire directly from the field.
- This course will develop understanding about designing and writing a field report.

Syllabus of Discipline Specific Elective Course

Course Name: Geography of Transportation Paper

Code: GGY-HE-5036

Course Outcome:

- The students will be able to understand and analyse the principal issues confronting the transportation systems from geographical perspectives.
- The students will get an insight into various transportation systems from global and India perspectives.

Syllabus of Discipline Specific Elective Course

Course Name: Regional Development and Planning Paper

Code: GGY-HE-5046

Course outcomes:

- The paper will be useful for students in developing ideas on disparities within and between countries and their fallout.
- The paper will help provide theoretical insights and perspectives to students, if they wish to pursue a higher studies or research in future.
- The paper will be very useful for students preparing for various competitive examinations including civil services.

Syllabus of Discipline-Specific Elective Course Course

Name: Agricultural Geography

Paper Code: GGY-HE-5066

Course Outcome:

- This paper will be useful for students in developing ideas about agricultural practices and their distribution and characteristics.
- This paper will also be useful to the students in understanding the world agricultural systems.
- This paper will help develop understanding of location of agricultural activities and associated contemporary problems and challenges.

Course Name: Geographical Thought

Paper Code: GGY-HC-6016

Course outcomes:

- This course develops a comprehensive understanding of the discipline

- This course helps the students to apply the historic and contemporary perspective to explain and approach the real world geographic problems.

Syllabus of Honours Core Course

Course Name: Research Methods in Geography and Project Work

Paper Code: GGY-HC-6026

Course Outcomes:

- This course will help the students to proceed with a research problem and the steps she/he should adopt and the tools and craft to be employed while doing quality research.

Discipline Specific Elective Paper

Course Name: Geography of Tourism

Paper Code: GGY-HE-6056

Course Outcomes:

- The paper will be useful for students in developing ideas on how geographical factors tangent on tourism activities and how geographers seek to address issues of development and carrying capacities of varied environments.
- It will also build skills for students seeking to enroll in a research programme and/or provide openings for them to work with tourism/eco- tourism planning agencies.

Syllabus of Discipline Specific Elective (Honours Course)

Course Name: Geography of Resources and Development

Paper Code: GGY-HE-6066

Course Outcomes:

- This paper will be useful to students in developing ideas on different aspects of resources, and the linkages with development issues that geographers usually address.
- This paper will also be useful for students preparing for different competitive examinations including the civil services.

Department of Geography (NON-CBCS)

Paper Code M 101

Understanding geography

- After gaining knowledge based on the paper students will be able to realize the importance of geography

Paper Code M 102

Basic of geomorphology

- The students will come to know about the meaning and scope of Geomorphology

Paper Code M 201

World regional geography

- This paper will also be useful for students preparing for different competitive examinations including the civil services.

Paper Code M 202

World regional geography

- This paper will also be useful for students preparing for different competitive examinations including the civil services.

Paper Code M 203

Practical on oceanography, climatology and world regional geography

- The paper will help provide theoretical insights and perspectives to students if they wish to pursue a research programme in future.

Paper Code M 301

Soil and biogeography

- Students will develop a basic understanding of the introductory concepts in bio-geography

Paper Code M 302

Economic geography

- The paper will be useful for students preparing for UGC NET/SLET exams and other competitive exams including the civil services.

Paper Code M 303

Practical on biogeography and economic geography and field study

- The paper will be useful for students preparing for various competitive examinations.

Paper Code M 401

Forms and processes in geomorphology

- The students will come to know about the meaning and scope of geomorphology as a major branch of Physical Geography

Paper Code M 402

Human geography

- The paper will be useful for students preparing for various competitive examinations including the civil services.

Paper Code M 403

Practicals on geomorphic processes

- After gaining knowledge based on the contents embodied in this paper, the students will be able to realize the importance of geomorphological knowledge as applied in various developmental activities executed in different areas.

Paper Code M 501

Concept on regional development planning and geography on development of USA and Japan

- The paper will be useful for students in developing understanding on Indian geography and its various dimensions.
- It will also be useful for students preparing for various competitive examinations including civil services.

Paper Code M 503

Cartography and quantitative methods

- Understanding the importance of various cartographic techniques in geographical study
General understanding of map type, map scale and map content.
- An acquaintance of different cartographic techniques for representation of various facets of physical and human geographic data of any area.

Paper Code M 504

Population and settlement geography

- The paper will be useful for students in developing ideas about spatio-temporal changes in the characteristics of population and settlement and the factors associated with them.
- The paper will be useful for students preparing for various competitive exams including the civil services

Paper Code M 505

practical's on cartographic methods (surveying and map works)

- The students will have a chance to interact with respondents and collect data through questionnaire directly from the field.
- This course will develop understanding about designing and writing a field report.

Paper Code M 506

Practical on cartographic and quantitative methods

- It provides general understanding of geographical data and application of various statistical measures for their meaningful analysis.
- Acquiring basic knowledge about probability and normal distributions and their applications for sample data collection and analysis.

Paper Code M 601

Environment and development

- This paper will be useful for students in developing ideas on environmental issues including disasters that geographers usually address.
- This paper will be useful for students preparing for different competitive exams including the civil services.

Paper Code M 602

Social and political geography

- This course will help equip the students to comprehend various social and political aspects of phenomena and their interface within the realm of geography.
- The paper will be very useful for students preparing for various competitive examinations including civil services.

Paper Code M 603

Regional geography of North-East India with special focus on Assam

- The paper will be useful for students in developing ideas on disparities within and between countries and their fallout.
- The paper will help provide theoretical insights and perspectives to students, if they wish to pursue a higher studies or research in future.
- The paper will be very useful for students preparing for various competitive examinations including civil services.

Paper Code M 604

Principles and application on remote sensing GIS and GPS

- The paper remains useful for students in developing skills in spatial data analysis if they wish to pursue a research programme.
- The paper will be useful for students preparing for different competitive exams including the civil services.

Paper Code M 605

Regional geography of North-East India with special focus on Assam

- It provides general understanding of geographical data and application of various statistical measures for their meaningful analysis.
- Acquiring basic knowledge about probability and normal distributions and their applications for sample data collection and analysis.

Paper Code M 606

Regional geography of North-East India with special focus on Assam

- At the end they are preparing a dissertation to full fill their bachelor degree. External examiner are appointed for viva to establish his or her findings

Department of Geology

**Programme outcome and Course
outcome**

Semester: 1st

Paper Code 1016: Earth System Science

(i) Course learning outcome:

The study of this paper strengthens students knowledge with respect to understanding the essentials of

the structural dynamics of the earth.

(ii) Broad contents of the course:

The course presents an understanding of the processes in action on the earth's surface and their impact on man and his institutions.

(iii) Skills to be learned:

The students will understand the origin of our solar system and planets, including earth. The students are exposed to the Geological time scale and be able to appreciate the dynamics of earth evolution through time.

(iv) The detail contents of this course

This course gives an overall introduction to Geology from topics ranging from the formation of the solar system (6), meteorites (2) minerals and rocks (3), plate tectonics (5), volcanoes and earthquakes (4). An introduction to historical geology (4) and the evolution of the earth's crust (5), oceans (3), atmosphere (3), and life forms (4). Topics like geological time scale (6), stratigraphic layering (3), fossils, geologic age, dating (4), rock deformation and tectonic plate movement, (4) climate change, and mass extinction events etc. (5) are to be covered.

Paper 1026: Mineral Science

(i) Course learning outcome:

Studying the basics of mineralogy and crystallography helps in understanding and building the overall knowledge in Geology.

(ii) Broad contents of the course:

The course deals with the study of minerals, their chemistry and identification in hand specimen. Further, it also deals with the study of crystals with respect to their morphology, symmetry and the normal crystal classes

(iii) Skills to be learned:

The students will be able to identify common rock-forming minerals in hand specimens as well as in thin sections. Besides, they will familiarise themselves with various crystal lattice and crystal systems.

(iv) The detail contents of this course

Mineralogy: An introduction to the study of minerals, definition of minerals, mineral groups and silicate structure. Topics include the physical mineralogy, chemical mineralogy and optical properties of the common rock-forming minerals, application of mineralogical information to geological problems. Lab activities include examination and identification of minerals in hand specimen and thin section.
Crystallography: Introduction to Crystals and their characters. Crystal form, face, edge, solid angle; Interfacial angle and their measurements; Crystallographic axes and angles. Introduction to Crystal parameters and Symmetry elements, various crystal lattice: (Isometric, Tetragonal, Hexagonal, Trigonal, Orthorhombic, Monoclinic and Triclinic systems).

Semester: 2nd

Paper 2016: Elements of Geochemistry

Course learning outcome:

The students will also acquire skills to determine and interpret geochemistry of rocks. An introduction to geochemistry, including geochemical abundances, partitioning coefficients and recycling within the earth, geochemistry of igneous/metamorphic rocks and hydrothermal processes, average geochemical composition of crust and mantle, Radiogenic isotopic end members.

Paper 2026: Structural Geology

(i) Course learning outcome:

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

(ii) Broad contents of the course:

The course is designed for the students to understand the geometry and mechanics of the various geological structures that result through the deformative processes operative within the earth.

(iii) Skills to be learned:

The students learn the skills of identifying different structure and measurements using Brunton compass. This is fundamental to geological mapping. This course also helps to know how to use structures and help students appreciate the dynamic nature of the Earth lithosphere. Learn how to read geologic maps and solve simple map problems using strike and preparations of cross sections. Concept of strike and dip, Dipping strata, unconformities, Brunton compass, Understanding stress and strain, ductile vs. brittle deformation, the effects of temperature, time, pressure, pore fluids and strain rate on rock strength, and the mechanisms of rock deformation. Definition, elements, types and nature of joints, fractures, shear zones, faults, and folds.

Semester: 3rd

Paper 3016: Igneous Petrology

(i) Course learning outcome:

On completion of the course the students will have gained an understanding of the processes involved in the formation of igneous rocks, their textures, structures, classifications and their importance

(ii) Broad contents of the course:

Petrology is the science of rocks. The course will help the students to exhibit an improved understanding of fundamental petrologic processes and common rock types.

(iii) Skills to be learned:

Students learn to identify, describe and classify rocks using hand specimens. Igneous rocks will be studied in terms of their definition, mineralogical and chemical relationships, classification (IUGS QAPF), field characteristics, and tectonic environments. Topics include: phase diagrams (6), melt generation and emplacement.

Paper 3026: Sedimentary Petrology

(i) Course learning outcome:

Sedimentary rocks are storehouse of many basic necessities of modern civilization viz. water, hydrocarbon etc. Major objective of the subject is to make students understand fundamentals, sedimentary processes and their products. Students will learn about texture and structures of sedimentary rock.

(ii) Broad contents of the course:

This course will students understand the earth's geomorphic processes responsible for formation of different landforms on the earth surface. The study of grain size distribution and its provenance study are some of the main moto of this paper.

(iii) Skills to be learned:

The students will be exposed to the principles of stratigraphy including order of superposition. They will also be able to identify primary sedimentary structure and their depositional environments. An introduction to secondary sedimentary structures in the interpretation and reconstruction of sedimentary facies, paleogeography, past climates, and depositional history.

Paper 3036: Palaeontology

(i) Course learning outcome:

The study of Palaeontology encompasses the aspects of the age of the earth, chronological arrangement of rocks and appearance and evolution of life through the geologic time. The knowledge of palaeontology would enable the students to understand the changes that occurred in the history of the earth and relate them to their field observations.

(ii) Broad contents of the course:

Palaeontologists study the fossils which have been preserved in the earth's crust by natural processes and are used to fingerprint a large chunk of the age of the earth in terms of time. Palaeontology encompasses study of micro-fossils, plant fossils, vertebrate and invertebrate fossils and their evolution. These aspects are fundamental not only to geology and stratigraphy but to inter-disciplinary fields of paleobotany, paleozoology and evolutionary biology.

(iii) Skills to be learned:

The students will acquire skills of discovering and describing fossils and their taxonomic classification. They will also be introduced to interpreting paleoclimate and paleoenvironment conditions. This course will introduce the student to the Geological Time scale. Concept of Eon, Era, Period, Epoch, Origin of life, Evolution of life with time, Index fossils through time. Lab will include taxonomic classification and morphological descriptions of - Microfossils (forams, coccolith and diatoms), Invertebrate (gastropods, nautiloids ammonites and belemnites, vertebrate and plant fossils.

Paper 3024: Skill Enhancement Course: Geological Field Training

(i) Course learning outcome:

This course is devised to provide basic knowledge of geological mapping and surveying techniques. It also will upgrade and relate the theoretical knowledge of geological aspects to field observations.

(ii) Broad contents of the course:

Students will be expected to understand how preliminary surveys are carried out especially in mining and natural resource bearing areas. They would be trained to work independently in the field of geological mapping and sampling.

(iii) Skills to be learned:

Skill of using of Brunton Compass and GPS is only taught and learnt in the field. Hence, these are imperative to geological mapping and preparation of cross sections.

(iv) The detail contents of this course

An introduction to geological field methods and mapping and use of Brunton Compass and GPS. Students will make geological observations in the field, record data in field notes, and prepare geological maps (equivalent to 30 lectures or at least 05 days). Topics include: field safety, logistics, navigation, field mapping techniques and data collection, toposheet reading, interpretation of geological data and maps, and communicating geological information.

Semester: 4th

Paper 4016: Metamorphic Petrology

(i) Course learning outcome:

On completion of the course the students will have gained an understanding of the processes involved in the formation metamorphic rocks, their textures, structures, classifications and their importance.

(ii) Broad contents of the course:

Petrology is the science of rocks. The course will help the students to exhibit an improved understanding of fundamental petrologic processes and common rock types.

(iii) Skills to be learned:

Students learn to identify, describe and classify rocks using hand specimens.

(iv) The detail contents of this course:

Petrology: Metamorphic rocks will be studied in terms of their definition, mineralogical and chemical relationships, classification, field characteristics, and tectonic environments. Topics include: phase diagrams, melt generation and emplacement, metamorphic facies and textures.

Paper 4026: Stratigraphic Principles and Indian Stratigraphy

(i) Course learning outcome:

The study of stratigraphy encompasses the aspects of the age of the earth, chronological arrangement of rocks and appearance and evolution of life through the geologic time. The knowledge of the concepts in stratigraphy would enable the students to understand the changes that occurred in the history of the earth and relate them to their field observations and also, in understanding the framework of the stratigraphy of India.

The Indian sub-continent exposes a wide range of lithologies that span from 3.6 billion years to present. The geology of India is synonymous with the geology of the world and its ancient rock types from the Indian Peninsula, Cretaceous Deccan volcanism and Tethyan sediments exposed in the mighty Himalayas is noteworthy. The student will gain knowledge about the stratigraphy and geology of India with emphasis on the Stratigraphy of India with respect to Paleozoic, Mesozoic and Cenozoic Era which will help in understanding the different episodes on the earth during the geologic past.

(ii) Broad contents of the course:

Stratigraphers study the composition and arrangement of layered or stratified rocks. Palaeontologists study the remains of plants and animals which have been preserved in the earth's crust by natural processes. Indian Stratigraphy intends to introduce students to important geological formations of India, from Precambrian to Recent times.

(iii) Skills to be learned:

The students will be exposed to the principles of stratigraphy including order of superposition. They will also be able to identify primary sedimentary structure and their depositional environments.

At the end of the course, the students will acquire skills that will enable to recognise different geological formation, their age and economic potential. They will also learn to correlate International Geological Time Scale with Indian Stratigraphic Time Scale.

(iv) The detail contents of this course:

Precambrian evolution of Peninsular India, Stratigraphy and evolution of Dharwar Craton, Aravalli craton, Singhbhum craton, etc. Central Indian Suture Zone, Introduction to Proterozoic basins of India, Gondwana sedimentation, Mesozoic basins of India, Deccan Traps volcanic province, Introduction to Himalayas: Physiographic divisions and tectono-magmatic evolution. Colleges to encourage teaching learning related to their respective state geology.

Paper 4036: Hydrogeology

(i) Course learning outcome:

On completion of the course, the student will have gained an understanding of hydrogeological concepts, exploration, exploitation and recharge of groundwater and methods of monitoring groundwater quality and sources of pollution

(ii) Broad contents of the course:

To impart knowledge about groundwater, its movement, methods of its exploration, the criteria of its quality, methods of its conservation, recharge of groundwater monitoring of groundwater quantity and quality.

(iii) Skills to be learned:

Students will be able to acquire skills of systematic hydrogeological surveys and water quality monitoring

(iv) The detail contents of this course:

This course will investigate, both qualitatively and quantitatively, the fundamental physical and chemical processes governing groundwater flow and composition, including aquifer properties: porosity, permeability, regional geology and hydrology, hydrogeology of crystalline rocks, water-rock interactions, and subsurface microbial activity. Well inventory. Field and laboratory methods used to characterize aquifer properties and, including well pumping tests. Groundwater chemistry: major ion and isotope analyses and chemical tracers will also be covered. Also Groundwater Resources of India with special reference to each state where the HEI is location should be encouraged. Groundwater quality hotspots in India: TDS, F, Ar, U, Fe, etc.

Semester 5th

Paper 5016: Economic Geology

(i) Course learning outcome:

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

(ii) Broad contents of the course:

Mining being a key source of revenue generation for the Central as well as State governments, and an important job provider for Geologists, this course is designed to equip the undergraduate student with basic knowledge of key concepts of mining processes right from exploration to exploitation, together with an acquaintance of government regulations that control the mining and mineral conservation processes.

(iii) Skills to be learned:

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

(iv) The detail contents of this course:

An introduction to mineral resources and the methods used to explore for them, with particular emphasis on Indian occurrences of metallic (iron, manganese, chromite, copper- lead zinc, gold, etc.) and non-metallic (barite, fire clay, gypsum, bauxite, etc.) deposits. Topics include: mineral deposit types, ore forming processes, mineral exploration techniques. Environmental and social issues that relate to mineral resource extraction will also be discussed. Colleges to encourage teaching and learning related to State geology.

Paper 5026: Geomorphology

(i) Course learning outcome:

Students will get a clear concept about topics related to geomorphology which includes the role of climate and tectonics on landscape development, weathering processes, mass wasting and hill slope evolution. They will understand the basic agents and processes that impact the Earth's surface including rivers, glaciers, wind and oceans.

(ii) Skills to be learned:

1. To learn interpretation of different topographic maps and different geomorphic features.
2. Detailed interpretation of geologic contoured map.
3. Topographic Profile
4. Longitudinal Profile
5. Stream Length Gradient Index.
6. Sinuosity Index
7. Braiding Index
8. Stream ordering and Bifurcation Ratio.

Paper 5016: Exploration Geology (Discipline Specific Elective)

(i) Course learning outcome:

The course provides the student essential and basic concepts of mineral exploration techniques and the art and science of mining mineral resources.

(ii) Broad contents of the course:

The course envisages to expose the students to the topics such as geology in mining industry, methods of exploration, Sampling Principle, Methods, estimation of reserves, Ore Dressing and Beneficiation.

(iii) Skills to be learned:

This course tries to impart skills related to Geology in mining and enable him/her to perform duties of a geologist at the mining site.

