2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

1. ABST

M Com (ABST)
Specific outcome of this post graduate program is to enrich the students with advanced knowledge of contemporary theory of accounting, auditing and taxation. Besides, the program focuses on enriching the student with the knowledge and skill of research tools and techniques. In all, the envisaged outcome is to prepare a future academician and researcher in the subject.
MFC:
This post-graduate programme is intended to equip the student with practical knowledge of accounting, finance and quantitative analysis. Outcome envisaged is to prepare a finance professional to work at supervisory level..

B Voc (Accounting, Taxation, Auditing):
Undergraduate vocational program is focused on giving practical exposure to the students of accounting skills related with financial cost and Management Accounting, auditing taxation and quantitative analysis related with business. This course specifically envisages employability of the students in respective areas

PGDIT

This is a part time postgraduate skill-based diploma programme which focuses on imparting knowledge and skills related with taxation. Specific outcome envisaged of this program is to prepare employable postgraduates in the arena of taxation profession.

Certification Courses

These are skill based programmes which have been launches specially for those who have knowledge and experience of particular subject but not specific degree. These programmes helps a candidate to get skilled practically in different areas of accounting, taxation and business statistics. The basic outcome of these programmes is that it enables a candidate to start his or her business in such areas or one can work as tax consultant or accountant or office assistant through theses certificate courses.

Master of Vocation (Accounting, Taxation, Auditing):

Postgraduate vocational program is focused on giving practical exposure to the students of accounting skills related with Business Practical Accounting, Financial Statement Analysis, Business Analysis, SAP Accounting, Advanced MS Excel, Stock market trading and quantitative analysis related with business. This course specifically envisages employability of the students in respective areas.

2. BBE

Programme Outcomes:

1. Outcome of M. Com: - To provide specialized knowledge of the banking and business economics to cater the need of banking and industry and prepare students for teaching positions in higher education institutions.

2. Outcome of MIB: - To equip students with the specialized skills of international business specifically focusing on export-import procedure and documentation to provide specialized teaching of world economic environment and opportunities of international trade.

3.Outcome of MBI: - To accompany students with the working knowledge of banking and insurance sector and equip them with the required skills to get employment in the sector.

3. Biotech

Not Available

4. Botany

PROGRAM OUTCOMES FOR M.Sc. BOTANY (CBCS)

Plant sciences is now an amalgamation of basic and applied science. Plants besides being the unique capability of plants to trap solar energy and provide food to all cannot be replicated by any system. Conventional studies like plant identification is now being supplemented with molecular

techniques like DNA Barcoding. The courses have been designed to benefit all Botany students to study various aspects of plant science including its practical applications. Keeping in mind that these students can take up teaching at different levels, research work in research institutes and or industry, doctoral work, environment impact assessment, biodiversity studies, entrepreneurship, scientific writing relevant topics have been included in the curriculum. Students would be benefited with knowledge of core subjects like plant diversity, physiology and biochemistry, molecular cytogenetics and application of statistics etc. which are offered in these subjects modules on analytical techniques, plant tissue culture and phytochemistry would make them obtain skills in doing research. All the courses in the programme are carefully designed to equip the students for competitive exams like CSIR NET, SET etc. and to write research proposals for grants.

PO1	Understanding the classification of plants from cryptogams to Spermatophyte. Identification of the flora in field. Study of biodiversity in relation to habitat correlate with climate change, land and forest degradation. Application of Botany in agriculture through study of plant pathology. Palaeobotany to trace the evolution of plants.
PO2	Understand the ultrastructure and function of cell membranes, cell communications, signaling, genetics, anatomy, taxonomy, ecology and plant physiology and biochemistry.
PO3	Molecular and Physiological adaptations in plants in response to biotic and abiotic stress. Genes responsible for stress tolerance genetic engineering of plants
PO4	To understand the multi functionality of plant cells in production of fine chemicals. There wide spread industrial applications.

Overall development

After completion of this course, it will educate students about plant science and inculcate strong fundamentals on modern and classical aspects of Botany, build life skills in Edible mushroom cultivation, Biofertilizer production, Greenhouse maintenance and Seed technology through value-added courses and create platform for higher studies in Botany and facilitate students to take-up successful career in Botany.Maintain a high level of scientific excellence in botanical research with specific emphasis on the role of plants. Create, select and apply appropriate techniques, resources and modern technology in multidisciplinary way. Practice of subject with knowledge to design experiments, analyse and interpret data to reach to an effective conclusion.

They would identify, formulate and analyse the complex problems with reaching a substantiated conclusion. Logical thinking with application of biological, physical and chemical sciences. Learning that develops analytical and integrative problem-solving approaches. Best problem-solving skills in students would encourage them to carry out innovative research projects thereby making them to use knowledge creation in depth.

M1BOT01-CT01	BIOLOGY AND DIVERSITY OF ALGAE AND BRYOPHYTES

Course Outcomes

After completion of this course, students will be able to

CO1: Learn criteria of classification, diversity, life form, reproduction, phylogeny, nutritional and economic importance of the plants.

CO2: Develop critical understanding on morphology, anatomy and reproduction.

CO3: Develop proficiency in the experimental technique and methods of appropriate analysis of plant of these groups.

CO4: Explore many unexplored plants for the economic benefits of human like medicine, biofertilizers and other uses because Rajasthan have diversified climatic condition.

CO5: Understand plant origin, evolution and their transition to land habitat because algae and bryophytes are one of the basics of botany.

M1BOT02-CT02	MICROBIOLOGY, MYCOLOGY AND PLANT PATHOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the general characteristic of archaebacteria and eubacteria
CO2: Develop a good knowledge of characteristics of different microorganisms and their significance.
CO3: Understand common characteristics of different classes of fungi with their economic and ecological importance.
CO4: Identify plant diseases ant their control measures.
CO5: Develop skill to perform basic experiments to grow and study vegetative and reproductive structure of microorganism in laboratory.