(iv) The detail contents of this course:

Geology in mining industry, Tenor and Grade: definition, meaning and specification, mineral exploration: sequence and phases, methods of exploration, float ores and In situ ores, Gossan, Pits, Trenches and Boreholes, core drilling, equipment and accessories, Core drill sampling, core splitting, logging, storage, sludge, combining Assay returns from sludge and core. Calculation of Specific gravity, Porosity, Bulk density, compression factor, Sampling Principle, Methods, Size and quantity, Reduction, Errors, Sampling practices in open-cast mining. Categories of reserves, estimation of reserves, cross-sectional method, area of influence method, triangular method, and weighted volume estimate method, Classification of mining methods, Factors influencing choice of mining method, Open cast mining, Underground mining, Coal mining methods, Ore Dressing or Beneficiation, Brief outline of Mining Acts and Regulations in India, Conservation of mineral resources etc.

Paper 5026: Earth and Climate (Discipline Specific Elective)

(i) Course learning outcome:

The course introduces the students to the Earth's climate system and explores the science of global climate change using different proxies.

(ii) Broad contents of the course:

Course topics include the greenhouse effects and the science of global warming and climate change impacts.

(iii) Skills to be learned:

Students should be able to describe how the Earth's climate system works and summarize general atmosphere circulation patterns, ocean circulation patterns and climate oscillations such as the El-Niño Southern Oscillation. Besides, they will also be in a position to illustrate the Earth's carbon cycle and quantitatively describe how addition of CO₂ to the atmosphere due to burning of fossil fuels influences the climate.

(iv) The detail contents of this course:

An interdisciplinary examination of global climate change from past, present, and future perspectives. The course will review the earth's current climate system, investigate evidence for past climates, and study climate change models. The factors affecting the earth's climate will be examined, along with anthropogenic impacts both globally and regionally. Milankovitch cycle, Greenhouse Gases and their effect. El Niño, ocean circulation. Climate changes vis-à-vis atmospheric hazards, changes in rainfall patterns/intensity vis-à-vis storm surges, cyclone, floods, droughts. Evolution of the Indian monsoon system, agro-climatic divisions of Indian subcontinent, Climate and landscape evolution. Use of climate proxies to model and monitor past and present climate indicators.

Semester: 6th Paper

6016: Engineering Geology

(i) Course learning outcome:

Upon completion of the course the student will become aware of the importance of geological studies and its applicability to various engineering problems.

(ii) Broad contents of the course:

To impart sufficient knowledge of engineering geology so as to be able to anticipate the technical problems related to geology of various engineering sites and suggest possible remedial measures.

(iii) Skills to be learned:

The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.

(iv)The detail contents of this course:

This course includes examination of the physical properties of earth materials in the context of engineering and environmental projects. Topics include: engineering properties of soil and rock, geological site investigations of slopes, foundations, tunnels, dams, mines, roads, and other developments. Building stones and aggregates.

Paper 6026: Remote Sensing and GIS

(i) Course learning outcome:

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

(ii) Broad contents of the course:

This course intends to introduce students to the fundamental principles and techniques of remote sensing, basic properties of electromagnetic radiation and its interaction with matter, It will also include topics like instruments and platforms used for remote sensing, and the ways those systems can be used to determine geological structure and rock types.

(iii) Skills to be learned:

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

(iv)The detail contents of this course:

Basic concepts in remote sensing, electro-magnetic spectrum, Energy sources, energy interaction in the atmosphere, atmospheric windows, atmospheric effects on remotely sensed data, signatures in remote sensing, sensors and sensor platforms. Introduction to aerial photographs, history of aerial photography, aerial camera, types of aerial photographs, classification, principles of stereoscopic viewing, conditions and cause for stereovision. Aerial photography missions. Use of pocket and mirror stereoscope, scale of aerial photographs, stereoscopic parallax, relief displacement, measurement of height of objects. Aerial photo interpretation, photo-recognition elements, methods of photo- interpretation, advantages and limitations of aerial photographs. Remote Sensing from space: space crafts and sensors. Visual image interpretation of satellite imagery, image enhancement, digital analysis, preparation of thematic

maps. Thermal Infrared remote sensing and microwave remote sensing for geological applications. Remote sensing satellites, Indian Remote Sensing Satellite programme.

Paper 6016: Fuel Geology (Discipline Specific Elective)

(i) Course learning outcome:

A student will understand and learn about the basic concepts of Coal and Petrology Geology with respect to geology as to enable them to work as a Petroleum Geologist or a Mining Geologist.

(ii) Broad contents of the course:

To provide the student essential and basic concepts of Coal and Petroleum Geology and to study the process and the operations involved in formation and exploration

(iii) Skills to be learned:

The students will be appraised about the origin, migration and accumulation of petroleum; formation and genesis of coal. It will also provide basic skills in prospecting, drilling and logging operation in oil and coal exploration.

Further PG studies in this subject will enable them towards getting employment in the oil industry

(iv)The detail contents of this course:

Basic classification of coal, Coal Bed Methane, Indian and Global Coal Scenario, Underground Coal Gasification, Coal liquefaction, Occurrence of petroleum, nature of source rock, Classification and composition of petroleum products, physical properties of petroleum, composition of biomass, Kerogen- Composition and types, Reservoir, Traps, Origin and Migration, pore space and fluids, Origin, migration and accumulation of petroleum, Prospecting, Drilling and Logging and subsurface correlation, Geophysical prospecting for petroleum, Oil bearing basins of India and the world, India's position as regards to petroleum and natural gas future prospects.

Paper 6026: Introduction to Geophysics (Discipline Specific Elective)

(i) Course learning outcome:

This course deals with methodologies for extracting geological information out of geophysical datasets generated from different petrophysical properties. In Geophysical exploration the student will gain first- hand knowledge dealing with the principles and their significance.

(ii) Broad contents of the course:

The course is centred on the topics of Applied Geophysics and use of GPS in mapping the subsurface. The geophysical techniques include seismic, gravity, magnetic and electrical resistivity methods and their various applications.

(iii) Skills to be learned:

The students will acquire skills to use GPS, Electrical Resistivity and other methods for exploration. These have wide application in mineral exploration, groundwater studies, petroleum geology, etc.

(iv)The detail contents of this course:

The subject mostly covers potential fields (gravity and magnetic methods) because these datasets are readily available, however it also visits seismic and electrical geophysical methods. Topics covered include elements of maps, projection systems, datums and GPS; theory, acquisition, processing and interpretation steps involved for gravity and magnetic methods; electrical geophysical techniques such as Self-potential, Electrical profiling and Vertical Electrical Soundings and arrays.

Department of Geology (Non-CBCS)

PROGRAMME OUTCOME

- The Bachelor of Science in Geology programme of Dimoria College under Gauhati University includes graded semester system which combines detailed theoretical knowledge, practical knowledge and extensive field survey/field work. The primary goals of this undergraduate programme are to provide students' academic competencies, ethical values and professional skills that facilitate their transition from undergraduate to post graduate work or professional positions.
- This programme inspires geology graduates to be life-long learners in a diverse global community and prepare them to pursue a geology career through innovative and hands-on engagement in the classroom, laboratory, and field. .
- Students will acquire a solid base of knowledge in the science of geology as a whole as well as earth materials, earth history, mineralogy, petrology and stratigraphy, deformational processes and structural features, and geomorphic processes and landforms.
- Students will understand how geologic resources form, how they can be exploit and use and about their economic value and resource areas.
- Students will develop proficiency in conveying complex geologic concepts in clear, technically correct writing; apply theoretical, conceptual, and observational knowledge to the analysis and solution of geologic data and problems.
- Students will develop proficiency in complex geologic concepts and communicate clearly and articulately their geologic knowledge, findings and interpretations in oral presentation.
- Students will develop the aptitudes and dispositions necessary to help democratize society by obtaining and maintaining employment as a professional geologist.
- Students will be able to Interpret, analyze, discuss, and critique topics about geological problems.
- They will be able to produce high quality written analyses of data, results, interpretations, and conclusions in a scientific format.
- As geology is mainly a field work based subject so students are to be trained to carry out extensive field work and to do advanced geological and scientific analysis, there by imparting practical knowledge/ hands- on training in the geological field work for augmenting practical/ professional knowledge which has implication in near future. Students will greatly strengthen their observational accuracy in the field, and this skill will translate into other aspects of data description and interpretation and they will gain new field experience, perspective, competence,

and confidence as a field geologist.

- Students will develop the capability to produce geologic maps and cross sections of unknown terrains working individually and/or in groups. Production of geologic maps will allow students to demonstrate the capacity for synthesizing and interpreting field data and compiling that information into a working understanding of the assigned field area.

Course learning outcomes

FIRST SEMESTER

Paper 101: GENERAL GEOLOGY, GEOMORPHOLOGY AND BASIC PRINCIPLES OF REMOTE SENSING

1. This course is basically aiming learning about the scope of geology, Earth and its relation to Universe, about the sedimentary flux: origin, transport and deposition.
2. Learning about the major surface features of the continents and ocean basins, Earth's interior, major internal processes of the Earth, Volcanism and Earthquake. They will be able to articulate the relationship between volcanoes, earthquakes, and mountain belts and tectonic plate boundaries.
3. Students will get a clear concept about topics related to geomorphology which includes the role of climate and tectonics on landscape development, weathering processes, mass wasting and hill slope evolution. They will understand the basic agents and processes that impact the Earth's surface including rivers, glaciers, wind and oceans.
4. They will study of basic concepts of remote sensing, various types of satellite images and aerial photographs and learn Basic principles of Photo geology and Photogrammetry thereby able to apply them in remote sensing and GIS tools to solve some real-world issues and problems

PAPER 102: CRYSTALLOGRAPHY AND X RAY CRYSTALLOGRAPHY

1. Minerals are geological resources of major economic importance, most of them are crystalline which explains the important role played by crystallography in their study. So, this course includes concepts about process of crystallization and crystal growth, unit cell, point group and bravais lattice, study of various crystal systems and determination of axial ratio, parameters and indices.
2. Students will learn about crystal intergrowth and twinning, twin law and twinning types. They will be able to learn how to do crystallographic projection of different crystal systems.
3. They will get a basic idea about principles of X-Ray crystallography and mineral identification by X Ray diffractometry.

PAPER 103: PRACTICAL: CRYSTALLOGRAPHY AND GEOMORPHOLOGY

1. This paper includes Practical application of Crystallography and Geomorphology. By studying this course, a student will be able to learn about the forms and symmetry elements of crystals belonging to different classes.

2. They will learn how to study different crystal models and hence determine twinning, to carry out stereographic projection and determine axial ratios.
3. To learn interpretation of different topographic maps and different geomorphic features.

SECOND SEMESTER

PAPER 201: OPTICAL MINERALOGY

- 1) Optical mineralogy is used to identify the mineralogical composition of geological materials in order to help reveal their origin and evolution. In this course students will learn about scope and utility of optical mineralogy, basic ideas about properties of light (polarization, dispersion, reflection and absorption).
- 2) To study properties of isotropic and anisotropic mineral and their configuration. They will get concept of Optical indicatrix, isotropic minerals, anisotropic minerals; Mineral colour and pleochroism, Interference phenomena, Interference figures.
- 3) To learn about properties of various minerals in thin section and distinguishing optical property of some non-opaque mineral.

PAPER 202: PHYSICAL AND DESCRIPTIVE MINERALOGY

1. Physical mineralogy is concerned with the physical properties and descriptions of minerals. Minerals can be described using several physical attributes, including hardness, specific gravity, luster, [colour](#), streak, and cleavage. This course students will learn scope, classification and properties of mineral.
 - 1) They will study physical and optical properties of different groups of mineral for eg. Garnet, olivine, pyroxene, amphibole etc. and mineralogy of various individual minerals.
 - 2) Understand the importance of minerals to society and the various subfields of geology

PAPER 203: PRACTICAL: MINERAL HAND SPECIMEN AND OPTICAL MINERALOGY

1. Study and identification of different minerals is a very important part of mineralogy. In this practical class the students will get to know the physical and optical properties of minerals practically.
3. They will be able to classify, characterize, and identify major rock-forming minerals in hand specimen and thin section. Use identified minerals to infer conditions of associated geologic environments.

THIRD SEMESTER:

PAPER: 301: STRUCTURAL GEOLOGY AND GEOTECTONICS

1. This course combines subjects structural geology and geotectonics. After successful completion of this course, a student will be able to know accurate geometric description of the structures observed in natural deformed rocks.
2. They will learn the classification of faults and fractures, fold and fold systems, the terminology used to describe them and the means by which they are measured and analyzed
3. Know the types of foliation and lineation, their origin, and their relationship to folding and fabric.
4. Understand the concepts of stress and strain and their measurement, normal and shear stresses, the principal stress axes, hydrostatic and deviatoric stresses, the strain ellipse and its graphical representation, pure and simple shear, and progressive deformation.
5. They will learn basic concept about plate tectonics which includes different types of tectonic plate boundaries, how they operate and the resulting landforms or features occurred due to plate movement and classical concept about geosynclines
6. In this context they will have to study a brief outline of the structural features and tectonics of North East India.

PAPER 302: PETROLOGY

1. Petrology combines concepts of igneous, sedimentary and metamorphic geology.
2. Igneous petrology subject is intended to emphasize on how the final appearance of characteristics of igneous rocks is controlled by chemical and physical properties of magmas and their surroundings.
3. Study of igneous rocks is a key component of geology curriculum (because these rocks not only abundant throughout the crust of the Earth, but, dominate some crustal and upper mantle environments) that provides understanding of melt generation and crystallization mechanisms, diverse rock types and their link to tectonic settings. In this course the students will learn mode of occurrence, texture and structure of igneous rocks and classification of igneous rocks based on mineralogical and chemical criteria.
4. Sedimentary rocks are storehouse of many basic necessities of modern civilization viz. water, hydrocarbon etc. Major objective of the subject is to make students understand fundamentals, sedimentary processes and their products. Students will learn about texture and structures of sedimentary rock.
5. Dynamic nature of lithosphere leads to solid state transformations of rocks which hold clue to the past processes which are not possible to reconstruct by other means. This subject aims to enable students to identify critical data as well as provide theoretical basis for interpreting this data for

past geodynamic processes, especially the orogenic events. In this subject students will learn basics of metamorphic petrology, types of metamorphism, depth zone of metamorphism.

6. And finally, to learn about facies and facies series of metamorphism, textures and structures structures of metamorphic rock.

PAPER 303: PRACTICAL: EXERCISE ON GEOLOGICAL CONTOURED MAPS, STRUCTURAL PROBLEM AND GEOLOGICAL FIELD WORK

1. Students will learn how to read geologic maps and solve simple map problems using strike lines and cross sections for areas showing dipping strata, unconformities, faults and folds.
2. Learn how to use the stereographic projection to plot planar and linear data, determine angular relationships, solve rotational problems, and analyze complex structural data in areas involving folding and faulting.
3. This course includes a geological field work where students are trained to take readings like strike dip, plunge, pitch, front bearing, back bearing with the help of clinometer and brunton compass.

FOURTH SEMESTER

PAPER 401: CRYSTAL CHEMISTRY AND GEOCHEMISTRY

1. This course combines elementary concept of crystal chemistry and geochemistry.
2. In the crystal chemistry part students will learn concepts of isomorphism, atomic substitution, polymorphism, solid solution and geological thermometry.
3. They will get to know composition of meteorite which has a vast scope to do research work in the near future and distribution of major, minor and trace elements in different kind of rock.

PAPER 402: PETROLOGY 2

1. As study of rocks is the main component of geology so this petrology paper describes characteristics of igneous and sedimentary rocks in details and in addition to the third semester petrology course.
2. In this course students will learn Composition and crystallization of magma, thermodynamic process related to magmatic crystallization, mineralogical phase rule and study of Binary and ternary systems with various examples.
3. They will study about rock associations, Petrographic province and variation diagrams. Descriptive petrology and origin of different kind of rock families is included in this course.

4. In the sedimentary petrology part they will get to know classification and petrographic description of sedimentary rocks and Preliminary concept about sedimentary environment and facies.
5. Detailed petrographic description of different kind of sedimentary rocks is also included in this course.
6. Metamorphic Petrology part combines concepts of phase diagrams and reactions, Prograde and retrograde metamorphism, Characteristic mineral assemblage and mineral reactions of mafic, basic and calcareous rock.
7. Also, they will get a clear concept about description and origin of Indian stratigraphic rock types.

PAPER 403: IGNEOUS AND METAMORPHIC PETROLOGY (PRACTICAL)

1. This practical course helps students to identify various types of igneous and metamorphic rocks in hand specimen and hence to study texture and structure of these rocks.
2. They will learn how to study and identify different rocks in thin section with the help of petrographic microscope.

FIFTH SEMESTER

PAPER 501: PRINCIPLES OF STRATIGRAPHY AND HISTORICAL GEOLOGY

1. The course is intended to familiarise the student with stratigraphic principles and nomenclature, major stratigraphic units, methods of stratigraphic correlation.
2. Students will understand basic principles of stratigraphy, different types of stratigraphic units and how they are named and different types of stratigraphic classification and nomenclature
3. Brief discussion about geological time scale and evolution of through the geologic time. They will understand the scientific basis for both relative and absolute ages in geologic time.
4. They will learn preliminary concepts of very emerging subjects of geology related to sequence stratigraphy, magneto stratigraphy and seismic stratigraphy.

PAPER 502: INDIAN STRATIGRAPHY

1. This course is intended to study various depositional environments and tectonostratigraphic framework of various lithostratigraphic units of India spanning Archaean to Holocene, and mass extinction boundaries.
2. Know the crustal evolution during the Precambrian in peninsular India and how the biosphere responded to the Precambrian-Cambrian boundary events.
3. Appreciate how plate tectonic movements separated India from contiguous landmasses and shaped the depositional basins of the Indian Phanerozoic, and what were their effects on climate and life.
4. Learn about large igneous provinces and their role in mass extinction events and important mass extinction boundary sections.
5. Gain knowledge on stratigraphy and sedimentation in India – Asia continental collision zone and Himalayan foreland basin.

PPAER 503: PALAEONTOLOGY AND SOIL GEOLOGY

1. This course intend to give the students a basic idea about palaeontology which includes mode of preservation of fossil and importance of fossil in in various aspects of geological studies.
2. They will learn study of morphological characteristics and geological distribution of various classes for e.g. Foraminifera, brachiopoda, Anthozoa, Mollusca, Arthropoda, Echinodermata and Graptoloidea.
3. They will gain knowledge about plant fossils of India with special reference to Gondwana flora and their palaeogeographic significance.
4. They will study evolutionary trend of Man, Proboscidea and Equidi from the study of vertebrate fossils.
5. Mropaleontology, the science of microfossils and nannofossils has become very important due to its significance in deciphering paleoclimate and its use in oceanographic studies. In this course students will study microfossil and their importance in oil exploration.
6. To study process of formation and physical properties of soil , study soil types found in India and their erosion and mode of conservation.

PAPER 504: HYDROGEOLOGY, REMOTE SENSING AND GIS

1. Water is a basic life supporting system. The rise in global population and the quest for better living standard has greatly stressed the water resources. The course content primarily focuses on groundwater, which being easily available is amenable to greater exploitation. Thus this course aims to enable students to acquire knowledge about the physical and chemical attributes, occurrence, movement and exploration of the groundwater resources. The students will learn about occurrence of groundwater, water bearing properties of formations, aquifer types and aquifer parameters.
2. The course imparts knowledge about water table definition and location, and how to select sites for sinking wells, construction, design and development of water wells,
3. The students will get an idea about basics of remote sensing, how sensors work, about the geostationary satellites with special reference to Indian Satellites. They will learn about the application of remote sensing in geomorphological, structural and lithological mapping and natural hazard mitigation and basics of GIS and data analysis.

PAPER: 505: PRACTICAL: SEDIMENTARY PETROLOGY AND PALAEOONTOLOGY

1. This practical course compiles concepts of practical application of sedimentology and palaeontology.
2. The students will learn about how to determine the textural properties of sediments and study, identify different types of sedimentary rocks in hand specimen and different sedimentary structures.
3. Identification of heavy minerals in thin section and study of limestone.
4. In the palaeontology part students will learn identification of different genera of fossils by their external morphology and stratigraphic ranges.
5. They will study interpretation and determination of stratigraphic range from the fossil assemblages from Cretaceous of Trichinopoly and Jurassic of Kutch.

PAPER 506: PRACTICAL: SURVEYING, INDIAN STRATIGRAPHIC ROCK AND GEOLOGICAL FIELD WORK

1. This course aims to teach the students how to do topographic survey with the help of Plane Table and Prismatic Compass(both open and closed)
2. Then to measure front bearing and back bearing with the help of clinometer and brunton compass.
3. They will get to know study and identification of different Indian Stratigraphic Rock.

4. As geology is mainly a field study oriented subject so students have to go for a minimum of ten days field work where they will learn how to take different measurements in field and finally plotting of all those measurement in a map and prepare geological mapping.
5. They will have to visit different industrial belts, mining sites and drill sites to acquire knowledge about how different industries operate geological work.

SIXTH SEMESTER

PAPER 601: ORE GENESIS AND PROSPECTING

1. In this course they will get a detailed concept about the process of formation of economic mineral deposit, mode of formation of ore deposit and classification of economic mineral deposit.
2. To learn about structural, physic chemical and stratigraphic control of ore localization.
3. To learn about different methods of prospecting.

PAPER 602: INDIAN MINERAL DEPOSITS AND MINERAL ECONOMICS

1. In this course students will study the mineralogy, mode of occurrence, origin and use of the metallic mineral deposits, non- matellic mineral deposits.
2. They will learn about different geology and use of different industrial raw materials.
3. To give them an idea about mineral economics, strategic, critical and essential minerals and national mineral policy.

PAPER 603: ENVIRONMENTAL GEOLOGY AND ENGINEERING GEOLOGY:

1. To study natural and anthropogenic hazards, landslide and flood and their impact on environment. They will become able to describe the different types of landslides and how to recognize their potential in the field.
2. To study impact of mining on environment, environmental pollution and seismic hazard. Become aware of the scientific limitations on earthquake prediction and the relatively easy reduction of damage from earthquakes through seismic hazard zoning, building codes and public education
3. To familiarize students about role of geologist in various engineering construction sites for eg. Tunnels, dam, highways and bridges.
4. To study of landslide, their causes and mitigation from engineering point of view.

PAPER 604: FUEL GEOLOGY AND MINING GEOLOGY

1. To get the understanding about the mechanism of hydrocarbon generation from organic material
2. To learn the relationship between temperature, pressure and other physical parameters and its effect on distribution and migration of hydrocarbons.
3. To study oil fields of NE India.
4. To comprehend fundamentals of coal, definition and coal forming sedimentary environments, definition and to understand analytical techniques in coal and its importance in coal classification and utilization for various industries, concept of macerals, its gross diagnostic properties under microscope and implications in climate and paleogeography.
5. To study mineralogy, mode of occurrence and atomic mineral deposits of India.
6. Study of mining geology where students will get to know about methods of open cast and underground mining and methods of sampling.

PAPER 605: PRACTICAL: ECONOMIC GEOLOGY, RESERVE ESTIMATION AND ORE MICROSCOPY, REMOTE SENSING AND HYDROGEOLOGY:

1. This course intends to familiarize students with common ore minerals and their identifying criteria at various scales of study.
2. To identify and study economic mineral assemblages required for various industries.
3. To calculate ore reserve estimation and microscopic study of ore minerals.
4. Use of stereoscope and visual interpretation of satellite images.
5. Preparation and interpretation of water table maps and analysis of rainfall data.

PAPER 606: PRACTICAL: ENGINEERING GEOLOGY, COAL GEOLOGY, SEMINAR PRESENTATION AND GENERAL VIVA VOCE

1. Students will learn how to determine different engineering parameters of soil including plastic limit, liquid limit, and shear strength parameters.
2. Study of coal in hand specimen and thin section.
3. Seminar presentation on topic related to their course.

B.Sc. (Geology General) Programme

PROGRAMME OUTCOME

- The Bachelor of Science in Geology (General) programme of Dimoria College under Gauhati University includes graded semester which combines basics of all subject's theoretical knowledge, practical knowledge and field survey/field work to train students in advanced geological and scientific analysis there by imparting practical knowledge/ hands- on training in the geological field work for augmenting practical/ professional knowledge which has implication in near future.
- Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program. The geology general programme will produce graduates who have—
- An ability to apply knowledge of geology in various branches of science and ability to design and conduct experiments, as well as to analyze and interpret geological data.
- An ability to formulate or design a system, process or programme to meet desired needs and function on multidisciplinary teams.
- An ability to identify and solve geological problems and understanding of professional and ethical responsibility.
- An ability to communicate effectively and the broad education necessary to understand the impact of geological solutions in a global economic, environmental and societal context.
- This programme inspires any graduates having geology as general course to be life-long learners in a diverse global community and prepare them to pursue a geology related career through innovative and hands-on engagement in the classroom, laboratory, and field.

Course learning outcomes:

FIRST SEMESTER

Paper 1.1: GENERAL GEOLOGY AND STRUCTURAL GEOLOGY

1. Learning about introduction to geology, Earth and its relation to Universe.
2. Learning about Basics of petrology and the major surface features of the continents and ocean basins and to learn geological actions and landforms introduced by rivers, wind, glaciers, sea and their associated landforms.

3. Accurate geometric description of the structures observed in natural deformed rocks, for eg Foliation, Lineation, Fold, Fault, Fractures and joint.
4. Basic description about various process of deformation—stress, strain behaviour of rocks under stress.

SECOND SEMESTER

PAPER 1.2: CRYSTALLOGRAPHY, MINERALOGY, OPTICAL MINERALOGY

1. Learning about process of crystallization and crystal growth, unit cell, point group and bravais lattice. 2.
2. Study of various crystal systems and determination of axial ratio, parameters and indices.
3. To learn scope, classification and properties of mineral.
4. To study physical and optical properties of different groups of mineral for eg. Garnet, olivine, pyroxene, amphibole etc. Study of mineralogy of various individual minerals.
5. To learn about scope and utility of optical mineralogy.
6. To study polarization, dispersion, reflection and absorption of light.
7. To study properties of isotropic and anisotropic mineral and their configuration.
8. To learn about properties of various minerals in thin section and distinguishing optical property of some non-opaque mineral.

THIRD SEMESTER:

PAPER 3.1: PETROLOGY: IGNEOUS AND METAMORPHIC

1. In this course the students will learn mode of occurrence and texture and structure of igneous rocks.
2. Classification of igneous rocks based on mineralogical and chemical criteria.
3. Basics of metamorphic petrology, types of metamorphism, depth zone of metamorphism.
4. They will learn about facies and facies series of metamorphism, textures and structures of metamorphic rock.

PAPER P3.1: PRACTICAL: CRYSTALLOGRAPHY, PHYSICAL AND OPTICAL MINERALOGY AND GEOLOGICAL FIELD WORK

4. To learn about the forms and symmetry elements of crystals belonging to different classes.
5. To study different crystal models and hence determine twinning.
6. To learn stereographic projection and determine axial ratios.
7. Study and identification of different minerals is a very important part of mineralogy. In this practical class the students will get to know the physical and optical properties of minerals practically
8. Geological field work where students are trained to take readings like strike dip, plunge, pitch, front bearing, back bearing with the help of clinometer and brunton compass.

FOURTH SEMESTER

PAPER: 4.1: SEDIMENTARY PETROLOGY AND PALAEOONTOLOGY

1. Sedimentary rocks are storehouse of many basic necessities of modern civilization viz. water, hydrocarbon etc. Major objective of the course is to make students understand fundamentals, sedimentary processes and their products.
2. Students will learn about texture and structures of sedimentary rock.
3. To get basic idea about palaeontology, mode of preservation of fossil and importance of fossil in various aspects of geological studies.
4. To study of morphological characteristics and geological distribution of various classes for eg. Foraminifera, brachiopoda, Anthozoa, Mollusca, Arthropoda, Echinodermata and Graptoloidea.
5. To gain knowledge about plant fossils of India with special reference to Gondwana flora and their palaeogeographic significance

PAPER: 4.2: Practical: Palaeontology and rock hand specimen

2. Students will learn identification of different genera of fossils by their external morphology and stratigraphic ranges.
3. Interpretation and determination of stratigraphic range from the fossil assemblages from Cretaceous of Trichinopoly and Jurassic of Kutch.
4. Students will know how to study and identify different kinds of rocks(igneous, sedimentary and metamorphic) in hand specimen.

FIFTH SEMESTER

Paper 5.1: ECONOMIC GEOLOGY AND PROSPECTING, INDIAN MINERAL DEPOSITS, HYDROGEOLOGY, REMOTE SENSING AND ENVIRONMENTAL GEOLOGY

4. To understand the process of formation of economic mineral deposit, mode of formation of ore deposit and classification of economic mineral deposit.
5. To learn about different methods of prospecting.
6. In this course students will study the mineralogy, mode of occurrence, origin and use of the metallic mineral deposits, non- metallic mineral deposits
7. Study of basic concepts of remote sensing and various types of satellite images and aerial photographs.
8. To study natural and anthropogenic hazards, landslide and flood and their impact on environment.
9. To study impact of mining on environment, environmental pollution and seismic hazard.

Paper P 5.1: ECONOMIC MINERALS, PETROLOGY AND GEOLOGICAL FIELD WORK

6. To familiarize students with common ore minerals and their identifying criteria at various scales of study.
7. To identify and study economic mineral assemblages required for various industries.
8. They will learn Identification of various rocks in hand specimen and To study texture and structure of different rocks.
9. Study and identification of heavy minerals in thin section.
10. As geology is mainly a field study oriented subject so students have to go for a minimum of ten days field work where they will learn how to take different measurements in field and finally plotting of all those measurement in a map and prepare geological mapping

Paper 6.1: PRINCIPLES OF STRATIGRAPHY, INDIAN STRATIGRAPHY AND GEOTECTONICS

The course is intended to familiarise the student with stratigraphic principles and nomenclature, major stratigraphic units, methods of stratigraphic correlation etc.

Course learning outcome—

1. Understand basic principles of stratigraphy, different types of stratigraphic units and how they are named.
2. Brief discussion about geological time scale and evolution of through the geologic time.
3. Different types of stratigraphic classification and nomenclature.
4. Know the crustal evolution during the Precambrian in peninsular India and how the biosphere responded to the Precambrian-Cambrian boundary events.
5. Appreciate how plate tectonic movements s
6. Separated India from contiguous landmasses and shaped the depositional basins of the Indian Phanerozoic, and what were their effects on climate and life.

7. To familiarize students about role of geologist in various engineering construction sites for e.g. Tunnels, dam, highways and bridges

Ppaer 6.1 P: GEOMORPHOLOGY, GEOLOGICAL MAPS, STUCTURAL PROBLEMS AND HYDROGEOLOGY

1. To learn interpretation of different topographic maps and different geomorphic features.
2. Detailed interpretation of geologic contoured map
3. Use and interpretation of structural problems on stereographic net
4. Geological field work where students are trained to take readings like strike dip, plunge, pitch, front bearing, back bearing with the help of clinometer and brunton compass
5. The students will learn about occurrence of groundwater, water bearing properties of formations, aquifer types and aquifer parameters.
6. The course imparts knowledge about water table definition and location, and how to select sites for sinking wells.

Department of History (CBCS)

CORE COURSE

Semester I

HIS-HC-1016: HISTORY OF INDIA- I

Course Outcome: After the completion of this paper

1. The students will be able to explore and effectively use historical tools in reconstructing the remote past of ancient Indian pre and proto history.
2. The course will also train the students to analyse the various stages of evolution of human cultures and the belief systems in the proto- history period.

HIS-HC-1026 : SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Course Outcome: after the completion of this paper,

1. The students will be able to explain the processes and stages of the evolution of the variety of cultural pattern throughout antiquarian periods in History.
2. They will be able to relate the connections between the various Bronze Age civilizations in the ancient world as well as development of slave and polis societies in ancient Greece.

SEMESTER II

HIS-HC-2016: HISTORY OF INDIA- II

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

1. Explain the economic and socio-cultural connections, transitions and stratifications during the

ruling houses, empires and the politico-administrative nuances of early Indian History from 300 BCE to 300 CE.

HIS-HC-2026 : SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

1. After the completion of this course, the students will be able to analyse and explain the historical socio-political, administrative and economic patterns of the medieval world. They will be able to describe the emergence, growth and decline of various politico-administrative and economic patterns and the resultant changes therein.

SEMESTER III

HIS-HC-3016: HISTORY OF INDIA III (c. 750 -1206)

Course Outcome: The completion of this paper

1. The students will enable the students to relate and explain the developments in India in its political and economic fields and its relation to the social and cultural patterns therein in the historical time period between c.700 to 1206.
2. They will also be able to analyse India's interaction with another wave of foreign influence and the changes brought in its wake in the period.

HIS-HC-3026: RISE OF THE MODERN WEST – I

Course Outcome: On completion of this course,

1. the students will be able to explain the major trends and developments in the Western world between the 14th to the 16th century CE.
2. They will be able to explore and analyse the significant historical shifts and events and the resultant effects on the civilizations of Europe in the period.

HIS-HC-3036: HISTORY OF INDIA IV (c.1206 - 1550)

Course Outcome: After completion of this course

1. The students will be able to explain the political and administrative history of medieval period of India from 1206 to 1550 AD.
2. They will also be able to analyse the sources of history, regional variations, social, cultural and economic set up of the period.

Semester: IV

HIS-HC-4016 : RISE OF THE MODERN WEST – II

Course Outcome: After the completion of this course,

1. The student will be able to explain the political and intellectual currents in Europe in the Modern Age.
2. They will also be able to relate the circumstances and causal factors of the intellectual and revolutionary currents of both Europe and America at the beginning of the Modern age.

HIS-HC-4026 : HISTORY OF INDIA V (c. 1550 - 1605)

Course Outcome: At the completion of this course,

1. The students will be able to analyse the circumstances and historical shifts and foundations of a variety of administrative and political setup in India between c.1550-1605.
2. They will also be able to describe the inter relationships between the economy, culture and religious practices of the period.

HIS-HC-4036 : HISTORY OF INDIA VI (c. 1605 - 1750)

Course Outcome: after the completion of this course,

1. The students will be able to explain and reconstruct the linkages of the history of India under the Mughal Rule.
2. As a whole, this course will enable them to relate to the socio-economic and religious orientation of the people of Medieval period in India.

Semester: V

HIS-HC-5016: History of Modern Europe- I (c. 1780-1939)

Course Outcome: After the completion of this course

1. The students will be able to evaluate the historical evolution and political developments that occurred in Europe in the period between 1780 to 1939.
2. They will also be also to critically analyse the evolution of social classes, nation states, evolution of capitalism and nationalist sentiment in Europe.
3. They will also be able to relate to the variety of causes that dragged the world into devastating wars in the intervening period.

HIS-HC-5026 : HISTORY OF INDIA VII (c. 1780 - 1857)

Course Outcome: After the completion of this course,

1. The students will be able to relate the circumstances leading to the consolidation of colonial rule over India and their consequences.
2. They will also be able to explain the orientation of the indigenous population and the masses towards resistance to the colonial exploitation.
3. The course will also enable the students to analyse popular uprisings among the tribal, peasant and common people against the British policies.

HIS –HE-5016: HISTORY OF ASSAM (UPTO c. 1228)

Course Outcome:

1. This paper will give a general outline of the history of Assam from the earliest times to the advent of the Ahoms in the 13th century.
2. The students will be acquainted with major stages of developments in the political, social and cultural history of Assam during the early times.

HIS –HE-5026 : HISTORY OF ASSAM (c. 1228 –1826)

Course Outcome: On completion of this paper,

1. The students will be able to identify major stages of developments in the political, social and cultural history of Assam during the medieval times.
2. This paper will enable the student to explain the history of Assam from the 13th century to the occupation of Assam by the English East India Company in the first quarter of the 19th century.

Semester: VI

HIS-HC-6016 : HISTORY OF INDIA VIII (c. 1857 - 1950)

Course Outcome: At the completion of this course,

1. The learners will be able to analyse the course of British colonial exploitation, the social mobilizations during the period between c.1857 to 1950 and also the techniques of Indian resistance to British policies.
2. It will also enable the students to explain the circumstances leading to de-colonization and also the initial period of nation building in India.

HIS-HC-6026: HISTORY OF MODERN EUROPE II (c. 1780 -1939)

Couse Outcome: After the completion of this course,

1. The students will be able to analyse the historical developments in Europe between c.1780 to 1939.
2. As the course structure of this paper focuses on the democratic and socialist foundations modern Europe, the students will be able to situate the historical development of working class movements,

socialist upsurge and the economic forces of the two wars and the other ideological shifts of Europe in the period.

HIS –HE-6016 : HISTORY OF ASSAM (c. 1826 – 1947)

Course Outcome: Upon completion of this course,

1. The students will be able to describe the period of British rule in Assam after its annexation by the imperialist forces.
2. They will also be able to situate the development of nationalism in Assam and its role in India's freedom struggle.
3. The course would enable the students to analyse the main currents of the political and socio-economic developments in Assam during the colonial period.

HIS –HE-6026 : ASSAM SINCE INDEPENDENCE

Course Outcome:

1. Students will be able to assess the aftermath of Partition and other socioeconomic developments in post-independence Assam upon completion of this course.
2. They will also be able to identify the main currents of political and socio-economic development in Assam after India's independence and the causes and impact of various struggles and movements in contemporary Assam.

Department of History (NON CBCS)

CORE COURSE

Semester I

PAPER 101- INTRODUCTION TO HISTORY

Course Outcome: After the completion of this paper

1. The students will be able to understand the meaning and scope of history.
2. The course will also provide the knowledge of other disciplines in relation with History.
3. The course will provide the knowledge of traditions of historical writings.

PAPER 102- HISTORY OF INDIA (300 AD- 1200 AD)

Course Outcome: After the completion of this paper

1. The students will be able to explore and effectively use historical tools in reconstructing the remote past of ancient Indian pre and proto history.
2. The course will also train the students to analyse the various stages of evolution of human cultures and the belief systems in the proto- history period.
3. The students will be able to explain the state formation, rise of religious movements, economic and socio-cultural connections, transitions and stratifications during the ruling houses, empires and the politico-administrative nuances of early Indian History and its impact upto 300AD.

PAPER 203- HISTORY OF INDIA (300 AD -1200 AD)

Course Outcome: After the completion of this paper

1. The students will be able to understand about the ancient Indian empire.
2. The course will explain the state, administration, socio-economic changes, cultural developments of ancient Indian empire.
3. The students get the knowledge of regional powers and foreign invasions in ancient india.

PAPER 204- HISTORY OF ANCIENT CIVILISATION OF THE WORLD

Course Outcome: After the completion of this paper

1. The students will be able to explain the processes and stages of the evolution of the variety of cultural pattern throughout antiquarian periods in History.
2. The students will able to understand the ancient civilization of Mesopotamia, Chinese, Greece, Roman empire.
3. They will be able to relate the connections between the various Bronze Age civilizations in the ancient world as well as development of slave and polis societies in ancient Greece.