M1BOT03-CT03	CYTOGENETICS, GENETICS AND PLANT BREEDING

Course Outcomes
After completion of this course, students will be able to
CO1: To develop conceptual understanding of chromosomes, law of inheritance, genetic basis of loci, alleles and their linkage.
CO2: Comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders and study of chromosomal basis of inheritance.
CO3: Develop critical understanding of chemical basis of genes and their interactions at population and evolutionary level.
CO4: Develop conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool.
CO5: Learning the methods of crop improvement along with development of mapping population in plants, QTL mapping, and molecular marker assisted breeding.

M1BOT04-CT04	PLANT ECOLOGY, CONSERVATION AND EVOLUTION

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the concept of population ecology and population genetics.
CO2: Learn about community structure and interaction**.**
CO3: Have knowledge of ecosystem functioning and global pollution phenomenon.
CO4: Understand concept of biodiversity and conservation strategies.
CO5: Conceptualize the phenomenon of evolution and speciation.

M2BOT01-CT05	PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand about the evolution of stellar system and heterospory.
CO2: Gain knowledge about the general character and classification of pteridophytes.
CO3: Understand about the general character of gymnosperms.
CO4: Learn about evolutionary relationship of Cycadopsida, Coniferopsida, Gnetopsida, Coniferales
CO5: Understand about the basic principle of paleobotany and know about prominent scientist.

M2BOT02-CT06	PLANT DEVELOPMENTAL BIOLOGY AND RESOURCE UTILIZATION

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about the organization of meristem and vascular tissue differentiation
CO2: Understand about the anatomical structure of stem and roots and learn the genetic and molecular aspects of flower development.
CO3: Understand the structure of anther and pollen wall because ultrastructure of pollen grain plays an important role in taxonomy.Evaluate the special structures and types of male and female gametophyte and learn the reproductive process in angiospermic plants.
CO4: Understand the mechanism of pollination and fertilization and can relate between embryo, endosperm and seed.Comprehend the causes of polyembryony and apomixis with its classification.
CO5: Learn about the ethnobotanical practices and economic importance of plants. Increase an awareness and appreciation of plants and plant products encountered in everyday life of human use

M2BOT03-CT07	CELL AND MOLECULAR BIOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the structure and function of cell organelle at ultrastructure level
CO2: Explore molecular level regulation of cell cycle and cancer.
CO3: Understand the nucleic acid structure, replication and transcription mechanism
CO4: Develop the knowledge of functioning of protein synthesis machinery
CO5: Learn the gene regulation mechanism and basic techniques of genomics and proteomics

M2BOT04-CT08	PLANT GROWTH AND DEVELOPMENT

Course Outcomes

CO1: Students will be able to understand the plant-water relationship and various mechanisms of active and passive transportation of molecules across the living membranes.

CO2: Students will be able to understand the importance of micro and macro-nutrients on plant growth and development. They will also understand the various factors controlling seed development and germination.

CO3: Students will be skilled theoretically about the biosynthesis and physiological effects of various plant growth regulators.

CO4: Students will learn about the importance of photoperiods and role of various photoreceptprs in flowering.

CO5: Students will learn various mechanisms of signal transduction in plants.

M3BOT01-CT09	PLANT BIOCHEMISTRY AND PHYSIOLOGY

Course Outcomes

CO1: Students will be able to understand the principles of the thermodynamics. They will also learn about the classification, structure and functions of various biomolecules.

CO2: Students will understand the mode of action of enzymes in detail. They will also understand the mechanism of nitrogen fixation in detail.

CO3: Students will be skilled theoretically about the mechanism of photosynthesis in C3, C4 and CAM plants.

CO4: Students will understand the various pathways of respiration and the mechanism of ATP biosynthesis in mitochondria.

CO5: Students will study the plant responses to various biotic and abiotic stresses.

M3BOT02-CT10	PLANT SYSTEMATICS

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the theory and practices of describing, naming, classifying and preparing herbarium of plants because such work is essential for understanding of biodiversity and its conservation including nomenclature, principles and evolutionary trends in taxonomy.

CO2: Assess terms and concepts related to taxonomy of plants and systems of classification and generalize the characters of the families according to various proposed systems of classification.

CO3: Learn about the various terminology used for description of flower characteristics and plant species

CO4: Understand the diagnostic features of various angiosperm families

CO5: Gain knowledge about role of various discipline in serving as evidence for taxonomic purpose.

M4BOT01-CT11	PLANT TISSUE CULTURE AND GENETIC ENGINEERING

Course Outcomes
CO1: Students will be able to understand the hormonal regulation of morphogenesis *in vitro* in plants..
CO2: Students will understand the various techniques of protoplast isolation and somatic hybridization. They will also understand the development of variations in somatic cells during *in vitro* conditions.
CO3: Students will learn modern tools and techniques of plant genetic engineering.
CO4: Students will able to understand the various methods of plant transformation. They will also study the importance of genetic modified plants in detail.
CO5: Students will learn various applications of plant genetic engineering. They will also learn various issues and processes of patenting in plant biotechnology.

M4BOT02-CT12	TOOLS AND TECHNIQUES IN PLANT SCIENCES

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the basic principle of microscopy, centrifugation and electrophoresis
CO2: Explore chromatography and spectrophotometry techniques.
CO3: Understand the basic principle of bioinformatics
CO4: Develop the knowledge of central tendency and dispersion
CO5: Learn the application of correlation, regression and analysis of variance

M3BOT03-ET01-A	BIOSYSTEMATICS–I

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the basic principle of taxonomic classification.
CO2: Develop the knowledge of rules related with nomenclature.
CO3: Understand the basic principles of botanical nomenclature.
CO4: Gain the knowledge related with pioneer classification of plants.
CO5: Learn about the evolutionary history of angiosperms.

M4BOT03-ET03-A	BIOSYSTEMATICS–II

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the method of plant collection and preservation of samples.
CO2: Learn about the documentation of taxonomic literature.
CO3: Assess the concept of evolution of characters and their application in taxonomy
CO4: Gain the knowledge of current advancement in plant taxonomy
CO5: Explore evolutionary history of angiosperm

M3BOT03-ET01-B	PRINCIPLES OF PATHOLOGY AND PLANT DISEASES

Course Outcomes
After completion of this course, students will be able to
CO1: Apply the conceptual and the practical training to differentiate between a healthy and disease plant in field.
CO2: Isolation and Identification of plant pathogen.
CO3: To ascertain the cause of the disease by Koch's Postulates.
CO4: To Know the source, symptoms and etiology of diseases of major concern.
CO5: To know about Disease forecasting

M4BOT03-ET03-B	MOLECULAR PLANT PATHOLOGY AND DISEASE MANAGEMENT

Course Outcomes
After completion of this course, students will be able to
CO1: Plant disease diagnosis by serological and molecular methods.
CO2: To learn the application of information technology and bioinformatics in plant pathology.
CO3: To have a brief idea about GIS and Remote sensing techniques in plant pathology.
CO4: To know about institute of repute of plant pathology in India and Abroad.
CO5: Learn about integrated pest management to reduce the risk of use of chemical agents for control

M3BOT03-ET01-C	BIOLOGY AND EVOLUTION IN BRYOPHYTES-I

Course Outcomes
After completion of this course, students will be able to
CO1: Develop critical understanding on characterization, reproduction, evolution of gametophytes and sporophytes of bryophytes.
CO2: Understand the comparative knowledge of Hepaticopsida, Anthocerotopsida, Bryopsida.
CO3: Recall and recognize the contributions of legends of bryology such as S.R. Kashyap, P.N. Mehra, S.K. Pande and Ram Udar along with the understanding of morphology and germination of spores.
CO4: Understand the mechanism of protonemal differentiation and bud formation and can relate the factors affecting physiology of reproduction.
CO5: Explore micro techniques used in bryological study and understand the economic importance of this ignored group of plants.

M4BOT03-ET03-C	BIOLOGY AND EVOLUTION IN BRYOPHYTES-II

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about the various life cycle pathway of bryophytes.
CO2: Gain knowledge about photomorphogenesis of liverworts and mosses.
CO3: Understandrole of bryophytes as indicator species.
CO4: Explore the conduction mechanism in the bryophytes.
CO5: Study the importance of model bryophytes for scientific research.

M3BOT03-ET01-D	RESTORATION ECOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand about role of habitat in species conservation.
CO2: Gain knowledge about the ecosystem functioning in disturbed ecosystem.
CO3: Develop basic understanding of restoration ecology
CO4: Learn about the case studies of restoration of degraded ecosystem.
CO5: Understand about role of biotechnology in solving the environmental problems.

M4BOT03-ET03-D	CONSERVATION BIOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the population dynamics for conservation purpose
CO2: Learn about the life history pattern
CO3: Basic principles of conservation genetics
CO4: Gain knowledge about genetic differentiation, geneflow and molecular variance
CO5: Skilled about conservation genetics using study of some case studies

M3BOT04-ET02-A	PLANT BIOENERGETICS AND APPLIED BIOCHEMISTRY

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about the bioenergetics of photosynthesis
CO2: Gain knowledge about various fluorescence parameters
CO3: Understand metabolism related with carbohydrate and fatty acid
CO4: Understand biosynthetic pathway of amino acids
CO5: Learn about concept of stress physiology

M4BOT04-ET04-A	SECONDARY METABOLITES AND BIOPROCESS ENGINEERING

Course Outcomes
After completion of this course, students will be able to
CO1: Understand different types of secondary metabolites and Knowledge generation of medicinal plants and various bioactive molecules
CO2: Study basic pathway for production of secondary metabolites and Standardization of isolation and extraction protocols of Secondary metabolites
CO3: Learn about different types of bioreactors and concept of bioprocess engineering and Scale up production of Secondary metabolites
CO4: Understand role of culture system in production of important drugs. Drug discoveries from medicinal plants.
CO5: Learning of genetic engineering tools for heterologous expression of genes to enhance secondary metabolite production, concept generation of functional foods and Nutraceuticals

M3BOT04-ET02-B	PRINCIPLES OF MICROBIAL TECHNOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about principles of fermentation technology, types of bioreactors and bioprocess parameters
CO2: Understand the overall fermentation process
CO3: Learn about strain selection and their improvement from the point of industry
CO4: Gain knowledge about the downstream processing
CO5: Develop the understanding of aerobic and anaerobic fermentation technology

M4BOT04-ET04-B	APPLICATIONS OF MICROBIAL TECHNOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand role of microorganism in agriculture.
CO2: Gain knowledge about the application of microbes in environmental studies
CO3: Learn about microbial degradation of pesticides and toxic chemicals
CO4: Understand the role of micro-organisms in food industry
CO5: Assess the role of microbes in preservation technology

M3BOT04-ET02-C	ADVANCED PHYCOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about the different types of culture media used for algal culture
CO2: Gain knowledge about the molecular systematics of algae
CO3: Understand molecular mechanisms of photodamage and photoprotection
CO4: Learn about pigments of algae for photosynthesis
CO5: Understand the role of toxins in algal blooms and their ecological implications

M4BOT04-ET04-C	APPLIED PHYCOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand application of algae for biodiesel production
CO2: Learn about the high value by-products of bioprocess engineering
CO3: Understand the role of algae in nanoparticle synthesis and nanoecotoxicology
CO4: Gain knowledge about role of algae in bioremediation
CO5: Understand the genetic engineering of algae

M3BOT04-ET02-D	APPLIED PLANT SCIENCES

Course Outcomes
Overall, the paper has been designed to inculcate the basic and applied knowledge and skill enhancement with a view of entrepreneurship, self- employment and livelihood security among PG students of plant sciences.After completion of this course, students will be able to
CO1: To make the students aware about organic farming, biofertilizers and sustainable agriculture package and practices for productivity enhancement.
CO2: To learn different nursery and gardening techniques.
CO3: To get the knowledge and scope of landscape gardening and cultivation of flowers of commerce.
CO4: To make them aware about the pest and pathogens of plants of ornamental and floriculture value.
CO5: To get them aware about the Intellectual Property Rights, Copyrights and how to draw a patent for biological specimens/ processes, etc.