PAPER 305- INDIA UNDER THE TURKO-AFGHANS

Course Outcome: After the completion of this paper

1. The students will be able to explain the political and administrative history of medieval period of India under the Turko- Afghans.
2. They will also be able to analyse the sources of history, regional variations, social, cultural and economic set up of the period.

PAPER 306- HISTORY OF ASSAM (5TH CENTURY AD TO 1228)

Course Outcome:

1. The students will understand about the history of ancient Assam, its ruling dynasties.
2. The students will be acquainted with major stages of developments in the political, social and cultural history of Assam during the early times.

PAPER 407- INDIA UNDER THE MUGHALS

Course Outcome: At the completion of this course,

1. The students will be able to analyse the circumstances and historical shifts and foundations of a variety of administrative and political setup in India under medieval period.
2. They will also be able to describe the inter relationships between the economy, culture and religious practices of the period.
3. The students will be able to explain and reconstruct the linkages of the history of India under the Mughal Rule.

4. As a whole, this course will enable them to relate to the socio-economic and religious orientation of the people of Medieval period in India.

PAPER 408- HISTORY OF EUROPE (1453- 1789)

Course Outcome: At the completion of this course

1. The students will be able to explain the major trends and developments in the Western world between the 14th to the 16th century CE.
2. They will be able to explore and analyse the significant historical shifts and events and the resultant effects on the civilizations of Europe in the period.
3. The student will be able to explain the political and intellectual currents in Europe in the Modern Age.
4. They will also be able to relate the circumstances and causal factors of the intellectual and revolutionary currents of both Europe and America at the beginning of the Modern age.

PAPER 509- INDIA UNDER THE EAST INDIA COMPANY

Course Outcome: After the completion of this course,

1. The students will be able to relate the circumstances leading to the consolidation of colonial rule over India and their consequences.
2. They will also be able to explain the orientation of the indigenous population and the masses towards resistance to the colonial exploitation.
4. The course will also enable the students to analyse popular uprisings among the tribal, peasant and common people against the British policies.

PAPER 510- HISTORY OF ASSAM (1228-1826)

Course Outcome: On completion of this paper,

1. The students will be able to identify major stages of developments in the political, social and cultural history of Assam during the medieval times.
2. This paper will enable the student to explain the history of Assam from the 13th century to the occupation of Assam by the English East India Company in the first quarter of the 19th century.

PAPER 511- HISTORY OF EUROPE (1789- 1870)

Course Outcome: After the completion of this course

1. The students will be able to evaluate the historical evolution and political developments that occurred in Europe in the period between 1789-1870.
2. They will also be able to critically analyse the evolution of social classes, nation states, evolution of capitalism and nationalist sentiment in Europe.
3. They will also be able to relate to the variety of causes that dragged the world into devastating wars in the intervening period.

PAPER 512- HISTORY OF SCIENCE AND TECHNOLOGY IN PRE COLONIAL PERIOD

Course Outcome: After the completion of this course

1. The students will be able to understand the stone age, bronze age technology, iron age culture.
2. The students will be able to understand the early developments and technological developments of medieval period.

PAPER 513- HISTORY OF GREAT BRITAIN (1485-1820)

Course Outcome: After the completion of this course

1. The students will be able to get the knowledge of the history of Renaissance and Reformation in England.
2. The students will be able to understand the constitutional developments, industrialization and its social impact in England.

PAPER 514- HISTORY OF CHINA (1839- 1949)

Course Outcome: After the completion of this course

1. The students will be able to understand the condition of China before the advent of the imperialist power.
2. The students will be able to understand the reform movements and about nationalism, growth of communism in China.

PAPER 615- INDIA UNDER THE CROWN

Course Outcome: After the completion of this course

1. The learners will be able to analyse the course of British colonial exploitation, the social mobilizations during the period between c.1857 to 1950 and also the techniques of Indian resistance to British policies.
2. It will also enable the students to explain the circumstances leading to de-colonization and also the initial period of nation building in India.

PAPER 616- HISTORY OF ASSAM (1826- 1947)

Course Outcome: After the completion of this course,

1. The students will be able to describe the period of British rule in Assam after its annexation by the imperialist forces.
2. They will also be able to situate the development of nationalism in Assam and its role in India's freedom struggle.
3. The course would enable the students to analyse the main currents of the political and socio-economic developments in Assam during the colonial period.

PAPER 617- HISTORY OF EUROPE (1871- 1945)

Course Outcome: After the completion of this course,

1. The students will be able to analyse the historical developments in Europe between c.1871-1945.
2. As the course structure of this paper focuses on the democratic and socialist foundations of modern Europe, the students will be able to situate the historical development of working-class movements, socialist upsurge and the economic forces of the two wars and the other ideological shifts of Europe in the period.

3. The students will be able to understand the foundation of a modern state in 19th century Europe and origin of World War I & II.

PAPER 618- WORLD SINCE 1945

Course Outcome: After the completion of this course

1. The students will be able to understand the international relations and world politics, foreign policies of major world powers.
2. The students will be able to understand the UNO and its activities and origins of the cold war.

PAPER 619- HISTORY OF JAPAN (1853- 1941)

Course Outcome: After the completion of this course

1. The students will be able to understand the history of Japan with the consideration of Meiji restoration and end of feudalism.
2. The students will be understanding the history of Japan between the two-world war.

Department of Mathematics (CBCS)

SEMESTER-I

MAT-HC-1016: Calculus (including practical)

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

- Learn first and second derivative tests for relative extremum and apply the knowledge in problems in business, economics and life sciences.
- Sketch curves in a plane using its mathematical properties in different coordinate systems.
- Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.
- Understand the calculus of vector functions and its use to develop the basic principles of planetary motion.

MAT-HC-1026: Algebra

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

- Employ De Moivre's theorem in a number of applications to solve numerical problems.
- Learn about equivalent classes and cardinality of a set.
- Use modular arithmetic and basic properties of congruences.
- Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix.
- Learn about the solution sets of linear systems using matrix method and Cramer's rule

GENERIC ELECTIVE PAPERS

MAT-HG-1016/ MAT-RC-1016: Calculus

Course Learning Outcomes: The students who take this course will be able to:

- Understand continuity and differentiability in terms of limits.
- Describe asymptotic behavior in terms of limits involving infinity.
- Use derivatives to explore the behavior of a given function, locating and classifying its extrema, and graphing the function.
- Understand the importance of mean value theorems.

MAT-HG-1026: Analytic Geometry

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

- Transform coordinate systems, conic sections
- Learn polar equation of a conic, tangent, normal and related properties
- Have a rigorous understanding of the concept of three-dimensional coordinate systems
- Understand geometrical properties of dot product, cross product of vectors

SEMESTER-II

MAT-HC-2016: Real Analysis

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

- Understand many properties of the real line R , including completeness and Archimedean properties.
- Learn to define sequences in terms of functions from N to a subset of R .
- Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence
- Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

MAT-HC-2026: Differential Equations (including practical)

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

- Learn basics of differential equations and mathematical modeling.
- Formulate differential equations for various mathematical models.
- Solve first order non-linear differential equations and linear differential equations of higher order using various techniques.
- Apply these techniques to solve and analyze various mathematical models.

GENERIC ELECTIVE PAPERS

MAT-HG-2016/MAT-RC-2016: Algebra

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

- Learn how to solve the cubic and biquadratic equations, also learn about symmetric functions of the roots for cubic and biquadratic
- Employ De Moivre's theorem in a number of applications to solve numerical problems.
- Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix. Finding inverse of a matrix with the help of Cayley-Hamilton theorem
- Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, ring etc.
- Learn about the concept of linear independence of vectors over a field, and the dimension of a vector space

MAT-HG-2026: Discrete Mathematics

Course Learning outcomes: After the course, the student will be able to:

- Understand the notion of ordered sets and maps between ordered sets.
- Learn about lattices, modular and distributive lattices, sublattices and homomorphisms between lattices.
- Become familiar with Boolean algebra, Boolean homomorphism, Karnaugh diagrams, switching circuits and their applications

SEMESTER-III

MAT-HC-3016: Theory of Real Functions

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

- Have a rigorous understanding of the concept of limit of a function.
- Learn about continuity and uniform continuity of functions defined on intervals.
- Understand geometrical properties of continuous functions on closed and bounded intervals.
- Learn extensively about the concept of differentiability using limits, leading to a better understanding for applications.
- Know about applications of mean value theorems and Taylor's theorem

MAT-HC-3026: Group Theory - I

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

- Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc.
- Link the fundamental concepts of groups and symmetrical figures.
- Analyse the subgroups of cyclic groups and classify subgroups of cyclic groups.
- Explain the significance of the notion of cosets, normal subgroups and factor groups.

- Learn about Lagrange's theorem and Fermat's Little theorem.
- Know about group homomorphisms and group isomorphisms.

[MAT-HC-3036: Analytical Geometry](#)

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

- Learn conic sections and transform co-ordinate systems
- Learn polar equation of a conic, tangent, normal and properties
- Have a rigorous understanding of the concept of three-dimensional coordinates systems

SKILL ENHANCEMENT COURSE SEC-1

[MAT-SE-3014: Computer Algebra Systems and Related Software](#)

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

- Use of software's; Mathematica/MATLAB/Maxima/Maple etc. as a calculator, for plotting functions and animations
- Use of CAS for various applications of matrices such as solving system of equations and finding eigenvalues and eigenvectors.

- Understand the use of the statistical software **R** as calculator and learn to read and get data into **R**.
- Learn the use of **R** in summary calculation, pictorial representation of data and exploring relationship between data.
- Analyse, test, and interpret technical arguments on the basis of geometry

MAT-SE-3024: [Combinatorics and Graph Theory](#)

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

- Learn about the counting principles, permutations and combinations, Pigeonhole principle
- Understand the basics of graph theory and learn about social networks, Eulerian and Hamiltonian graphs, diagram tracing puzzles and Knight's tour problem.

GENERIC ELECTIVE PAPERS

MAT-HG-3016/MAT-RC-3016: [Differential Equations](#)

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

Learn basics of differential equations and mathematical modelling.

Solve first order non-linear differential equations and linear differential equations of higher order using various techniques.

MAT-HG-3026: [Linear Programming](#)

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

- Learn about the graphical solution of linear programming problem with two variables.
- Learn about the relation between basic feasible solutions and extreme points.
- Understand the theory of the simplex method used to solve linear programming problems.
- Learn about two-phase and big-M methods to deal with problems involving artificial variables.
- Learn about the relationships between the primal and dual problems.
- Solve transportation and assignment problems.
- Apply linear programming method to solve two-person zero-sum game problems

SEMESTER-IV

MAT-HC-4016: Multivariate Calculus

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

- Learn the conceptual variations when advancing in calculus from one variable to multivariable discussion.
- Understand the maximization and minimization of multivariable functions subject to the given constraints
- Learn about inter-relationship amongst the line integral, double and triple integral formulations.
- Familiarize with Green's, Stokes' and Gauss divergence theorems.

MAT-HC-4026: Numerical Methods (including practical)

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

- Learn some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision.
- Know about methods to solve system of linear equations, such as False position method, Fixed point iteration method, Newton's method, Secant method and LU decomposition.
- Interpolation techniques to compute the values for a tabulated function at points not in the table.
- Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.

MAT-HC-4036: Ring Theory

Courses Learning Outcomes: On completion of this course, the student will be able to:

- Appreciate the significance of unique factorization in rings and integral domains.
- Learn about the fundamental concept of rings, integral domains and fields.
- Know about ring homomorphism and isomorphism theorems of rings.
- Learn about the polynomial rings over commutative rings, integral domains, Euclidean domains, and UFD

SKILL ENHANCEMENT COURSE

SEC-2

MAT-SE-4014: R Programming

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

- Become familiar with **R** syntax and to use **R** as a calculator.
- Understand the concepts of objects, vectors and data types.
- Know about summary commands and summary table in **R**.
- Visualize distribution of data in **R** and learn about normality test.
- Plot various graphs and charts using **R**.

MAT-SE-4024: LaTeX and HTML (practical)

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

- Create and typeset a LaTeX document.
- Typeset a mathematical document using LaTeX.
- Learn about pictures and graphics in LaTeX.
- Create beamer presentations.
- Create web page using HTML.

GENERIC ELECTIVE PAPERS

MAT-HG-4016/ MAT-RC-4016: Real Analysis

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

- Understand many properties of the real line \mathbb{R} , including completeness and Archimedean properties.
- Learn to define sequences in terms of functions from \mathbb{R} to a subset of \mathbb{R} .
- Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
- Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

MAT-HG-4026: Numerical Analysis

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

- Learn some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision.
- Know about iterative and non-iterative methods to solve system of linear equations
- Know interpolation techniques to compute the values for a tabulated function at points not in the table.
- Integrate a definite integral that cannot be done analytically
- Find numerical differentiation of functional values
- Solve differential equations that cannot be solved by analytical methods

SEMESTER-V

MAT-HC-5016: Riemann Integration and Metric spaces

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

- Learn about some of the classes and properties of Riemann integrable functions, and the applications of the Fundamental theorems of integration.
- Know about improper integrals including, beta and gamma functions.
- Learn various natural and abstract formulations of distance on the sets of usual or unusual entities. Become aware one such formulations leading to metric spaces.
- Analyse how a theory advances from a particular frame to a general frame.
- Appreciate the mathematical understanding of various geometrical concepts, viz. Balls or connected sets etc. in an abstract setting.
- Know about Banach fixed point theorem, whose far-reaching consequences have resulted into an independent branch of study in analysis, known as fixed point theory.
- Learn about the two important topological properties, namely connectedness and compactness of metric spaces.

MAT-HC-5026: Linear Algebra

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

- Learn about the concept of linear independence of vectors over a field, and the dimension of a vector space.
- Basic concepts of linear transformations, dimension theorem, matrix representation of a linear transformation, and the change of coordinate matrix.
- Compute the characteristic polynomial, eigenvalues, eigenvectors, and eigenspaces, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.
- Compute inner products and determine orthogonality on vector spaces, including Gram–Schmidt orthogonalization to obtain orthonormal basis.
- Find the adjoint, normal, unitary and orthogonal operators.

DISCIPLINE SPECIFIC ELECTIVE PAPERS DSE-1

MAT-HE-5016: Number Theory

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

- Learn about some fascinating discoveries related to the properties of prime numbers, and some of the open problems in number theory, viz., Goldbach conjecture etc.
- Know about number theoretic functions and modular arithmetic.
- Solve linear, quadratic and system of linear congruence equations.

MAT-HE-5026: Mechanics

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

- Know about the concepts in statics such as moments, couples, equilibrium in both two and three dimensions.
- Understand the theory behind friction and center of gravity.
- Know about conservation of mechanical energy and work-energy equations.
- Learn about translational and rotational motion of rigid bodies.

MAT-HE-5036: Probability and Statistics

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

- Learn about probability density and moment generating functions.
- Know about various univariate distributions such as Bernoulli, Binomial, Poisson, gamma and exponential distributions.
- Learn about distributions to study the joint behavior of two random variables.
- Measure the scale of association between two variables, and to establish a formulation helping to predict one variable in terms of the other, i.e., correlation and linear regression.
- Understand central limit theorem, which helps to understand the remarkable fact that: the empirical frequencies of so many natural populations, exhibit a bell-shaped curve, i.e., a normal distribution

DSE-2

MAT-HE-5046: Linear Programming

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

- Learn about the graphical solution of linear programming problem with two variables

- Learn about the relation between basic feasible solutions and extreme points.
- Understand the theory of the simplex method used to solve linear programming problems.
- Learn about two-phase and big-M methods to deal with problems involving artificial variables.
- Learn about the relationships between the primal and dual problems.
- Solve transportation and assignment problems.
- Apply linear programming method to solve two-person zero-sum game problems.

MAT-HE-5056: Spherical Trigonometry and Astronomy

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

- Learn about the properties of spherical and polar triangles
- know about fundamental formulae of spherical triangles
- learn about the celestial sphere, circumpolar star, rate of change of zenith distance and azimuth iv)
learn about Keplar's law of planetary motion, Cassini's hypothesis, differential equation for fraction

MAT-HE-5066: Programming in C (including practical)

Course Learning Outcomes: After completion of this paper, student will be able to:

- Understand and apply the programming concepts of C which is important to mathematical investigation and problem solving.
- Learn about structured data-types in C and learn about applications in factorization of an integer and understanding Cartesian geometry and Pythagorean triples.
- Use of containers and templates in various applications in algebra.
- Use mathematical libraries for computational objectives.
- Represent the outputs of programs visually in terms of well formatted text and plots.

SEMESTER-VI

MAT-HC-6016: Complex Analysis (including practical)

Course Learning Outcomes: Completion of the course will enable the students to:

- Learn the significance of differentiability of complex functions leading to the understanding of Cauchy–Riemann equations.
- Learn some elementary functions and can evaluate the contour integrals.
- Understand the role of Cauchy–Goursat theorem and the Cauchy integral formula.
- Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals

MAT-HC-6026: Partial Differential Equations (including practical)

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

- Formulate, classify and transform first order PDEs into canonical form.
- Learn about method of characteristics and separation of variables to solve first order PDE's.
- Classify and solve second order linear PDEs.
- Learn about Cauchy problem for second order PDE and homogeneous as well as nonhomogeneous wave equations.
- Apply the method of separation of variables for solving second order PDEs.

DISCIPLIN ESPECIFIC PAPERS DSE-3

MAT-HE-6016: Boolean Algebra and Automata Theory

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

- Learn about the order isomorphism, Hasse diagrams, building new ordered set.
- Learn about the algebraic structure lattices, properties of modular and distributive lattices.
- Get ideas about the Boolean algebra, switching circuits and applications of switching circuits.
- Appreciate the theory of automata and its applications

MAT-HE-6026: Bio-Mathematics

Course Learning outcomes: Apropos conclusion of the course will empower the student to:

- Learn the development, analysis and interpretation of bio mathematical models such as population growth, cell division, and predator-prey models.
- Learn about the mathematics behind heartbeat model and nerve impulse transmission model.
- Appreciate the theory of bifurcation and chaos.
- Learn to apply the basic concepts of probability to molecular evolution and genetics.

MAT-HE-6036: [Mathematical Modelling \(including practical\)](#)

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

- Know about power series solution of a differential equation and learn about Legendre's and Bessel's equations.
- Use of Laplace transform and inverse transform for solving initial value problems.
- Learn about various models such as Monte Carlo simulation models, queuing models, and linear programming models.

MAT-HE-6046: [Hydromechanics](#)

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

- Know about Pressure equation, rotating fluids.
- Learn about Fluid pressure on plane surfaces, resultant pressure on curved surfaces, Gas law, mixture of gases

- Learn about the Eulerian and Lagrangian method.
- Learn about equation of continuity, examples, acceleration of a fluid at a point

MAT-HE-6056: Rigid Dynamics

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

- Know how to find the moments and products of inertia.
- Learn about the motion of the centre of inertia
- Learn about the D'Alembert's principle and Lagrange's equations
- Learn about motion of a body in two dimensions.

MAT-HE-6066: Group Theory II

Course Learning Outcomes: The course shall enable students to:

- Learn about automorphisms for constructing new groups from the given group.
- Learn about the fact that external direct product applies to data security and electric circuits.
- Understand fundamental theorem of finite abelian groups.
- Be familiar with group actions and conjugacy in S_n .
- Understand Sylow theorems and their applications in checking non-simplicity.