M4BOT04-ET04-D	COMMERCIALIZATION OF MICROPROPAGATION TECHNOLOGIES

Course Outcomes
After completion of this course, students will be able to
CO1: Learn about the micropropagation technology
CO2: Commercialization of micropropagation technique
CO3: Understand about greenhouse technology
CO4: Understand application of micropropagation technology for commercialization of important groups of plants
CO5: Understand the industrial scale setup based on micropropagation

5. Chemistry

Not Available

6. Zoology

PROGRAMME SPECIFIC OUTCOMES (PSO)

- M.Sc. Zoology is a 2 year postgraduate course run under the CBCS scheme. It relates with the study of animal kingdom starting from a single cell, their structure, function, biochemistry, physiology, cell and molecular biology, biotechnology, conservation biology, bioinformatics etc.
- The entire syllabus is divided into four semesters each having 4 theory papers and 2 practicals accounting to a total of 16 theory and 8 practicals for each student.
- Third semester offers 2 elective courses namely Entomology and Insect Toxicology and Wildlife Biology.
- Students are gain expertise and indepth theoretical and practical knowledge of all the basic and allied field s of Zoology.
- The programme is designed in such a way to provide both academic and professional training and proficiency in animal science.
- The course imbibes students with state of art knowledge of every aspect animal science and its allies.

PROGRAMME OUTCOMES (PO)

- To understand the existing and new avenues of the biological sciences with special reference to animal science and imbibe the knowledge from all different perspectives.
- To Gain knowledge and understand concepts in all the contemporary fields of Zoology.
- To provide students with a broad understanding of animals and their interactions with the environment and to explain how organisms function at the level of the gene, cell, tissue, organ, organ-system and physiology.
- To equip students with competent and significant research knowledge to engage in any biomedical or bioscience research.
- To enable the students for gaining competencies for various competitive examinations of private and Government sectors as teachers, lecturers, food inspector, environmental inspectors etc.

SEMESTER I

Paper I: Biosystematics, Structure and Function of Invertebrates (Course Code-MI ZOO 01CT-01)

Course Outcome:

- To study the fundamentals of taxonomy, nomenclature and classification of invertebrates.
- To study molecular cytotaxonomy and role of genetics in taxonomy.
- To know the functional aspects of different systems of invertebrates.
- To study the various physiological mechanisms of various organ systems like locomotory, integumentary, reproductive, digestive etc., in invertebrates.
- To make students aware about how life evolved from simple to complex organization by modification in various systems and thus enhancing efficiency in Invertebrates.
- To help explain and compare the functional morphology of invertebrates.

Paper II: Ethology and Evolution (Course Code- MI ZOO02CT-02)

Course Outcome:

- Students would be imparted knowledge about basic and important concepts of ethology
- To give an insight into the various methods of studying animal behavior.
- To study about social organization, animal societies and its importance.
- To get acquainted with different types of learning and biological rhythms.
- To know the history and concept of evolution.
- To understand the mechanisms and factors involving in evolution process.
- To know the evolutionary patterns of various animals at micro and macro level.

Paper III -Instrumentation and Techniques in Biology (Course Code-MI ZOO03 CT03)

Course Outcome:

- To study the principle, working mechanism and application of various types of microscopes like electron, phase contrast, atomic absorption etc., used in biological experiments.
- To study the principle, working mechanism and application of various types of instruments like pH meter, spectrophotometer, centrifuge etc., used in biological experiments.
- To know the different types of separation techniques of electrophoresis and chromatography.
- To understand the technique of histological slide preparation by knowing the concepts of fixation, staining techniques etc.,
- To get aware about section cutting using microtome, cryostat etc.,
- To know about techniques like decalcification, cryopreservation, freezing techniques etc.

Paper IV: Cell and Molecular Biology (Course code-MI ZOO 04 CT-04)

Course Outcome:

- To gain insight into how processes are integrated at the molecular level to create a functional eukaryotic cell.
- To provide knowledge about the biomembranes, transport across them.
- To know the principles of cell communication and adhesion and cell- cell signaling.
- To acquire advanced knowledge of molecular biology of cell cycle, its regulation and the checkpoints.
- To study the biology of aging, genetic mechanism of cell death in terms of necrosis and apoptosis.
- To have an insight into the intracellular transport mechanism, protein trafficking and their regulation.
- To know about chromation, karyotype, somatic cell genetics etc.,

Practical I: (Paper I and II) (Course code-MI ZOO 05 CP 01)

Course Outcome:

- This course involves the practical knowledge related to theory papers I and II.
- It acquaints the students with various types of invertebrates by studying museum specimens and slides of their internal parts etc.
- Students are imparted practical knowledge of preparing permanent slides of various materials available as well as by collection of material.

- Virtual dissection helps to have practical knowledge about the anatomy of different animals.
- Experiments related to animal behavior provide practical insight into hoe the behavior is performed and varies under different circumstances.
- Exercises on evolutionary biology give clear indication of how estimations of gene and genotype frequencies are made.

Practical II: (Paper –III and IV) (Course code-MI ZOO 06CP-02)

Course Outcome:

- This course involves the practical knowledge related to theory papers III and IV.
- To demonstrate the practical usage of various instruments.
- To prepare paraffin block, perform sectioning, and prepare double stained slide.
- To know and prepare different solutions, fixatives and stains.
- To prepare slides of mitosis and meiosis to demonstrate cell division.
- To study human karyotype and sex chromatin.

SEMESTER II

Paper I: Biodiversity and Conservation Biology (Course code-M2 ZOO 01CT-05)

Course Outcome:

- To learn the concepts of biodiversity and mega diversity of India.
- To study the different causes leading to habitat destruction, impacts of climate change, overexploitation and environmental impact assessment.
- To gain knowledge about Conservation biology and methods of conservation.
- To know about different conservation categories of animals and global as well as national conservation agencies.
- To study different plant and animal interaction in the context of population ecology and community ecology.
- To know about Restoration ecology, human conflicts with animals and species reintroduction programmes.