MAT-HE-6076: Mathematical Finance

Course Learning outcomes: On completion of this course, the student will be able to:

- Know the basics of financial markets and derivatives including options and futures.
- Learn about pricing and hedging of options, as well as interest rate swaps.
- Learn about no-arbitrage pricing concept and types of options.
- Learn stochastic analysis (Ito formula, Ito integration) and the Black-Scholes model.
- Understand the concepts of trading strategies and valuation of currency swaps.

Department of Mathematics (Non-CBCS)

1st Semester (Major Course)

Paper-M104: Algebra and Trigonometry.

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

Learn about relation, equivalent classes and different type of mappings.

Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc.

Analyze and explain the significance of subgroups, cyclic groups, cosets, Lagrange's theorem, Fermat's Little theorem, normal subgroups and factor groups.

Know about complex number, their presentation, various properties of complex numbers, De Moivre's theorem, its application.

Learn about logarithm of a complex number, exponential, trigonometric, hyperbolic functions of a complex variable, Euler's expansion of cosine and sine etc.

Learn about Relation between the roots and coefficients of a polynomial equation in one variable; also learn symmetric functions of the roots, solution of cubic equation by Cardon's method.

Learn about different types of matrices, elementary operations, adjoint and inverse of a matrix, invariance of rank of a matrix under elementary operations, normal form, solution of a system of linear equations by matrix method.

Paper-M105: Calculus

Course Learning Outcomes: After the course, the student will be able to:

- Know about Successive differentiation, Leibnit'z theorem, partial differentiation of first and higher orders for functions of two and three variables, Euler's theorem on homogeneous functions.
- Have concept on Tangents, normals, subtangent, subnormal, pedal equation, polar equation, points of inflexion.
- Understand what is Curvature, radius of curvature, Asymptotes and working rules for determination these. Conjugate point, multiple point, of the curve $f(x,y)=0$ and tracing of different curves.
- Integrate different form of Integrals such as rational functions of $\sin x$ and $\cos x$. Also know Reduction formulae for integration, Rectification, Quadrature, volume and surface area of solids of revolution.

1st Semester (General Course)

Paper-E101: Classical Algebra and Trigonometry

Course Learning Outcomes: After completion of this paper students will be able to know about:

- Sequence of real numbers, bounded, convergent, non- convergent sequences. Cauchy sequence, Cauchy's general principle of convergence, Subsequence, monotonic sequences.
- Tests for convergence: Comparison test, Ratio test, Raabe's test, Leibnitz's test.
- Geometrical Representation of Complex numbers, Polar form, Modulus, amplitude and their various properties, De Moiver's theorem and its application.
- Relation between roots and coefficients, Symmetric functions of roots, Cardon's method of solution of a cubic equation.

2nd Semester (Major Course)

Paper-M204: Co-Ordinate Geometry

Course Learning Outcomes: After the course, the student will be able to know about:

- Transformation of coordinate axes, pair of straight lines.
- Parabola, tangent, normal, ellipse and its conjugate diameters, pole and polar, centre of a conic, equation of pair of tangents etc.
- 3-D plane, straight lines and shortest distance.
- Sphere, cone, cylinder, central conicoids, ellipsoid, hyperboloid, enveloping cone and cylinder.

Paper-M205: Differential Equation

Course Learning Outcomes: After the course, the student will be able to know about:

- Formation of ordinary differential equations, degree and order of ordinary differential equations,
- Method of solving differential equations: exact differential equations, homogeneous linear differential equations, Bernoulli's equations and Clairaut's form.
- Linear differential equations with constant and variable coefficients.
- Simultaneous linear differential equations, total differential equations.
- Partial differential equations of 1st order, Lagrange's solutions and Charpit's general method of solution.

2nd Semester (General Course)

Paper-E201: Abstract Algebra and Matrices.

Course Learning Outcomes: After completion of the paper students will be able to know:

- Group, various types of groups, Subgroups, Cosets, Lagrange's theorem, Normal subgroups, Quotient groups.
- Homomorphism and Isomorphism of groups.
- Definition, examples and simple properties of Rings. Integral Domains, Fields .
- Matrices, types of matrices, adjoint and inverse of a matrix, rank of a matrix and solution of a system of linear equations by matrix method.

3rd Semester (Major Course)

Paper-M304: Abstract Algebra

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

- Learn Homomorphism and isomorphism groups, inner automorphism and class equation of groups.
- Learn about the fundamental concept of rings, integral domains, fields, subrings ideals of rings and about vector space and its subspaces
- Know about ring homomorphism and isomorphism theorems of rings.
- Learn about the polynomial rings, quotient rings, field of quotients of an integral domain, Euclidean rings.

3rd Semester (Major Course)

Paper-M305: Linear Algebra and Vector

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

- Learn about sums and direct sum of subspaces, linear span, linear dependence and independence, basis, subspaces, quotient spaces and dimension.
- Know linear transformations and their representation as matrices, the rank nullity theorem.
- Learn about eigenvalues, eigenvector, characteristic equation of a matrix, Cayley Hamilton theorem and existence of solution of a system of linear equations.
- Concept of Scalar triple product, vector triple product, product of four vectors.
- Concept of Continuity, derivability, partial derivatives of vector point function, gradient, curl and divergence.
- Learn vector integration, Green, Stokes and Gauss's theorems.

3rd Semester (General Course)

Paper-E303: Calculus: Methods and applications

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

- Familiar with the properties of continuous functions, differentiation, successive differentiation, Leibnitz's theorem. tangents and normals.
- Know Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean Value theorem, expansions of functions. Indeterminate forms, Maxima and Minima etc.
- Have working knowledge of the limit and continuity of a functions of two or more
- Variables, Partial differentiation, Euler's theorem on homogeneous functions, Maxima and minima of a function of two variables.
- Know about working rules for finding curvature, asymptotes, properties of definite integrals.
- Have concept about differential equation, finding their solution by different methods and applications.

4th Semester (Major Course)

Paper-404: Real Analysis

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

- Understand many properties of the real line R , including completeness and Archimedean properties.
- Learn to define sequences in terms of functions from N to a subset of R .
- Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence
- Apply the ratio, root, alternating series and limit comparison tests for convergence

- Understand limit, continuity, uniform continuity of a function of single variable and their properties.
- Know about Derivability, Taylor's theorem, Taylor's and Maclaurin's infinite series, maxima-minima of a function.

Paper-405: Mechanics

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

- Get concept of Parallel forces, couples, equilibrium of coplanar forces, friction.
- Know Centre of gravity of solids and surface of revolution, C.G of areas bounded by a given curve.
- Learn Principle of virtual work-in 2D, forces in 3D, Stable and unstable equilibrium.
- Learn about Velocities, acceleration, simple harmonic motion and elastic string.
- Also learn about Motion on smooth and in resisting medium, Central orbit and Kepler's laws.

4th Semester (General Course)

Paper-E403: Coordinate Geometry and Vector Analysis

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

- Get idea of coordinate axes and Pair of straight lines.
- Learn about parametric form equation of circle and parabola, Their tangent, normal,
- Know **tangent**, normal and conjugate diameters of Ellipse, hyperbola and its asymptotes.
- Get idea of general equation of second degree and the conditions for representing a pair of straight lines, parabola, an ellipse, a hyperbola and reduction to standard forms. Polar equations of conics.
- Apply to find equation of Plane, straight lines, shortest distance, Sphere, circle in three dimensions, Cone and cylinder.
- Know about products of vectors, continuity and differentiation of vector point function. Partial derivatives of vectors, curl, grad, divergence.

5th Semester (Major Course)

Paper-M501: Real and Complex Analysis

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

- Understand Limit, continuity, partial derivatives, differentiability of a function of several variables and its applications in finding jacobians, maxima and minima.
- Learn Riemann integrals, the fundamental theorem of integral calculus and application of M.V. theorems of integral calculus.
- Know about Improper integrals and their convergence, various forms of comparison tests. Continuity, derivability and integrability of an integral as a function of a parameter.

- Learn limit, continuity, differentiability of a function of complex variable. Also analytic functions, Cauchy-Riemann equations, harmonic functions.
- Get idea of Rectifiable curves, fundamental Cauchy theorem, Cauchy integral formula.

Paper-M502: Topology

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

- Familiar with metric spaces, open set, closed sets, subspace of a metric space, Cauchy sequences, completeness, Cantor's intersection theorem.
- Know dense subsets, Baire's category theorem, countable spaces, continuous functions, isometry and homeomorphism.
- Learn Compactness, finite intersection property, connected sets and components.
- Learn topological spaces, metric topology, limit points, bases and sub bases, relative topology, continuity and homeomorphism topological spaces.
- Use norm to define normed linear space, Banach space, inner product
- space and Hilbert space and know some elementary properties.

Paper-M503: Spherical Trigonometry and Astronomy

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

- Get idea of spherical triangles, their properties, sine, cosine, cot formula, Napier's rule of circular parts.
- Learn the standard celestial sphere, system of coordinates, conversion of one coordinate system to the another system, rising and setting of stars, dip of the horizon, rate of change of zenith distance and azimuth,
- Know planetary motion: Kepler's law of planetary motion, Newton's law of gravitation, laws of refraction declination.
- Learn Geocentric parallax, parallax, effect of parallax on the star longitude, and latitude. ar eclipses, condition of eclipse, frequency of eclipses.

Paper-M504: Rigid Dynamics

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

- Get idea of Moments and products of inertia, parallel axes theorem, principal axes.
- Learn D'Alembert's principle, motion of the centre of inertia.
- Motion about a fixed axis, the compound pendulum.
- Motion of a body in two dimensions under finite and impulsive forces. Conservation of momentum and energy.

Paper-M505: Probability

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

- Familiar with definition of probability and the theorems of total and compound probability. Conditional probability and independent events, Bay's theorem.
- Know Random variables, discrete and continuous probability distributions, change of variables, conditional distribution.
- Learn Mathematical expectation, variance and standard deviation, Chebyshev's inequality, law of large numbers
- Learn some important probability distributions: Binomial, Poisson and Normal.

Paper-M506: Optimization Theory

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

- Familiar with Partitioning of matrices, simultaneous equations, basic solution, point sets, convex sets and their properties, convex cones.
- Get ideas of general linear programming problems, mathematical formulation of a linear programming problem, finding feasible solution, graphical method for the solution of a linear programming problem.
- Learn **simplex** method and apply the simplex method of solution of a linear programming problem,
- Know Principles of duality in linear programming problem, fundamental duality theorem, simple problems.
- Solve the Transportation and Assignment problem.

5th Semester (General Course)

Paper-E503: Statics and Dynamics

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

- Familiar with Parallel forces, Couple, System of coplanar forces and conditions of equilibrium.
- Determine Centre of gravity of plane curves, sector of a circle and a parabola.
- Understand Friction, laws of friction and its effect on a particle on a rough inclined plane.
- Understand role of Machines, Mechanical advantage, velocity ratio, three systems of pulleys.
- Determine velocity and acceleration along radial and transverse direction, relation of angular and linear velocity.
- Know rectilinear motion with variable acceleration, square law and other laws of forces.
- Get idea of **Simple** harmonic motion, Motion of a projectile, impulsive forces Conservation of linear momentum and energy **Impact** of elastic bodies

Paper-E504: Numerical Method and Spherical Astronomy

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

- Know **Finite** Difference, Interpolation, Newton's forward and backward formula etc
- Learn Bisection method, Iteration method, Newton –Raphson methods.

- Familiar with Spherical triangle and its properties, sine-cosine formulae.
- Celestial sphere-three coordinate systems, Altitude of a celestial body, signs of zodiac.
- Planetary motion, Kepler's laws, Newton's law of gravitation.

6th Semester (Major Course)

Paper-M601: Hydrostatics

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

- Pressure equation, surface of equal pressure, rotating fluids.
- Fluid pressure on plane surfaces, centre of pressure and pressure on curved surfaces.
- Equilibrium of a floating body, surface of buoyancy, stability of equilibrium of floating bodies.
- Gas law, mixture of gases, internal energy, isothermal atmosphere,

Paper-M602: Numerical Analysis

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

- Normalized floating point representation of real numbers, truncation, round off errors, approximation and significant figures.
- Calculus of finite difference s, Newton's formulae, Lagrange's formula, Hermite interpolation.
- Numerical differentiation and integration, general quadrature formula, trapezoidal rule.
- Solution of polynomial, regular falsi method, Newton-Raphson method and comparison of methods.

Paper-M603: Computer Programming in C

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

- Get introduction of central processing, various memory, operating system and its need, levels language editor, algorithm, flowchart and C-requirement of programming language to solve problems for computer.
- Get ideas of variables, constants and identifiers, characters, floating point, Syntax and semantics, various expression operators in C.
- Apply Conditional Statement if, if-else, switch. Iterative statement: while, do while. For Arrays and pointers statements: break, continue, go to, return, null statement, block statement
- Get knowledge of Functions, storage class recursion and how it works, conversion of recursive programmes to non-recursive version.
- Solve various problems writing in c-Programming such as to find gcd, addition subtraction and multiplication of matrices and solution of transcendental equation.

Paper-M604: Discrete Mathematics

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

- Familiar with Peano's axiom, well ordered principle, division algorithm, prime numbers, unique factorization theorem.

- Know Congruence's, properties of congruence's and its applications in various topics. Fermat's Little theorem and Wilson's theorem.
- Learn Diophantine equations, Fermat's last theorem, representation of a number by two or four squares.
- Get concept **Number** theoretic function: Euler's phi function, Euler's theorem, basic theorems on $\tau(n)$ and $\sigma(n)$, the Mobious function, greatest integer function.
- Understand Propositional logic, Boolean algebra and its properties.
- Acquire knowledge of Boolean expression in DNF, CNF, Complement of DNF CNF and their various applications.

Paper-M605: Graph and Combinatorics

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

- Familiar with elementary combinatorics, Rules of sum and product, two models of counting, sample and distribution model of counting and solution of problems.
- Get concept various Graphs, Walks and connectedness, degrees, operations on graphs, Cut points. Bridges, Block graphs, Cut point graphs, Characterization of trees.
- Know about Eulerian graphs, Hamiltonian graphs and their characterizations

6th Semester (General Course)

Paper-E603: Linear Algebra and Complex analysis

Course Learning Outcomes: The course will enable the students to know:

- vector spaces, subspaces with their some properties, linearly dependent and independent set, basis, dimension of a vector space.
- Linear mapping with algebraic properties.
- Reduction to echelon and normal form to determine rank of a matrix by elementary transformation.
- Eigenvalues, eigenvectors, characteristic equation, Cayley-Hamilton theorem and its applications.
- Functions of a complex variable, their limit, continuity and theorems on them, derivatives, Cauchy –Riemann equations, analytic and harmonic functions.
- Integration of complex function along an oriented curve, Cauchy integral formula.

Paper-E604: Advanced Calculus

Course Learning Outcomes: The course will enable the students to know:

- Concept of Metric space with reference Neighborhoods, open sets, closed sets, Bolzano-Weierstrass theorem and complete metric spaces.
- Riemann integral and Fundamental theorem of integral calculus
- Elementary idea of improper integrals, Beta and Gamma functions.

- application of double and triple integrals with Beta and Gamma functions in determination of area and volume.

Department of Physics (CBCS)

SEMESTER-I

Paper Code: PHY-HC-1016

Paper Title: Mathematical Physics I

- On successful completion of this paper, students should be able to understand vector and its applications in various fields, differential equations and its applications, different co-ordinate systems, concept of probability and error.
- After completing the lab course, the students will understand the use of computational methods to solve different physical problems.

Paper Code: PHY-HC-1026

Paper Title: Mechanics

- On successful completion of the course, students should be able to understand Inertial and non-inertial reference frames, Newtonian motion, Galilean transformations, projectile motion, work and energy, Elastic and inelastic collisions, motion under central force, simple harmonic oscillations, special theory of relativity.
- The lab course will enable students to measure different physical quantities, such as small length/diameter, spring constant, Rigidity modulus, Moment of Inertia, Coefficient of viscosity, Young's modulus, value of g etc.

SEMESTER-II

Paper Code: PHY-HC-2016

Paper Title: Electricity and Magnetism

- After successful completion of this course, students should be able to understand electric and magnetic fields in matter, Dielectric properties of matter, magnetic properties of matter, electromagnetic induction, applications of Kirchhoff's laws in different circuits, applications of network theorems in circuits.
- The lab course will enable students to understand the use of multimeter, potentiometer, Carey Foster's Bridge, to verify different network theorems, to determine self-inductance, mutual inductance, to study a series LCR circuit, parallel LCR circuit, Ballistic galvanometer etc.

Paper Code: PHY-HC-2026

Paper Title: Waves & Optics

- After successful completion of this course, students will be able to understand superposition of harmonic oscillations, different types of wave motions, superposition of harmonic waves, interference and interferometer, diffraction, holography.

- The lab course will enable students to familiarize with Schuster's focusing, to determine wavelength of sodium light, spectral lines of Hg source, dispersive and resolving powers of a grating, refractive index of the material of a prism etc.

SEMESTER-III

Paper Code: PHY-HC-3016

Paper Title: Mathematical Physics II

- After completion, students will be able to solve differential equation using power series solution method, solve differential equation using separation of variables method, special integrals, different properties of matrix, Fourier series.
- The lab course will enable students to use the computational methods to solve physical problems.

Paper Code: PHY-HC-3026

Paper Title: Thermal Physics

- Upon successful completion, students will have the knowledge and skills to identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, Thermodynamic potentials, Free energies, Maxwell's relations in thermodynamics, behavior of real gases.
- The lab course enables the students to determine Mechanical Equivalent of Heat, Coefficient of Thermal conductivity, Temperature coefficient of resistance, Neutral Temperature of a Thermocouple and also to study the variation of Thermo-emf of a thermocouple with temperature.

Paper Code: PHY-HC-3036

Paper Title: Digital Systems & Applications

- After successful completion of the course student will be able to understand the working principle of CRO, develop a digital logic and apply it to solve real life problems, Analyze, design and implement combinational logic circuits, classify different semiconductor memories, Analyze, design and implement sequential logic circuits, analyze digital system design using PLD, Simulate and implement combinational and sequential circuits.
- The lab course enables the students to understand the uses of a CRO, to design and verify different logic circuits, such as NOT, AND, OR, XOR, Half Adder, Full Adder, Half Subtractor, Full subtractor, Flip-Flops, Counters, Registers, Multivibrators and also to have a basic understanding of the uses of a 8085 Microprocessor.

SEMESTER-IV

Paper Code: PHY-HC-4016

Paper Title: Mathematical Physics III

- On successful completion of the course students will be able to solve complex integrals using residue theorem, apply Fourier and Laplace transforms in solving differential equations, understand properties of Tensor like Transformation of coordinates, contravariant and covariant tensors, indices rules for combining tensors.
- After completion of the lab course, the students will be able to use computational methods to solve differential equation, evaluate integrals involving Dirac Delta function, Fourier series, Special functions, Trigonometric functions etc.

Paper Code: PHY-HC-4026

Paper Title: Elements of Modern Physics

- On completion of the course students will be able to understand modern developments in Physics, Starting from Planck's law, development of the idea of probability interpretation and the formulation of Schrodinger equation. Students will also get preliminary idea of structure of nucleus, radioactivity Fission and Fusion and Laser.
- The lab course will enable the students to measure Planck's constant, to study photo-electric effect, to determine the work function, H_α emission line of hydrogen atom, the value of e/m_e , the charge of an electron, to study tunnel diode, to determine the wavelength of laser source etc.

Paper Code: PHY-HC-4036

Paper Title: Analog Systems & Applications

- On successful completion of the course, students will be able to understand about the physics of semiconductor, p-n junction and devices such as rectifier diodes, zener diode, photodiode etc. and bipolar junction transistors, transistor biasing and stabilization circuits, the concept of feedback in amplifiers and the oscillator circuits. Students will also have an understanding of operational amplifiers and their applications.
- The lab course will enable students to study the characteristics of PN junction diode, LED, zener diode, solar cell, BJT, to design Amplifiers, Oscillators, DAC, ADC, to study different applications of an op-amp etc.

SEMESTER-V

Paper Code: PHY-HC-5016

Paper Title: Quantum Mechanics & Applications

- On successful completion of the course, students will be able to understand the principles of Quantum Mechanics, such as Schrodinger equation, the wave equation, the uncertainty principle, stationary and non-stationary states, time evolution of solutions, as well as the relation between Quantum Mechanics and linear algebra.

- Students will also be able to solve the Schrodinger equation for hydrogen atom. Students will have the concepts of angular momentum and spin, as well as the rules for quantization and addition of these, spin-orbit coupling and Zeeman Effect.
- On completion of the lab course, the students will be able to solve different problems based on Quantum Mechanics using a programming language or a mathematical software.

Paper Code: PHY-HC-5026

Paper Title: Solid State Physics

- The course will enable the students to explain the main features of crystal lattices and phonons, understand the elementary lattice dynamics and its influence on the properties of materials, describe the main features of the physics of electrons in solids; explain the dielectric, ferroelectric and magnetic properties of solids and understand the basic concept of superconductivity.
- The lab course will enable the students to measure susceptibility of paramagnetic solution and also solids, to determine Dielectric constant of a dielectric, to study B-H curve, to determine Hall coefficient of a semiconductor etc.

Paper Code: PHY-HE-5036 (DSE Paper)

Paper Title: Advanced Mathematical Physics I

- Upon completion of this course, students will be able to solve problems in physics related to linear vector space, Matrix algebra, Tensor.
- On completion of the lab course, the students will be able to perform computer based simulations experiments based on Mathematical Physics problems.

Paper Code: PHY-HE-5056 (DSE Paper)

Paper Title: Nuclear and Particle Physics

- On completion, students will have the understanding of the sub-atomic particles and their properties. They will gain knowledge about the different nuclear techniques and their applications in different branches of physics. The problem-based skills developed and the acquired knowledge can be applied in the areas of nuclear, medical, archeology, geology and other interdisciplinary fields of Physics and Chemistry.

SEMESTER-VI

Paper Code: PHY-HC-6016

Paper Title: Electromagnetic Theory

- On successful completion of the course, students will acquire the concepts of Maxwell's equations, propagation of EM waves in different homogeneous-isotropic as well as anisotropic unbounded and bounded media, production and detection of different types of polarized EM waves, general information on waveguides and fibre optics.

- The lab course will enable the students to verify Malu's law, determine the specific rotation of sugar solution using polarimeter, to study reflection and refraction of microwaves, to determine Boltzmann constant, Stefan's constant, R.I. of glass and liquid by TIR, to study polarization and interference in microwaves etc.

Paper Code: PHY-HC-6026

Paper Title: Statistical Mechanics

- On successful completion of this course, students will learn the techniques of Statistical Mechanics to apply in various fields including Astrophysics, Semiconductors, Plasma Physics, Bio-Physics, Chemistry and in many other directions.
- The lab course will enable the students to solve problems based on Statistical Mechanics using numerical simulations.

Paper Code: PHY-HE-6036 (DSE Paper)

Paper Title: Advanced Mathematical Physics II

- Upon completion of this course, students will be able to apply the concepts of Calculus of variations, Group Theory and Probability Theory to solve numerical problems in Physics.

Paper Code: PHY-HE-6046 (DSE Paper)

Paper Title: Astronomy and Astrophysics

- Upon completion of this course, students will be able to understand the origin and evolution of the Universe. The course will give a comprehensive introduction on the measurement of basic astronomical parameters such as astronomical scales, luminosity and astronomical quantities.
- It will give an overview on key developments in observational astrophysics. Students will have the idea of the instruments implemented for astronomical observation, the formation of planetary system and its evolution with time, the physical properties of Sun and the components of the solar system; and stellar and interstellar components of our Milky Way galaxy. Students will have the understanding of the origin and evolution of galaxies, presence of dark matter and large-scale structures of the Universe.

HONOURS GENERIC/REGULAR CORE (CBCS)

SEMESTER-I

Paper Code: PHY-HG-1016/PHY-RC-1016

Paper Title: Mechanics

- Upon completion of this course, students are expected to understand the role of vectors and coordinate systems in Physics, solve Ordinary Differential Equations, laws of motion and their application to various dynamical situations, Inertial reference frames their transformations,

concept of conservation of energy, momentum, angular momentum and apply them to basic problems, phenomenon of simple harmonic motion, motion under central force, concept of time dilation, Length contraction using special theory of relativity. In the laboratory course, after acquiring knowledge of how to handle measuring instruments (like screw gauge, Vernier calipers, travelling microscope) student shall embark on verifying various principles and associated measurable parameters.

SEMESTER-II

Paper Code: PHY-HG-2016/PHY-RC-2016

Paper Title: Electricity & Magnetism

- Upon completion of this course, students are expected to apply Gauss's law of electrostatics to solve a variety of problems, calculate the magnetic forces that act on moving charges and the magnetic fields due to currents, have brief idea of magnetic materials, understand the concepts of induction, and apply them to solve variety of problems. In the Lab course, students will be able to measure resistance (high and low), Voltage, Current, self and mutual inductance, capacitor, strength of magnetic field and its variation, study different circuits RC, LCR etc.

SEMESTER-III

Paper Code: PHY-HG-3016/PHY-RC-3016

Paper Title: Thermal Physics & Statistical Mechanics

- Upon completion of this course, students are expected to learn the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations, Maxwell's thermodynamic relations, fundamentals of the kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion, black body radiations, Stefan-Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances, quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi-Firac statistics.
- In the laboratory course, the students will be able to Measure Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature coefficient of resistance, study variation of thermo emf across two junctions of a thermocouple with temperature etc.

SEMESTER-IV

Paper Code: PHY-HG-4016/PHY-RC-4016

Paper Title: Waves & Optics

- Upon completion of this course, students are expected to understand Simple harmonic oscillation and superposition principle, importance of classical wave equation in transverse and longitudinal waves and solving a range of physical systems on its basis, concept of normal modes in transverse and longitudinal waves: their frequencies and configurations, interference as superposition of waves from coherent sources derived from same parent source, Demonstrate understanding on Interference and diffraction experiments, Polarization.
- In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. resolving power of optical equipment, the motion of coupled oscillators, study of Lissajous figures and behavior of transverse, longitudinal waves.

SKILL ENHANCEMENT COURSE (CBCS)

SEMESTER-III

Paper Code: PHY-SE-3094

Paper Title: PageMaker

- On successful completion of the course students will be able to Create Documents and Templates, add text into documents using various methods, and apply different formatting styles to characters and paragraphs, Import graphics, create objects using various tools, add effects to objects, Create a book and export it into PDF, Multipage Layout Design.
- The lab course will enable students to design Letter Head, Business Card, Sign Board, Cash Memo, Logo, Certificate, Newspaper Advertisement, Newsletter design etc.

SEMESTER-IV

Paper Code: PHY-SE-4044

Paper Title: Photoshop

- On successful completion of the course students will be able to work with the tools in Adobe Photoshop CC, crop image in Adobe Photoshop CC, to resize an image for print and digital media in Adobe Photoshop CC, apply Photoshop filters in print and digital media, apply filters to sharpen the images, different types of brushes used for digital painting.

DEPARTMENT OF PHYSICS (NON CBCS)

Program Outcome

At the completion of B. Sc. in Physics students are able to:

Demonstrate a rigorous understanding of the core theories & principles of physics, which includes mechanics, electromagnetism, thermodynamics, & quantum mechanics. Learn the Concepts as Quantum Mechanics, Relativity, introduced at degree level in order to understand nature at atomic levels. Provide knowledge about material properties and its application for developing technology to ease the problems related to the society. Understand the set of physical laws, describing the motion of bodies, under the influence of system of forces.

Understand the relationship between particles & atom, as well as their creation & decay. Relate the structure of atoms & subatomic particles Understand physical properties of molecule the chemical bonds between atom as well as molecular dynamics. Analyse the applications of mathematics to the problems in physics & develop suitable mathematical method for such application & for formulation of physical theories. Learn the structure of solid materials & their different physical properties along with metallurgy, cryogenics, electronics, & material science. Understand the fundamental theory of nature at small scale & levels of atom & sub-atomic particles.

Course Outcome

First Semester

Paper 101: Mathematical methods and Mechanics

After completion of this course student will understand about the vector and scalar fields and their mathematical operation. Also, the application of these fields in practical time. Student will be able to relate the inertial and non-inertial frame and their different laws and principles in these frames.

Paper 102: Wave, oscillations and Ray optics

After completion of this course student should be able to –

- Demonstrate the behaviour and nature of a wave and its application.
- Explain why SHM is important in physical world.
- Describe the formation of real and virtual images in lens as well as mirror.

Second semester

Paper 201: Mathematical methods- II and Properties of matter.

After completion of this course, student will able to explain about the physical application of Green's function and curvilinear surface. The conversion of Cartesian to other co-ordinate system also get acquainted. Student will also able to relate the elasticity, surface tension and viscosity in real time after completion of course.

Paper 202: Heat and thermodynamics.

After completion of this course student will able to –

- Describe basic concepts of Thermodynamic.
- Judge the properties of pure substance.
- Application of law of thermodynamics for any real systems.
- Can relate with the energy efficiency.

Third Semester

Paper 301: Mathematical Methods-III and Electrostatics

After completion of this course student will able to –

- The students will be able to understand and apply matrix mathematical skills to solve quantitative problems in the study of physics.
- Will enable students to apply integral transform to solve mathematical problems of interest in physics.
- To explain and solve advanced problems based on classical electrodynamics using Maxwell's equation.
- The students will be able to analyse radiation systems in which the electric dipole, magnetic dipole or electric quadruple dominate.

Paper 302: Current electricity and Magneto statics

After completion of this course student will able to –

- Obtain, through a combined theoretical and experimental approach to the subject, a fundamental understanding of electromagnetic phenomena.
- Learn how to analyse various problems in electromagnetism with mathematical methods involving vectors and elementary differential and integral calculus.
- Gain experience in analysing problems within electromagnetism with ICT based methods.
- Learn experimental methods in physics.

Fourth Semester

Paper 401: Mathematical methods- IV and computer programming.

After completion of this course student will able to –

- Identify situations where computational methods and computers would be useful.
- Given a computational problem, identify and abstract the programming task involved.
- Approach the programming tasks using techniques learned and write pseudo-code.
- Choose the right data representation formats based on the requirements of the problem.
- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.
- Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Paper 402: Wave optics and special theory of relativity

After completion of this course student will able to –

- Appreciate the efficacy of Fourier transforms and their application to physical systems.
- Understand linear, time-invariant systems.
- Understand the role of the wave equation and appreciate the universal nature of wave motion in a range of physical systems
- Understand dispersion in waves and model dispersion using Fourier theory.
- Derive Lorentz transformation equations by using special Theory of Relativity.
- Define Four-Dimensional Space and deduce the transformation formulae between E and B , J and ρ .
- Explain Gibb's paradox.

Fifth Semester

Paper 501: Mathematical Methods- V and Classical Mechanics

After completion of this course student will able to –

- To demonstrate knowledge and understanding of the following fundamental concepts in: the dynamics of system of particles, motion of rigid body,
- Lagrangian and Hamiltonian formulation of mechanics
- To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.

Paper 502: Atomic Physics

After completion of this course student will able to –

- Explain the characteristics of Photoelectric and Compton effects.
- Give the origin of Hydrogen spectra from Bohr's theory.
- Obtain the energy values of systems executing Linear Harmonic Oscillator
- Explain the characteristics of X Ray Spectra and derive Mosley's law.

Paper 503: Quantum Mechanics

After completion of this course student will able to –

- Able to formulate and solve problems in quantum mechanics using Dirac representation.
- Able to grasp the concepts of spin and angular momentum, as well as their quantization and addition rules.
- Familiar with various approximation methods applied to atomic, nuclear and solid- state physics.

Paper 504: Electronics

After completion of this course student will able to –

- Explain the I-V characteristics of Zener diode, Tunnel diode and PN diode.
- Construct Rectifiers and Filters using diodes.
- Find gain of BJT Amplifiers & frequency of operation of Oscillators.
- Explain communication techniques using Modulation & de modulation.
- Calculate gain of Operational Amplifiers and describe its use.
- Introduce basic gates and construct Flip- Flops.

Sixth Semester

Paper 601: Nuclear Physics

After completion of this course student will able to –

- Express the basic concepts of nuclear physics.
- Express the alpha decay. Can express reaction equation and Q values and Energy of alpha particles.
- Express the types of gamma decay. Can tell about selection rules.
- Explain nuclear fusion. Can state basic fusion processes. Can write characteristics of fusion, cycles in solar fusion
- Express the basic principles and laws on criterion.

Paper 602: Mathematical Methods and Solid-State Physics

After completion of this course student will able to –

- The students should be able to formulate and express a physical law in terms of tensors, and simplify it by use of coordinate transforms.
- Be able to account for interatomic forces and bonds
- Be able to account for how crystalline materials are studied using diffraction, including concepts like form factor, structure factor, and scattering amplitude.
- Know the principles of structure determination by diffraction.

Paper 603: Modern optics and Electromagnetic theory

After completion of this course student will able to –

- Describe the optical principles of thick lenses and optical aberrations.
- Use the principles of wave motion and superposition to explain the physics of polarisation, interference and diffraction.
- Describe the operation of optical devices, including, polarisers, retarders, modulators and interferometers.
- Define and recognize different co- ordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory as they are functions of space and time.
- Apply different techniques of vector calculus to understand different concepts of electromagnetic field theory.
- Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields (Field intensity, Flux density etc.)

Paper 604: Statistical Mechanics and Computer Application

After completion of this course student will able to –

- Acquired a foundation for advanced courses in physics, especially those involving many-particle systems.
- Be able to analyse and debate society problems of energy, environment and climate based on fundamental principles of thermodynamics and statistical physics.
- Be able to solve integration, differentiation using computer programming.

DEPARTMENT OF POLITICAL SCIENCE (CBCS)

SEMESTER I

POL HC 1016: UNDERSTANDING POLITICAL THEORY

Course Outcome:

- To Introduce the idea of political theory and various approaches
- To enable the students to assess the contemporary trends of political theory
- To reconcile theory and practice in relation to democracy

POL HC 1026 CONSTITUTIONAL GOVERNMENT AND DEMOCRACY IN INDIA

Course Outcome:

- To acquaint students with constitutional design of state structures and institutions
- To understand the conflicts in constitutional provisions
- To make them comprehend the state institutions in relation to extra constitutional environment.

SEMESTER II

POL HC 2016 POLITICAL THEORY-CONCEPTS AND DEBATES

Course Outcomes:

- Understand the various concepts in political theory and appreciate how they can be helpful to analyse crucial political issues
- Understand the significance of debates in political theory in exploring multiple perspective to concepts, ideas and issues.
- Appreciate how these concepts and debates enrich political life and issues surrounding it.

POL HC 2026 POLITICAL PROCESS IN INDIA

Course outcome:

- Understand the working of major political institutions in India
- Understand the major debates in Indian politics along the axes of caste, gender, region and religion
- Understand the changing nature of the Indian state and the contradictory dynamics of modern state power

SEMESTER III

POL HC 3016 INTRODUCTION TO COMPARATIVE GOVERNMENT AND POLITICS

Course Outcome:

- To make students understand the basic concepts in comparative politics,
- To make students classify the different political systems and historical context of modern governments,
- To enable students to have a comparative analysis of countries related to their political institutions and behaviour.

POL HC 3026 PERSPECTIVES ON PUBLIC ADMINISTRATION

Course Outcome:

- To enable students to learn the basic concepts related to public administration and its importance,
- To make students learn the major theories of public administration,
- To enable students to have an understanding of public policy and its formulation,
- To familiarize students with the major approaches and recent debates related to field of public administration.

POL HC 3036 PERSPECTIVES ON INTERNATIONAL RELATIONS AND WORLD HISTORY

Course outcome:

- To make students understand the key theoretical approaches in international relations,
- To familiarize students with the evolution of international state systems and its importance.
- To make students aware of the key theoretical debates in international relations
- To enable students to have an overall understanding of international relations in relation to twentieth century IR history.

SEMESTER IV

POL HC 4016 POLITICAL PROCESSES AND INSTITUTIONS IN COMPARATIVE PERSPECTIVE

Course Outcomes:

- To understand, comprehend and analyse the complex nature and functioning of the political systems, political institutions and corresponding issues to these both in a country specific case of India and cross-country perspectives.
- To demonstrate critical thinking about key issues of political system of different forms, political process and public policy.
- to use the contents and sub-units of the course as yardsticks for comparing these political systems and processes.

POL HC 4026 PUBLIC POLICY AND ADMINISTRATION IN INDIA

Course Outcomes:

- be familiarised with and gain knowledge about the processes of public policy making in India and their significance in administering the state.
- develop the ability to assess the functioning of the government and the administration in ensuring a citizen centric welfare administration in India.

POL HC 4036 GLOBAL POLITICS

Course Outcomes:

- To enable students to understand how to approach a wide range of important global political and economic policy problems and participate in public policy debates on the crucial issues facing the world today.
- To have knowledge of the essential theoretical assumptions underlying globalisation's conceptual

frameworks and their relationships to policy interventions.

- to demonstrate elementary knowledge of major issues and subject-matters surrounding globalisation that decides the international relations- *political, economic and security relations*- among the nations.

SEMESTER V

POL HC 5016 CLASSICAL POLITICAL PHILOSOPHY

Course Outcome :

- To interpret ideas underlying traditions in classical political philosophy
- To analyze the debates and arguments of leading political philosophers belonging to different traditions of the period
- To appraise the relevance of classical political philosophy in understanding contemporary politics

POL HC 5026 INDIAN POLITICAL THOUGHT-I

Course Outcome:

- To underline themes and issues in political traditions of pre-colonial India.
- To compare and contrast positions of different political traditions those were present in pre-colonial India.
- To evaluate the relevance of political thought of pre-colonial India for contemporary politics.

SEMESTER VI

POL HC 6016 MODERN POLITICAL PHILOSOPHY

Course Outcome:

- To interpret ideas underlying traditions in modern political philosophy
- To analyze the debates and arguments of leading political philosophers of different philosophical traditions
- To appraise the relevance of modern political philosophy in understanding contemporary politics

POL HC 6026 INDIAN POLITICAL THOUGHT-II

Course Outcome:

- To underline themes and issues in political thought of modern India.
- To compare and contrast positions of leading political thinkers in India on issues those are constitutive of modern India.
- To assess the relevance of political thought of modern India in understanding contemporary politics.