Paper II: Environmental Toxicology (Course Code-M2 ZOO 02 CT06)

Course Outcome:

- To have a wide knowledge about environmental toxicology.
- To understand the Environmental stress and its management strategies.
- To know the different types of pollution and their control.
- To have an insight into the general principles of toxicology, toxicokinetics and toxicodynamics.
- To know the bioindicators and biomarkers of environmental health.
- To study different toxicants, their mechanism of action and kinetics.
- To gain insight into the safety evaluation of toxicants, risk management, assessment and monitoring.

Paper III: Developmental Biology (Course code-M2ZOO03CT-07)

Course Outcome:

- To get knowledge about gametogenesis, fertilization and its mechanism.
- To know about the mechanism of cleavage, blastulation and gastrulation in different animals.
- To have an insight into mechanisms of induction, competence and differentiation.
- To know how animals achieve symmetry and axis.
- To study morphogenesis and organogenesis and their genetic mechanism.
- To know how evolution has changed the development process in the phylogeny.
- To gain knowledge about modern techniques of developmental biology and socio ethical issues.

Paper IV: Animal Physiology and Immunology (Course Code-M2ZOO 04CT08)

Course Outcome:

- To help the students in understanding how the body functions adapts with respect to its external and internal environment.
- To study about thermoregulation, osmotic balance, hormonal regulation in relation to the environment.
- To understand the all areas of immunology and study the innate and adaptive immunity, antigens and antibodies.
- To know about the immune deficiency diseases, hypersensitivity and vaccines.

Practical I: (Paper I and II) (Course Code-M2 ZOO05- CP03)

Course Outcome:

- This course involves the practical knowledge related to theory papers I and II.
- The students are given exposure to field by visits to natural habitats and protected areas and wetlands of Rajasthan for detailed study.
- Analysis of habitat characteristics and determination of various parameters of population and species.
- Practical demonstration and performance of bioassays of different pesticides and dose calculation are taught.
- Effect of heavy metal toxicity on various mammalian tissues is demonstrated.

Practical II: (Paper III and IV) (Course code-M2 ZOO6CP-04)

Course Outcome:

- This course involves the practical knowledge related to theory papers III and IV.
- It gives knowledge about the structure of reproductive organs.
- To acquire students with basic knowledge of experimental embryology that leads to understanding cleave, blastula and gastrula.
- To demonstrate the development of chick embryo.

- To help study the internal structure of various immune organs viz spleen, thymus, bone-marrow, kidney, lymph nodes etc.
- Demonstration of different experiments of blood related to clotting and bleeding time, formation of haematin crystals and differential staining.

SEMESTER III

Paper I: Vertebrates (Course code-M3ZOO01CT-09) (Core)

Course Outcome:

- To critically examine the origin and diversification history of vertebrates.
- To study the origin and classification of vertebrates.
- To have an insight into various concepts of origin and phylogenetic relationship of vertebrates starting from agnatha, gnathostomes, pisces, amphibians, reptiles, aves and mammals.
- Evolutionary significance of vertebrates is studied.

Paper II: Computational biology, Biostatistics and Bioinformatics (Course Code-M3 ZOO 02 CT-10)) (Core)

Course Outcome:

- To learn the strategies of data collection, analysis of data, measurement of central tendencies and different sampling techniques.
- To understand the proper interpretation of data generated in the biology using correlation, regression and significance tests.
- To have access to computer statistical programs – Prism, SPSS.
- To have knowledge about probability and different probability distribution.
- To understand theStatistical designing of experiments and importance of research designs.
- To give knowledge about computer and its applications for further research and to use of different scientific database.
- To introduce to bioinformatics and various tools like proteomics, genomics, microarray etc.

Elective I A: Entomology and Insect Toxicology

Paper I: SYSTEMATIC ENTOMOLOGY, INSECT ORGANIZATION AND ECOLOGY (Course Code-M3ZOO 03 ET-01A) (Elective)

Course Outcome:

- To give a detailed knowledge about Origin and Evolution of insects.
- To know taxonomical position, classification and use of identification keys for the largest inhabitants of the earth i.e., insects.
- To give knowledge about collection, identification and preservation aspects of insects.
- To study about different insect societies and their success rate.
- To provide information about the ecology, population dynamics, intra and interspecific relations along with human and insect interactions.

Elective I B: Wildlife Biology

Wildlife Biology I : Biodiversity and Wildlife Ecology (Course Code-M3ZOO-03 ET01B) (Elective)

Course Outcome:

- To understand the concepts, levels and values of biodiversity alongwith different types of species of biodiversity importance.
- To study the organization and characteristics of biotic community and population ecology
- To know about the Ecology of major habitats, patterns of habitat utilization and dispersion.
- To have idea about the Major vegetation types of India, phenology and distribution.
- To study the forest soils, conservation methods and forest menstruation.
- To provide insight into Silviculture.

Elective III B : Limnology and Fisheries

Limnology and Fisheries I: Limnology (Course Code-M3ZOO 04ET01C) (Elective)

Course Outcome:

- To have a detailed knowledge about the origin, classification and morphogenesis of lakes
- To study how different physical factors like temperature, density etc., affect the lake ecosystem
- To study the various chemical factors like pH, oxygen, salts etc. which influence the lake ecosystem
- To have an insight about various planktonic organisms in terms of their classification, distribution, significance and to study the productivity and energy flow in aquatic system.
- To know about eutrophication and its causes, control, water purification techniques, wetlands and their conservation.

Elective II A: Entomology and Insect Toxicology

Paper II: Insect Physiology and Toxicology (Course Code-M3ZOO04 ET02A) (Elective)

Course Outcome:

- To inculcate knowledge of morphology and physiology of insects.
- To study the integument, appendages and wing development.
- To have knowledge about various systems namely muscular, digestive, circulatory, excretory and respiratory systems of insects and to know their physiology and how they make insects the most successful organisms on the earth.
- To provide information about the morphology and physiology of neuro endocrine system.
- To impart knowledge about the reproductive, endocrine system, growth, development and metamorphosis in insects.