ABILITY ENHANCEMENT- (SKILL BASED)

POL SE 3014 PARLIAMENTARY PROCEDURES AND PRACTICES

Course outcome:

- To help students in understanding the practical approaches to legislative practices and procedures,
- To make students understand the procedures and processes related to drafting a Bill and the passage of the Bill,

- To enable students to have an understanding of the importance of Parliamentary Committees,
- To make students learn about the basic functioning of Parliament.

POL SE 3024 YOUTH AND NATION-BUILDING

Course Outcome:

- To enable students to learn the importance of youth in NSS and NCC,
- To make students understand the activities related to NSS and NCC and its importance,
- To make students learn the basics of National Disaster Management and its importance.

POL SE 4014: PANCHAYATI RAJ IN PRACTICE

Course outcomes:

- This paper will help students understand the importance of grassroot political institutions in empowering people.
- This paper will highlight the complex challenges faced by PRIs in India and mechanisms involved to make it more participatory and inclusive in nature.

POL SE 4024 CITIZEN AND RIGHTS

Course outcome:

- To analyse the linkages between citizenship, law, rights and equality
- To understand the measures of discrimination, justice and empowerment and the ways to protect the same.
- To evaluate the idea of justice and assess its relevance in context of contemporary India.

DISCIPLINE SPECIFIC ELECTIVE

POL HE 5016 HUMAN RIGHTS

Course Outcome:

- To interpret ideas underlying traditions in classical political philosophy
- To analyze the debates and arguments of leading political philosophers belonging to different traditions of the period
- To appraise the relevance of classical political philosophy in understanding contemporary politics

POL HE 5026 Public Policy in India

Course Outcome:

- To be familiarised with and gain knowledge about the processes of public policy making in India
- to assess the functioning of the government and the administration in ensuring a citizen centric welfare administration in India.

POL HE 5036 Understanding Global Politics

Course Outcomes:

- To describe the key concepts underlying the idea of world order and their historical evolution.
- To comprehend diverse approaches to understand global political and economic problems.
- To demonstrate relevance of international actors in understanding world politics.

POL HE 5046 Select Constitutions

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

POL HE 6016 India's Foreign Policy in a globalizing world

Course Outcome:

- To underline the issues in India's foreign policy
- To evaluate the impact of global development on India's foreign policy
- To demonstrate the change and continuity that marks India's foreign policy.

POL HE 6026 Understanding South Asia

Course Outcome:

- To identify geo-political and historical construction of South Asia as a region.
- To analyse the politics and socio-economic issues of the South Asian Region.
- To assess the relevance of regionalism in South Asia and India's position in the region.

POL HE 6036 Women, Power and Politics

Course Outcome:

- To explain key concepts that offers an understanding of gender inequality.
- To appraise the historical evolution of the Women's movement in India and issues addressed by it
- To underline the contemporary issues that affect women's participation in politics

POL HE 6046 Social Movements in North-east India

Course Outcome:

- To introduce the students with the social movements of the North-East India and nature of these.
- To engage them with historical development of such social movements
- To understand the new social movements of the region

Generic Elective

POL HG 1016 Introduction to Political

Theory Course Outcome:

- To introduce the key concepts in political theory
- To make students understand the aspects of conceptual analysis
- To engage the students in application of concepts and their limitations

POL HG 1026 POLITICS IN NORTH-EAST INDIA

Course Outcome:

- To introduce the students with the region and nature of its politics
- To engage them with historical development of the region
- To understand the contemporary developments of the region

POL HG 1036 GOVERNANCE: ISSUES AND CHALLENGES

Course Outcome:

- To introduce major concepts and debates of Governance
- To enable the students to relate governance with globalization, environment and development
- To make students explore good governance initiatives in India

POL HG 2016 Indian Government and

Politics Course outcomes:

- Appreciate the approaches to the study of Indian politics and the changing nature of the state
- Understand the basic features of the Indian constitution and its institutional functioning
- examine the changing role of caste, class and patriarchy and their impact on politics
- understand the dynamics of social movements in India.

POL HG 2026 Feminism: Theory and

Practice Course outcomes:

- This course on gender studies will open up the structural and institutional basis of patriarchy as well as establish that gender identity and gender injustice cannot be understood in isolation, but only with reference to caste, class and religious community identities.
- Understand the history of feminism and its origins in different parts of the world
- Appreciate the Indian Women's Movement and its role in foregrounding important issues relating to women's position in the society, economy and polity.

POL HG 2036 LOCAL RURAL AND URBAN GOVERNANCE

Course Outcomes:

- Understand the historical evolution of local governance in India
- Understand the working of rural and urban governance in India
- Understand the workings of committees and commissions associated with local governance

POL HG 3016 Comparative Government and Politics

Course Outcome:

- To make students have a basic understanding of comparative political analysis,
- To make students learn the classification of political systems from a comparative politics framework.
- To make students learn the classification of governments and the political behavior of institutions and the changes in the nature of the nation-state.

POL HG3026 Gandhi and the Contemporary World

Course Outcome:

- To make students understand relevance of Gandhi and his philosophy in modern times,
- To familiarize students with Gandhian ideology and leadership,
- To make students learn Gandhi's critique on modern civilization and development,
- To make students understand Gandhi's political strategy and philosophy.

POL HG 3036 UNITED NATIONS AND GLOBAL CONFLICTS

Course Outcome:

- To make students learn the importance of United Nations as an organization
- To enable students to have a basic understanding of the political processes of the United Nations
- To make students to learn the relevance of United Nations and its intervention in global conflicts critically.

POL HG 4016 Introduction to International Relations

Course Outcomes:

- To demonstrate basic understanding of scientific methods of inquiry in international relations.
- To understand how international relations influence societies.
- To demonstrate a basic understanding of the foundational theories and concepts in international relations.
- To analyse the current world events and their implications on the Indian Foreign policy decision making process by applying prominent theories of international relations and generate substantial research question on the topics.

POL HG 4026 Understanding Ambedkar

Course Outcomes:

- To analyse Ambedkar's views on caste, class, religion, nationalism, gender and constitutional democracy.
- To understand contribution of Ambedkar to political thought in modern India.
- To evaluate political ideas of Ambedkar and assess its relevance in context of contemporary politics.

POL HG 4036 Politics of Globalization

Course Outcomes:.

- To analyse the historical evolution of globalisation.
- To understand social, economic, cultural and political impact of globalisation.
- To evaluate the idea of globalisation and assess its relevance in context of contemporary politics.

BA (REGULAR)

SEMESTER I

POL RC 1016 Introduction to Political

Theory Course Outcomes:

- To introduce the key concepts in political theory
- To make students understand the aspects of conceptual analysis
- To engage in application of concepts and limitations

SEMESTER II

POL RC 2016 Indian Government and Politics

Course outcomes:

After reading the course the student will be able to

- Appreciate the approaches to the study of Indian politics and the changing nature of the state
- Understand the basic features of the Indian constitution and its institutional functioning

- Examine the changing role of caste, class and patriarchy and their impact on politics
- Understand the dynamics of social movements in India.

SEMESTER III

POL RC 3016 Comparative Government and Politics

Course Outcomes:

- To make students have a basic understanding of comparative political analysis,
- To make students learn the classification of political systems from a comparative politics framework.
- To make students learn the classification of governments and the political behavior of institutions and the changes in the nature of the nation-state.

POL SE 3014 Parliamentary Procedures and Practice

Course outcomes:

- To help students in understanding the practical approaches to legislative practices and procedures,
- To make students understand the procedures and processes related to drafting a Bill and the passage of the Bill,
- To enable students to have an understanding of the importance of Parliamentary Committees,
- To make students learn about the basic functioning of Parliament.

POL SE 3024 YOUTH AND NATION-BUILDING

Course Outcomes:

- To enable students to learn the importance of youth in NSS and NCC,
- To make students understand the activities related to NSS and NCC and its importance,
- To make students learn the basics of National Disaster Management and its importance.

SEMESTER IV

POL RC 4016 Introduction to International Relations

Course Outcomes:

- To demonstrate basic understanding of scientific methods of inquiry in international relations.
- To understand how international relations influence societies.
- To demonstrate a basic understanding of the foundational theories and concepts in international relations.
- To analyse the current world events and their implications on the Indian Foreign policy decision making process by applying prominent theories of international relations and generate substantial research question on the topics.

POL SE 4014: Panchayati Raj in Practice

Course outcomes:

- This paper will help students understand the importance of grassroots political institutions in empowering people.
- This paper will highlight the complex challenges faced by PRIs in India and mechanisms involved to make it more participatory and inclusive in nature.

POL SE 4024 Citizens and Rights

Course outcomes:

- To analyse the linkages between citizenship, law, rights and equality
- To understand the measures of discrimination, justice and empowerment and the ways to protect the same.
- To evaluate the idea of justice and assess its relevance in context of contemporary India.

SEMESTER V

POL SE 5014 Public Opinion and Survey Research

Course outcome:

- This course will introduce the students to the debates, principles and practices of public opinion polling in the context of democracies, with special reference to India.
- It will familiarize the students with how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilization of quantitative data.

POL RE 5016 Public Administration-I Course

outcomes:

- Students will be able to understand the basics of public administration;
- This paper is an integral part of public services examinations.
Students will be well versed with ideas of administration.

POL RE 5026 Select Constitutions-I

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

POL RG 5016 Public Administration-I Course

outcomes:

- Students will be able to understand the basics of public administration;

- This paper is an integral part of public services examinations. Students will be well versed with ideas of administration.

POL RG 5026 Democracy in India

Course outcomes:

- Students will be able to understand the importance of freedom movement in India;
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.
- The debates on the nature of Indian democracy will provide an important insight to the complex nature of challenges faced by the state and different public institutions.

SEMESTER VI

POL SE 6014 Conflict and Peace Building

Course Outcomes:

- It will help the students to build an understanding of a variety of conflict situations among students in a way that they can relate to them through their lived experiences.
- It's an interdisciplinary course that draws its insights from various branches of social sciences and seeks to provide a lively learning environment for teaching and training students how to bring about political and social transformations at the local, national and international levels.
-

POL RE 6026 Select Constitutions -II

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

POL RG 6016 Public Administration –II

Course outcomes:

- After reading this course the students will be in a position acquaint with the different layers and structures of public administration and also to know how public administration contributes towards development.
- One will also be in a position to know about the principles and processes of budgeting etc.

POL RG 6026 Indian Administration

Outcomes:

- After reading this course a student will be in a position to acquaint himself/herself with the process of evolution of Indian administration and also different layers and structures of the administration.

DEPARTMENT OF POLITICAL SCIENCE

NON-CBCS

First Semester

1. Political Theory-I

Course Outcome:

- To Introduce the idea of political theory and various approaches
- To enable the students to assess the contemporary trends of political theory
- To reconcile theory and practice in relation to democracy

2. Politics in India-I

Course Outcome:

- To acquaint students with constitutional design of state structures and institutions
- To understand the conflicts in constitutional provisions
- To make them comprehend the state institutions in relation to extra constitutional environment.

Second Semester

1. Political Theory-II

- Understand the various concepts in political theory and appreciate how they can be helpful to analyse crucial political issues
- Understand the significance of debates in political theory in exploring multiple perspectives to concepts, ideas and issues.
- Appreciate how these concepts and debates enrich political life and issues surrounding it.

2. Politics in India-II

Course outcome:

- Understand the working of major political institutions in India
- Understand the major debates in Indian politics along the axes of caste, gender, region and religion
- Understand the changing nature of the Indian state and the contradictory dynamics of modern state power

Third Semester

1. International Relations-I

Course outcome:

- To make students understand the key theoretical approaches in international relations,
- To familiarize students with the evolution of international state systems and its importance.

- To make students aware of the key theoretical debates in international relations
- To enable students to have an overall understanding of international relations in relation to twentieth century IR history.

2. Public Administration-I

Course Outcome:

- To enable students to learn the basic concepts related to public administration and its importance,
- To make students learn the major theories of public administration,
- To enable students to have an understanding of public policy and its formulation,
- To familiarize students with the major approaches and recent debates related to field of public administration.

Fourth Semester

1. International Relations-II

Course outcome:

- To make students understand the key theoretical approaches in international relations,
- To familiarize students with the evolution of international state systems and its importance.
- To make students aware of the key theoretical debates in international relations
- To enable students to have an overall understanding of international relations in relation to twentieth century IR history.

2. Public Administration-II

Course Outcomes:

- Be familiarised with and gain knowledge about the processes of public policy making in India and their significance in administering the state.
- Develop the ability to assess the functioning of the government and the administration in ensuring a citizen centric welfare administration in India.

Fifth Semester

1. Western Political Thinkers

Course Outcome:

- To interpret ideas underlying traditions in classical political philosophy
- To analyze the debates and arguments of leading political philosophers belonging to different traditions of the period
- To appraise the relevance of classical political philosophy in understanding contemporary politics

2. Select Constitutions-I

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

3A. Politics in North-East India Course

Outcome:

- To introduce the students with the region and nature of its politics
- To engage them with historical development of the region
- To understand the contemporary developments of the region

OR

3B. General Sociology-I Course

outcomes:

- Students will be able to understand the theoretical concepts of sociology;
- Students will be able to understand the relationship between sociology and other subjects of social sciences.

4A. Contemporary Political Issues

Course Outcome:

- To introduce major concepts and debates of Governance
- To enable the students to relate governance with globalization, environment and development
- To make students explore good governance initiatives in India

OR

4B. Women and Politics

Course outcomes:

- This course on gender studies will open up the structural and institutional basis of patriarchy as well as establish that gender identity and gender injustice cannot be understood in isolation, but only with reference to caste, class and religious community identities.
- Understand the history of feminism and its origins in different parts of the world

5A. Rural Local Governance Course

Outcomes:

- Understand the historical evolution of local governance in India
- Understand the working of rural and urban governance in India
- Understand the workings of committees and commissions associated with local governance

OR

5B. Political Sociology-I Course

outcomes:

- Students will be able to understand the relation between sociology and political science;
- Students will be able to understand the various concepts of society.

6A. Democracy in India-I Course

outcomes:

- Students will be able to understand the importance of freedom movement in India;
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.
- The debates on the nature of Indian democracy will provide an important insight to the complex nature of challenges faced by the state and different public institutions.

OR

6B. Human Rights

Course Outcome:

- To interpret ideas underlying traditions in classical political philosophy
- To analyze the debates and arguments of leading political philosophers belonging to different traditions of the period
- To appraise the relevance of classical political philosophy in understanding contemporary politics

Sixth Semester

1. Indian Political Thinkers

Course Outcome:

- To underline themes and issues in political thought of modern India.
- To compare and contrast positions of leading political thinkers in India on issues those are constitutive of modern India.
- To assess the relevance of political thought of modern India in understanding contemporary politics.

Select constitutions-II

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

3C. Politics in North-East India

Course Outcome:

- To introduce the students with the region and nature of its politics
- To engage them with historical development of the region
- To understand the contemporary developments of the region

OR

3D. General Sociology-II Course

outcomes:

- Students will be able to understand the theoretical concepts of sociology;
- Students will be able to understand the relationship between sociology and other subjects of social sciences.

4C. Contemporary Political Ideologies Course

Outcome:

- To interpret ideas underlying traditions in modern political philosophy
- To analyze the debates and arguments of leading political philosophers of different philosophical traditions
- To appraise the relevance of modern political philosophy in understanding contemporary politics

OR

4D. Women and Politics in India

Course outcomes:

- Understand the history of feminism and its origins in different parts of the world
- Appreciate the Indian Women's Movement and its role in foregrounding important issues relating to women's position in the society, economy and polity.

5C. Urban Local Governance Course

Outcomes:

- Understand the historical evolution of local governance in India
- Understand the working of rural and urban governance in India
- Understand the workings of committees and commissions associated with local governance

OR

5D. Political Sociology-II Course

outcomes:

- Students will be able to understand the relation between sociology and political science;
- Students will be able to understand the various concepts of society.

6C. Democracy in India-II Course

outcomes:

- Students will be able to understand the importance of freedom movement in India;
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.
- The debates on the nature of Indian democracy will provide an important insight to the complex nature of challenges faced by the state and different public institutions.

OR

6D. Human Rights in India Course

Outcome:

- To interpret ideas underlying traditions in classical political philosophy
- To analyze the debates and arguments of leading political philosophers belonging to different traditions of the period
- To appraise the relevance of classical political philosophy in understanding contemporary politics

POLITICAL SCIENCE (PASS COURSE)

FIRST SEMESTER

Political Theory –I

Course Outcome:

- To Introduce the idea of political theory and various approaches
- To enable the students to assess the contemporary trends of political theory
- To reconcile theory and practice in relation to democracy

SECOND SEMESTER

Political Theory –II Course Outcome:

- To Introduce the idea of political theory and various approaches
- To enable the students to assess the contemporary trends of political theory
- To reconcile theory and practice in relation to democracy

THIRD SEMESTER

1. International Relations –I

Course outcome:

- To make students understand the key theoretical approaches in International relations,
- To familiarize students with the evolution of International state systems and its importance.
- To make students aware of the key theoretical debates in International relations
- To enable students to have an overall understanding of International relations in relation to twentieth century IR history.

2. Politics in India-I

Course Outcome:

- To acquaint students with constitutional design of state structures and institutions
- To understand the conflicts in constitutional provisions
- To make them comprehend the state institutions in relation to extra constitutional environment.

FOURTH SEMESTER

International Relations-II

Course Outcomes:

To have knowledge of the essential theoretical assumptions underlying globalization's conceptual frameworks and their relationships to policy interventions.

- To demonstrate elementary knowledge of major issues and subject-matters surrounding globalization that decides the international relations- *political, economic and security relations*- among the nations.

Politics in India –II

Course outcome:

- Understand the working of major political institutions in India
- Understand the major debates in Indian politics along the axes of caste, gender, region and religion
- Understand the changing nature of the Indian state and the contradictory dynamics of modern state power

FIFTH SEMESTER

Public Administration –I Course Outcome:

- To enable students to learn the basic concepts related to public administration and its importance,
- To make students learn the major theories of public administration,
- To enable students to have an understanding of public policy and its formulation,
- To familiarize students with the major approaches and recent debates related to field of public administration.

Select Constitutions-I

Course outcomes:

- Students will be able to understand the importance of constitutions;
- This paper is an integral part of public services examinations.
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

SIXTH SEMESTER

Public Administration-II Course Outcome:

- To enable students to have an understanding of public policy and its formulation,
- To familiarize students with the major approaches and recent debates related to field of public administration.

Select Constitutions-II

Course Outcome:

- Students will be able to understand the importance of constitutions;
- Students will be introduced to the various types of constitutions and the forms of governments from different parts of the world.

DEPARTMENT OF STATISTICS

SEMESTER I

Paper: STA-HG- 1016
Statistical Methods

- After completion of this paper, the students will be able to explore the basic knowledge of statistics such as collection, tabulation, comparison and presentation of data.

- They will also be able to calculate mean, variance, standard deviation, co-efficient of variation etc. They will also be able to know about the relationship between two and more variables.
- Moreover, the knowledge of finite difference will help the students to have an idea about the application of different formulae of interpolation and numerical integration.

SEMESTER II

Paper: STA-HG2016

Introductory Probability

- After completion of this paper, students will be able to understand the principle of probability theory and probability distribution for discrete and continuous random variables along with p.m.f., p.d.f. and distribution function etc.
- They can also be able to know about the standard probability distributions such as Binomial, Poisson, Normal, Exponential and Beta, Gamma distribution.