Elective II B : Wildlife Biology

Wildlife Biology II : Conservation Biology (Course Code-M3ZOO 04ET02B) (Elective)

Course Outcome:

- To gain knowledge about Conservation biology and biodiversity conservation
- To have an insight into *ex situ* and *in situ* methods of conservation
- To have an idea about international conservation bodies – IUCN, UNDP, FAO, WWF
- To have knowledge about national parks, wildlife sanctuaries and biosphere reserves of India
- To know about the formation and management of zoological parks and zoo sanitation
- To have an idea of Indian wildlife and endangered and threatened species
- To impart knowledge about wildlife forensics, conservation ethics and values

Elective III B: Limnology and Fisheries

Limnology and Fisheries II : Fresh water aquaculture and its management (Course Code-M3ZOO 04ET02C) (Elective)

Course Outcome:

- This paper gives insight about fresh water aquaculture and its management
- Gives an account of aquaculture in India
- Students gain knowledge about fishes of cold water and brackish water.
- Gives knowledge about fisheries of economically important fishes.
- Helps the student gain insight into how to develop, plan and construct a fish farm and hatcheries.
- Gives information about fish culture, fish preservation, conservation and fish behavior.

Practical- I (Core Paper I & II) (Course Code-M3ZOO05CP05)

Course Outcome:

- This course involves the practical knowledge related to core theory papers I and II.
- It acquaints the students with various types of vertebrates by studying museum specimens and slides of their internal parts etc.
- Students are imparted practical knowledge of preparing permanent slides of various materials available
- Virtual dissection helps to have practical knowledge about the anatomy of different vertebrate animals.
- Comparison of axial skeleton of pisces, amphibians, reptiles, aves and mammals gives an idea about the bones and their development
- Understand the application of statistical techniques in biological research.
- To know the statistical problems in biological science which are useful for the students for their research works.
- To work on computer statistical programs – Prism, SPSS
- To have practical knowledge about how to perform various statistical tests like significance tests, ANOVA, etc.
- To use various bioinformatics tools like proteomics, genomics, microarray etc.
- To calculate probability and different probability distribution.

Practical-II (Elective I A and II A: Entomology and Insect Toxicology) (Course Code -M3ZOO 05 EP01A)

Course Outcome:

- This course involves the practical knowledge related to elective IA and IIA theory papers.
- Students are exposed to field visits for identification and collection of insects of various orders.
- To inculcate practical knowledge and usage of various collection, identification and preservation methods of insects at various stages
- Dissections of insects from different orders gives an insight of the anatomy of various systems
- To demonstrate the different types of antennae, mouthparts, wings etc., which are an important parameter for identification
- Insect preservation boxes are made for future studies
- Microtomy of internal organs helps to analyze the detailed structure

Practical-II (Elective I B and II B: Wildlife Biology) (Course Code-M3ZOO05 EP01B) Biodiversity, Wildlife Ecology and Conservation Biology

Course Outcome:

- This course involves the practical knowledge related to elective IB and II B theory papers.
- The students are given exposure to field by visits to Zoological garden and a small report is submitted by them.
- Practical knowledge about identification of mammalian species using hair imprinting and scat analysis is given which is an important aspect for wildlife studies.
- Analysis of population density, species dominance, habitat characteristics etc., are done in field.
- Soil and water analysis in the field are demonstrated.

Practical-II (Elective I C and II C: Limnology and Fisheries) (Course Code-M3ZOO05 EP01C)

Course Outcome:

- This course involves the practical knowledge related to elective IC and II C theory papers
- This course gives practical training about various aspects related to limnology
- It helps students to know methods to measure the area, shoreline and shoreline index of lake.
- Helps to learn methods to measure the various physical factors like temperature, visibility and pH of water.
- Gives practical knowledge about measurement of chemical factors like alkalinity, salinity, dissolved oxygen etc.
- Acquaints students with the different types of aquactic insects, planktons, aquatic weeds and various fishing crafts and gears.

SEMESTER IV

Paper I: Applied Zoology (Course Code-M4ZOO01CT11) (Core)

Course Outcome:

- To study the concepts of applied zoology.
- To study various protozoans, helminthes and insects in relation to the human diseases they cause.

- To acquire information on beneficial insects, sericulture and apiculture.
- Students are introduced to vector biology and are imparted knowledge regarding different vector borne diseases especially in humans and their recent facts.
- To impart knowledge about agricultural pests.
- Brief idea of pisciculture, fish industry, pearl culture and pearl industry are given.
- To provide knowledge about Sustainable agriculture, organic farming and vermicomposting.

Paper II: Animal Biotechnology (Course Code-M4ZOO02CT-12) (Core)

Course Outcome:

- To give an insight into the various aspects of biotechnology, rDNA technology and genetic engineering.
- To provide knowledge about dealing with different procedures involving genes viz., isolation, sequencing, labeling, probing, cloning techniques etc.
- To study different hybridization techniques, DNA fingerprinting, blotting techniques etc.
- To study the mechanism of gene regulation, gene targetting, gene therapy and human genome project.
- To learn the application of biotechnology and genetic engineering in various fields.
- To study the Role of biotechnology in health care diagnosis.
- To learn the Intellectual Property Rights and patenting laws.
- To give knowledge about Ethical and social implications of gene technology.

Elective I A: Entomology and Insect Toxicology

Paper I: Economic, Medical, Forensic and Commercial Entomology (Course Code-M4ZOO03 ET -01A) (Elective)

Course outcomes:

- To impart knowledge about pests of economic importance and their management
- To study about synthetic insecticides, assessment of pest status and their chemical control
- To provide an insight into the biological control of insects and integrated pest management
- To acquaint with role of biotechnology and nanotechnology in insect control
- To give knowledge of medical entomology where life cycle, disease transmission and control measures of flies, fleas and ticks etc.,
- To have an insight of mosquito borne diseases, other vector borne diseases, disease outbreak and integrated vector management strategies
- To study commercial entomology by providing an insight into apiculture, sericulture and lac culture and their status in India

Elective I B: Wildlife Biology

Paper I B: Wildlife Biology: Indian Wildlife (Course code-M4ZOO 03ET -01B) (Elective)

Course outcomes:

- To study about various aspects of Indian wildlife.