SEMESTER III

Paper: STA-HG3016

Basics of Statistical Inference

- After studying this paper students will be able to understand the concept of sample, population, parameter, statistic, hypothesis, type I and type II error etc.
- They can acquire the knowledge of chi-square distribution and other non-parametric tests such as Sign test, Wilcoxon two sample test etc. and their properties and applications in different fields.
- Students will get knowledge about analysis of variance and different type of design of experiment such as CRD, RBD, LSD etc. and their applications in different field work.

SEMESTER IV

Paper: STA-HG4016

Applied Statistics

- After completion of this paper, the students will get the knowledge of statistical quality control and different types of control charts such as X-Bar and Rchart, P and C-charts.
- Students will also be able to study about the standard of living of people in various regions by acquiring the knowledge of Index Number. This paper will help students to know about different measures of mortality and fertility and different measures of population growth.

- Demand analysis will help them to know about theory of consumption and demand function, determination of elasticity of demand etc. Moreover, time series analysis will help them to know about decomposition of time series by different methods

Department of Folklore

(CBCS)

PROGRAMME OUT COME: at the end of the study the students will be able to know:

1. Folklore, oral literature, Material Culture, Folk Social Customs and Performing Art
2. Folklore and Fieldwork or Project Work which will give exposure to students about various methods of data collection and analysis of data for a conclusion and suggestion.
3. Study extensively about tourists and tourist spots will give them exposure to get involved in various tourism industry with their various capacities.
4. Study on Computer and Internet technologies will give them opportunities to use the Computer and ICT for their future use.

FIRST SEMESTER

Discipline Specific Core Course Credit

(5+1)

FOK-RC-1016 Introduction to Folklore

Course Outcome

At the end of the semester the students should know:

1. To define the meaning and scope of folklore, the importance of studying folklore in context, Origin and beginning of folklore as a discipline.
2. Classification of folklore material. Four sectors of folklore forms.
3. Short History of folklore studies in North-East India.
4. Short History of folklore studies in North-East India
5. Present status of folklore studies in Assam

SECOND SEMESTER

Discipline specific Core Course Credit (5+1)

FOK-RC-2016 Oral Literature

Course Outcome

1. Concept of Oral Literature, Narrative genre of Assamese Oral literature- muth, legend, tale, ballad etc.
2. Introduction and identification of the Non-Narrative genre of Assamese Oral Literature.
(i) Folksongs, (ii) Proverbs and (iii) Riddles.
3. To study about Ramayana Tradition among the tribes of Assam.
4. To practice oral literature like
 - a. Songs associated with the festival of Boros
 - b. Jhumur songs of tea garden labourers of Assam.
 - c. Lalilang songs of Dimoria.

THIRD SEMESTER

Discipline specific Core Course Credit (5+1)

FOK-RC-3016 MATERIAL CULTURE

Course Outcome

1. To learn the Concept of Material Culture, house types found in Assam, Assamese Ornaments.
2. To study folk Toys and Folk Painting.
3. To know about Agricultural implements, House Decoration

FOURTH SEMESTER

Discipline Specific Core Course Credit (5+1)

FOK-RC-4016 Folk Social Customs and Performing Art

Course Outcome

1. To know folk Customs thoroughly.

2. Details about Ceremonies connected with agriculture, with special reference to Assamese, Boro, Rabha, Mising, Karbi and Dimasa communities.
3. To have a look into Ceremonies connected with agriculture, with special reference to Assamese, Boro, Rabha, Mising, Karbi and Dimasa communities.
4. The Concept of Folk religion, with special reference to Folk Hinduism.
5. To study about Folk deities of West Assam: Kati Puja, Hudumdeo Puja, Mare Puja, Bas Puja
6. To perform general survey on the various performing art form of Assamese society.

FIFTH SEMESTER

Discipline specific Elective Course Credit (5+1)

FOK-RE-5016 FOLKLORE AND FIELDWORK

Course Outcome

1. To study about Research Methodology.
2. To study about Methods of Field Data Collection- observation-participant and non-participant; Interview; Use of schedules and question; Case study and Life history method.
3. Practice on methods of Report Writing including citation and Report Writing including citation of references.

FIFTH SEMESTER

Discipline specific Elective Course Credit (5+1)

FOK-RE-5016 PROJECT WORK

Course Outcome

- Students have to undertake a field work in tribal or non-tribal villages preferably in N.E. India on topics suggested by the department. A Project Report on the work duly forwarded by the concerned Supervisors is to be submitted at the time of examination. Marks will be allotted by an external evaluator on the report and viva-voce.

- The students will have practical knowledge of what is being taught in the previous semesters. It will help them to serve the society in their various capacities for their upliftment. They can carry out further research work in the field of Folklore.

SIXTH SEMESTER

Discipline specific Elective Course Credit (5+1)

FOK-RE-6016 FOLKLORE AND CULTURAL STUDIES

Course Outcome

- To study about Modern approach to the theory and concept of Folklore. It's context and importance.
- To understand about Urbanisation and Folklore, Commodification of Folklore with special reference to Assam.
- To have knowledge on transmission of Folklore and its bearer: Historical and present day context.
- Role of Folklore in Ethnic Assertion: Case of tribal movement in N.E India.
- To study about Cultural Studies, Ethnicity, Identity and Culture of Northeast and Culture for Social Change

THIRD SEMESTER

Skill Enhancement Course Credit (4)

FOK-SE-3014 Archives and Museum

Course Outcome

1. To learn about museums and archives, setting up of museums: case study of Assam State Museum or Kalakshetra (one case study only)
2. To study about functioning of archives and museums, kinds of museums and archives: virtual; digital; crafts; media.
3. Visit to local museums and/or archives is part of this course.

FOURTH SEMESTER

Skill Enhancement Course Credit (4)

FOK-SE-4014 Crafts and Artisans: Living Traditions

Course Outcome

Students will visit the sites of traditional crafts and meet the craftsmen and artisans to have an idea about the background, production and marketing of the traditional handicraft and handloom of Assam. A report should be submitted on the basis of the field visit.

- a. Mask making
- b. Metal crafts: brass, bell metal
- c. Woodcarving, weaving and basketry
- d. Textile and weaving
- e. Terracotta, toy making and puppetry
- f. A visit to a craft exhibition is part of this course.
- g. Folk musical instruments
- h. Traditional jewellery

FIFTH SEMESTER

Skill Enhancement Course Credit (4)

FOK-SE-5014 Tourism Management and Folklore

Course Outcome

- To study about Tourism: definition, meaning, nature and scope, approaches to study tourism.
- To know what are Tourist, travelers, visitor, transit visitor and excursionist - definition and differentiation
- Concept of tourism resource, attraction, product, market, industry and destination in the context of tourism
- Components and elements of tourism: Intermediaries and suppliers
- Cultural Tourism Resources: Major tribes, fair and festivals, dance and music, handicraft and handloom, cuisines, dress materials, etc.

- *Satra* institution of Assam: Significance of *Satras* of Assam as a Cultural and Religious tourist Attraction.

SIXTH SEMESTER

Skill Enhancement Course Credit (4)

FOK-SE-6014 Computer Application

Course Outcome

- To have basic Computer knowledge like- Major components of a computer (A brief introduction of CPU, Main Memory, I/Ounits), Keyboard, display, mouse, printers, etc.
- Memory concepts--Secondary storage devices (hard disks, optical disks, flash memory), backup devices.
- To know about Representation of information: Number system- Binary, Octal, Decimal & Hexadecimal numbers. Characters, ASCII, EBCDIC, BCD, Gray code, Unicode.
- To have knowledge on Role of Information Technology (IT) in present scenario.
- To study about Computer Networks: Data communication, Transmission Media- Coaxial, UTP, Optical-Fiber, Wireless, Components of Computer Networks, Types of wireless communication (mobile, WiFi, WiMAX, Bluetooth, Infrared – concept and def only)
- To study basic terminologies in Internet and their applications -Evolution of Internet, Basic Internet terms(Client, Server, MODEM, Webpage, Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & offline), Internet applications(email, search engines, ftp, VOIP, Video Conferencing, Audio-Video streaming, Chatting).
- To know Computer Security: Definition, Viruses and Worms, Antivirus, Digital Signature, Software Piracy, Firewall. Hacking and Cracking (basic concepts only for these topics).
- To study applications of IT: Railways, Airlines, Banking, Inventory Control, Education and Information Kiosks.

FIFTH SEMESTER

Generic Elective Course Credit (6)

FOK-RG-5016 Social and Cultural Anthropology

- Social- to know about Cultural Anthropology –definitions, aims, Subject matter, and scope, History and development of social –cultural anthropology. Concepts of ethnology and ethnography.
- To study about relationships with other disciplines: Sociology, Economics and Political Sciences, History, Folklore, Linguistics, Philosophy, Literature, media studies.
- To study about Various subfields of social anthropology with special reference to the following: Economic anthropology, Political anthropology, Cognitive anthropology, Linguistic Anthropology, Urban anthropology, psychological anthropology, Symbolic anthropology, Anthropology of art, Applied Socio-Cultural Anthropology.
- To study about some emerging fields: Visual Anthropology, Business/Corporate Anthropology, Medical Anthropology, Anthropology of communications, Legal Anthropology, Anthropology of Disaster Management
- To know society Types of society – traditional and modern societies; tribal, peasant and urban-industrial societies, characteristics of primitive or pre -literate society.
- Social units, social institutions, social structure, social organization; community; kinship; Association, Aspects of culture: Material culture; non-material culture.

SIXTH SEMESTER

Generic Elective Course Credit (6)

FOK-RG-6016 Social and Cultural Geography

Course Outcome

- To know the Meaning, nature and scope of Social Geography and approaches to the study of Social Geography
- To have Concepts in Social Geography: Society and environment, type of society, Social Space, Social differentiation and integration
- To learn about Peopling process of Assam
- To study Social Categories: Caste, Class, Religion, and Race and their Spatial distribution
- Urbanization, westernization and social change concepts should be learnt.
- To study nature, scope and subject matter of Cultural geography and Cultural geography.
- To have knowledge on racial, linguistic and ethnic diversities; religious minorities;
- To know about major tribes, tribal areas and their problems; cultural regions

**DEPARTMENT OF LINGUISTICS
(CBCS)**

Semester-I

LIN-RC-1016 / GEN-RG-5016

Language and Linguistics

Course outcomes:

At the end of this course, the following outcomes will be expected:

1. Students will have the knowledge of different concepts related to language and linguistics.
2. Students will know the role of pronunciation, grammar and meaning in the structure of human language.

Semester-II

LIN-RC-2016 / GEN-RG-6016

Levels of Linguistic Analysis

Course outcomes:

At the end of this course, students will:

1. Have the knowledge of different levels of linguistic analysis
2. acquire the analytic skill to do preliminary analysis of different levels of language, such as, phonology, morphology etc.

Semester-III

LIN-RC-3016

Structure of Assamese I: Phonology

Course outcomes:

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

1. gain the detailed knowledge of the sound system of Assamese.
2. describe and classify the speech sounds in Assamese.

Semester-IV

LIN-RC-4016

Structure of Assamese II: Grammar

Course outcomes: At the end of this course, the students will be able to.

1. Identify the structure of Assamese morphology and syntax
2. Describe different grammatical parts at morphological and syntactic levels.

Semester-V

LIN-RE-5016

Linguistic Fieldwork and Language Documentation

Course outcomes:

After doing this course, students will be able to:

1. understand the basics of doing fieldwork and documenting a language.
2. observe the issues relating to the language endangerment and apply the introduced notions in the context of Assam.

LIN-RE-5026

Literacy and Mother Tongue-Based Multilingual Education

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

1. understand the basic notions of literacy and multi-lingual education.
2. identify the need of promoting literacy in the mother tongue in multi-lingual education.
3. identify and analyze the issues and challenges regarding the transition from the mother tongue to the language of wider communication.

Semester-VI

LIN-RE-6016

Languages of Assam

Course outcomes: At the end of the course, students:

1. will have the knowledge about the languages of Assam.

2. will know how Assam is ethnographically, demographically and linguistically diverse.

LIN-RE-6026

Language in Literature and Society

Course outcomes:

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

1. acquire a basic idea of the stylistic analysis of different literary texts.
2. observe the relationship between language and society.
3. identify the language varieties triggered by social factors.

DEPARTMENT OF ZOOLOGY

Semester: I

ZOO-HC-1016: non-chordates 1: Protista to Pseudocoelomates

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

- Learn about the importance of systematics, taxonomy and structural organization of animals.
- Appreciate the diversity of non-chordates living in varied habit and habitats.
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- Critically analyse the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla.
- Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

ZOO-HC-1026: Principles of Ecology

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

- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.
- Comprehend the population characteristics, dynamics, growth models and interactions.
- Understand the community characteristics, ecosystem development and climax theories.
- Know about the types of ecosystems, food chains, food webs, energy models, and ecological efficiencies.
- Apply the basic principles of ecology in wildlife conservation and management.
- Inculcate scientific quantitative skills, evaluate experimental design, read graphs, and analyse and use information available in scientific literature.

Semester II

ZOO-HC-2016: Non-chordates II: Coelomates

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

- Learn about the importance of systematics, taxonomy and structural organization of animals.
- Appreciate the diversity of non-chordates living in diverse habit and habitats.
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- Critically think about the organization, complexity and characteristic features of no chordates.
- Getting familiarized with the morphology and anatomy of representatives of various animal phyla.
- Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

ZOO-HC-2026: Cell Biology

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

- Understand fundamental principles of cell biology.
- Explain structure and functions of cell organelles involved in diverse cellular processes.
- Appreciate how cells grow, divide, survive, die and regulate these important processes.
- Comprehend the process of cell signalling and its role in cellular functions.

- Have an insight of how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.
- Learn the advances made in the field of cell biology and their applications.

Semester III

ZOO-HC-3016: DIVERSITY OF CHORDATES

Upon completion of the course, the students will be able to:

- Understand different classes of chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum.
- Study about diversity in animals making students understand about their distinguishing features.
- Appreciate similarities and differences in life functions among various groups of animals in Phylum Chordata.
- Comprehend the circulatory, nervous and skeletal system of chordates.
- Know about the habit and habitat of chordates in marine, freshwater and terrestrial ecosystems.

ZOO-HC-3026 Physiology: Controlling and Coordinating Systems

Upon completion of the course, students will be able to:

- Know the basic fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.
- Comprehend and analyse problem-based questions
- Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body and use of feedback loops to control the same
- Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body. Synthesize ideas to make connection between knowledge of physiology and real-world situations, including healthy life style decisions and homeostatic imbalances
- Know the role of regulatory systems viz. endocrine and nervous systems and their amalgamation in maintaining various physiological processes.

ZOO-HC-3036: Fundamentals of Biochemistry

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

- Gain knowledge and skill in the fundamentals of biochemical sciences, interactions and interdependence of physiological and biochemical processes.
- Get exposed to various processes used in industries and gain skills in techniques of chromatography and spectroscopy.
- Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.
- Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyse the resulting data.
- Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

Semester IV

ZOO-HC-4016: Comparative Anatomy of Vertebrate

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

- Explain comparative account of the different vertebrate systems
- Understand the pattern of vertebrate evolution, organisation and functions of various systems.
- Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.
- Understand the evolution of heart, modification in aortic arches, structure of respiratory organs used in aquatic, terrestrial and aerial vertebrates; and digestive system and its anatomical specializations with respect to different diets and feeding habits.
- Learn the evolution of brain, sense organs and excretory organs to a complex, highly evolved form in mammals;
- Learn to analyze and critically evaluate the structure and functions of vertebrate systems, which helps them to discern the developmental, functional and evolutionary history of vertebrate species.
- Understand the importance of comparative vertebrate anatomy to discriminate human biology.

ZOO-HC-4026: Physiology: Life Sustaining

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

- Have a clear knowledge of basic fundamentals and understanding of advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.
- Comprehend and analyse problem-based questions on physiological aspects.
- Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use of feedback loops to control the same.
- Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.

ZOO-HC-4036: Biochemistry of Metabolic Process

Upon completion of the course, students will be able to

- Gain knowledge and skill in the interactions and interdependence of physiological and biomolecules
- Understand essentials of the metabolic pathways along with their regulation.
- Know the principles, instrumentation and applications of bioanalytical techniques.
- Get exposure to various processes used in industries.
- Become aware about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments and analyze the resulting data.
- Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

Semester V

ZOO-HC-5016: Molecular Biology

Upon completion of the course, students will be able to:

- Describe the basic structure and chemistry of nucleic acids, DNA and RNA;
- Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
- Elucidate the molecular machinery and mechanism of information transfer processes—transcription and translation—in prokaryotes and eukaryotes;
- Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs;

- Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons;
- Give an overview of gene expression regulation in eukaryotes;
- Explain the significance of DNA repair mechanisms in controlling DNA damage;
- Recognise role of RNAs (riboswitches, siRNA and miRNA) in gene expression regulation.
- Demonstrate practical knowledge of raising, handling, maintenance and special features such as antibiotic resistance of a simple prokaryotic model organism, Escherichia coli.
- Quantitatively estimate concentration of DNA and RNA by colorimetric methods.

ZOO-HC-5026: Principles of Genetics

Upon completion of the course, students will be able to:

- Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics.
- Gain knowledge of the basic principles of inheritance.
- Analyse pedigree leading to development of analytical skills and critical thinking enabling the students to present the conclusion of their findings in a scientific manner.
- Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day-to-day life.
- Find out the effects of indiscriminate use of various chemicals, drugs or insecticides in nature by studying their effect on various bacterial species in soil and water samples from different industrial or polluted areas.

Discipline Specific Electives (DSE)

ZOO-HE-5016: Computational Biology and Biostatistics

Upon completion of the course, students will be able to:

- To use the experimental methods to solve the biological problem using computational algorithms including database design and implementation,
- To implement the computational methods to analyse large collections of complex biological data to make new predictions or discover new concepts of biology
- Capable of using critical thinking and research methods to be applied on computational biology problems.

- Gain an opportunity to participate in cutting edge research by the assignment of research project that spans over two semesters

Semester VI

ZOO-HC-6016: Developmental Biology

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

- Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.
- Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these.
- Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.
- Discuss the general mechanisms involved in morphogenesis and to explain how different cells and tissues interact in a coordinated way to form various tissues and organs.
- Understand about the evolutionary development of various animals.
- Know the process of ageing leading to interventions that can improve the overall health and quality of life in aged people.
- Learn the importance of latest techniques like stem cell therapy, in vitro fertilization and amniocentesis etc. to be applied for human welfare.
- Develop the skill to raise and maintain culture of model system; *Drosophila* in the laboratory.

ZOO-HC-6026: Evolutionary Biology

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

- Acquire problem solving and high order analytical skills by attempting numerical problems as well as performing simulation studies of various evolutionary forces in action.
- Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.
- Gain knowledge about the relationship of the evolution of various species and the environment they live in.
- Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment.

- Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.
- Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.
- Use various software to generate interest towards the field of bioinformatics and coding used in programming language

Discipline Specific Electives (DSE)

ZOO-HE-6026: FISH AND FISHERIES

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

- To impart knowledge about fish nutrition, methods of determining the food of fishes.
- To study functional anatomy of: different system of bivalve.
- The students will gain knowledge of fish farming with Agriculture: rice cum fish culture and culturable species in rice fields, rotational and simultaneous culture.
- The students will gain knowledge Sewage fed fisheries, culture of air breathing fishes.
- The students will gain knowledge cold water fisheries, fish farm Management, Brood stock and hatchery management.