- To study the various Zoogeographical regions of India and their fauna and special mention of fauna of Thar desert.
- To have an insight into the Status, distribution, physical characteristics and ethology of important endangered animals and plants of the country.
- To study about the different special wildlife programs likeProject Tiger, Project Elephant, Operation Rhino, Project Crocodile running in the country.
- To gain knowledge about Wildlife Institutes in India and wildlife legislation including different acts and plans.
- To study the damages caused by wildlife- their identification and control.

Elective I C: Limnology and Fisheries

Paper I C: Limnology and Fisheries: Fish Taxonomy and Physiology (Course code-M4ZOO 03ET -01C) (Elective)

Course outcomes:

- To study the taxonomy and physiology of fishes.
- Gives an account of origin and classification of fishes.
- Provides knowledge about Ganga river system, coastal and deep sea fisheries.
- Gives knowledge about various physiological system of fishes like respiration, reproduction osmoregulation etc.
- Helps to gain knowledge about bacterial, fungal and worm diseases of fish and their prevention, fish spoilage, preservation and transport.
- Gives insight about fish biotechnology

Elective II A: Entomology and Insect Toxicology

Paper II: DISSERTATION (Course Code-M4ZOO04ET -02A) (Elective)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Elective II B: Wildlife Biology

Paper II: DISSERTATION (Course Code-M4ZOO 04ET -02B)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Elective II C: Limnology and Fisheries

Paper II C: DISSERTATION (Course code-M4ZOO 03ET -02C) (Elective)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Practical- I (Core Paper I & II) (Course Code-M4ZOO06-CP06)

Course Outcome:

- This course involves the practical knowledge related to core theory papers I and II.
- Students are given practical knowledge of rearing and the life cycle study of any stored product pest, phytophagous pests or medically important insects.
- To study permanent slides of disease causing protozoans, helminthes and arthropods.
- Extraction and quantification of DNA is practically demonstrated.
- Practical knowledge and demonstration of Agarose gel electrophoresis for DNA, RNA and protein.

Practical-II (Elective I A: Entomology and Insect Toxicology)

Entomology and Insect Toxicology (Course Code-M4ZOO06-EP02A)

Course Outcome:

- Students are given practical knowledge about Collection, identification and rearing of phytophagous pests and different mosquitoes.
- Estimation of LD50 and LC 50 of insecticides using insects is demonstrated.
- Students are acquainted with techniques of appliances used for the application of insecticides.
- Analysis of Blood cells, meiotic and polytene chromosomes is being practically taught.
- Various rearing techniques, mechanisms and use of equipments is learnt by the student.

Practical-II (Elective I B : Wildlife Biology)

Indian Wildlife and Wildlife Management (Course Code-M4ZOO06-EP02B)

Course Outcome:

- Visit to natural habitats and wildlife sanctuaries, desert, mountain range, wetland and especially Rajasthan for the detail study.
- Visit to wetland for demonstration and field exposure of students.
- Students are acquainted with use of Taxonomic identification and preparation of taxonomic key of given animals.
- Practical knowledge of POP preparation of pugmarks and footprints, designing the animal housing, enclosures, Permanent preparation of barbs of different avian feathers and use of statistical parameters is imparted.

Students also have to submit a project report on the different field visits done.

Practical-II (Elective I C: Limnology and Fisheries) (Course Code-M4ZOO05 EP02C)

Course Outcome:

- Helps in identification of fishes using morphometric characters
- Identification of important cultivable fin fishes, shell fishes, predator and weed fishes.
- Identification of fish eggs, larva fry and fingerlings.
- Identification of commercially important indigenous fishes, exotic fishes, Prawns, fishing nets, boat models, hapas,
- Field trips to gain knowledge about various lakes, fish farms, landing centres and polluted streams for limnological and fisheries study
- Students also have to submit a project report on the different field visits done.

7. Bussiness Adm

Program	**M.COM (Business Admn.)**
Credits	
ISO Certification	NA
Programme Outcomes	M.Com is two year full time post-graduate degree programme. To keep conformity with the requirements of Choice Based Credit System, provisions have been made for Core Courses, Skill Enhancement Courses and Discipline Specific Elective Courses; this is based on a cafeteria approach to choosing dual specialization The sixteen core courses have been enumerated to be offered in Semester I and Semester II; i.e., eight core courses are to be taught in each semester. The students will

also have four skill enhancement courses in the 3rd and 4th Semesters. They will have the opportunity of selecting 10 subject specific elective courses to pursue dual specialization for their future career Program Outcome 1. Fundamental knowledge in different functional areas of management, managerial principles, economic theory and quantitative techniques of decision-making like Statistics and Operations Research are imbibed by the students. Program Outcome 2. Managerial skill of the students are developed by adopting practical approaches such as case study, business games, assignment writing and application of digital technology Program Outcome 3. Students get adequate exposure to operational procedures in Finance, Marketing, HRD, Banking, Insurance, Accounting, Taxation, International Business and Operations Management. Program Outcome 4. Students are equipped with dual specialization such a combination of Finance and Marketing or Finance and Human Resource

Development or Marketing and HRD so as to make them useful human resources to cater to multiple tasking demands in industry . Program Outcome 5. Students interested in pursuing academic careers acquire the ability to bond with their specializations and come up with primary ideas of research to be carried in their respective fields. Programme Specific Outcomes

PSO-1 - Students develop the ability to comprehend and imbibe core and functional management concepts, business environment and domain specific knowledge. 2

PSO-2 - Equip the students with requisite knowledge, skills and right attitude necessary to provide effective leadership in a global environment.

PSO-3 - Develop competent management professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Indian Economy and Society, aligned with the national priorities.

PSO-4 - Develop skills for analysing of the business data, application of relevant analysis, and problem solving in other functional areas such as marketing, finance, business strategy and human resources etc.

PSO-5 - Develop attributes for research in academics and applied research for industry .

Program	MHRM
Credits	
ISO	NA
Program Outcomes	PO1 :- To understand human resource issues and management trends in a competitive global economy as well as a broad spectrum of state and federal employment legislation. PO2:- To equip students with the tools necessary to effectively meet the challenges of an ever-changing business climate. PO3:- To inculcate specialized knowledge and skills required by managers who are responsible primarily of managing human resources and improving industrial relations PO4 :- To develop a sound theoretical base in the domain of Human Resource Management.

	PO5:- To develop communication, interpersonal skills and leadership qualities to work in and with teams in organizations.
Program Specific Outcomes	PSO1:- Understand the basic concepts of Human resources management and its applications in the individual, team and organizational levels
	PSO2 :- Theoretical Knowledge in Enterprise Resource Planning, Innovation and Change Management, Organisational Behavior, Labour Laws, Knowlegde and Talent Management, Marketing Management, MIS etc.
	PSO3:- Practical knowledge and training in various areas of HR such a recruitment, selection, induction, communication, peformance appraisal, stress etc
	PSO4 :- Practical exposure to the real life organizational situations and opportunities of Human resources management through the two practical project studies Internship and a Problem centered study

8. DTHM

Not Available

9. Education

Not Available

10. Engineering

Not Available

11. Women Studies

Programme Outcomes

- To introduce students to the discipline of Gender Studies and its specific proposes and specifics;
- To make boys and girls aware of each other's strengths and Weakness. It will help in developing sensitivity and attitudinal change towards both genders in order to lead a gender balanced ambience and women empowerment;
- To assess the condition and position of women and men in the local, national, regional, and global settings;
- To provide theoretical knowledge and advanced competencies in gender related teachings, research, project and programme planning, gender mainstreaming and training through direct field experiences;
- To develop an orientation among students which will encourage them to capture the realities and perspective of women and men in the community, nation and globally in a better manner;
- To familiarize student with the concept of gender and ideology and its operation in the various domain of the society and to study the legal provisions and rights of women as human rights in develop context;
- To impart education and awareness to female folk about their status and rights and to motivate researchers for planning and execution of gender-issues and community development so that can work in NGO's and other civil societies.

- The idea is to equip the student so that their ability to think and analyze is enhanced also, they develop good research-oriented perspective.

Programme Specific Outcomes

- To introduce students to the discipline of Gender Studies and its specific proposes and specifics;
- To make boys and girls aware of each other's strengths and Weakness. It will help in developing sensitivity and attitudinal change towards both genders in order to lead a gender balanced ambience and women empowerment;
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- To impart education and awareness to female folk about their status and rights and to motivate researchers for planning and execution of gender-issues and community development so that can work in NGO's and other civil societies.

Course Outcomes

- To familiarize & elaborate the students with the terminologies related to Gender studies, the concept of patriarchy and its impact on women
- To introduce students to the discipline of Women's Studies and Gender Studies and its perspectives.
- To trace the evolution of Gender Studies from Women's Studies & to familiarise the students with historical overview of feminist movements
- To develop an understanding of the various Women's movement in India
- To introduce basic concepts relating to gender and provide logical understanding of gender role, the role of education and media as an instrument to gender equality, the ground reality by analyzing educational scheme
- To introduce to the evolution of communication and the emergence of different Mass media in our society
- To understand the concept of community and social institutions
- To provide a comprehensive knowledge about health issues of women and gender, social issues playing important role in gender development.
- To provide insight on gender disparities within the family and community
- To introduce the concept of work and development, gender issues in organized and unorganized sectors
- To learn about economic situation at local and global level & know about gender budgeting and mainstreaming
- To study the legal provisions for Gender and women's access to justice, look at the issues related political participation and representation of gender
- To sensitize students on gender issues in governance, acquaint students with actors at state, national and international levels

12. Fashion Technology

Degree Program: FASHION DESIGN & TECHNOLOGY(OPTIONAL COURSE IN B.A. DEGREE)

Program Outcomes (PO)

- To understand the concept related to elements and principles of fashion.
- To introduce students to the glory of fashion and impart knowledge of fashion components.
- To acquaint the students with the basic design ideas and apparel construction details.
- To familiarize the students with the role of a designer.
- To Acquaint Students with Computer Aided Designing
- To understand the concept related to elements and principles of design.

Course Outcomes (CO)

- To increase and build an acute sensitivity to the world around in relation to fashion and textiles
- To develop and initialize a design vocabulary, an essential tool for practicing as designers;
- To develop an understanding about various kinds of fabrics, their structure and the utility;
- To impart knowledge about Textile dyeing and printing;
- To expose the students to the various craft and textiles and to install appreciation for hand craftsmanship;
- To familiarize students with the design elements and principles and its application in fashion and textile designing;
- To increase and build an acute sensitivity to the world around in relation to fashion and textiles

Diploma Programs: Diploma Course (Textile & Fashion Designing)

Diploma Course (Fashion Merchandising & Readymade Garments)

Diploma Course (Fashion Design & Technology)

Program Outcomes (PO)

- To expose students to basic microeconomic concepts related to Fashion.
- To provide a method/ approach to help draw correct conclusions/ solve economic problems in the fashion industry.
- To introduce students to the glory of fashion and impart knowledge of fashion components.
- To acquaint the students with the basic design ideas and apparel construction details.
- To understand the concept related to elements and principles of design.
- To familiarize the students with the role of a designer.
- To Acquaint Students with Computer Aided Designing

Course Outcomes (CO)

- To acquaint the students with the basic textile and textile construction details.
- To impart knowledge about different aspects of pattern making and commercial Pattern making.
- To impart knowledge of drafting, adaptation and apparel construction.
- To understand the concept related to elements and principles of design.
- To understand terminology related to fashion.
- To acquaint the students with the basic factors influencing fashion.
- To foster an understanding of international designers and their work.
- To Impart the Skills of Fashion Designing Through Corel Draw & Reach Fashion Studio
- To enhance the creative skills in sketching and rendering for designing garments
- Introduce the concept of spec sheets and source fabric accordingly

Master Program: M.Voc. (Master of Vocation-Fashion designing)

Program Outcomes (PO)

- To impart skill based education to enable students gain a vocational degree in Fashion designing
- To understand the concept related to elements and principles of fashion.
- To acquaint the students with the basics of designing
- To enable students to gain real time work experience of the industry by means of internships
- To produce a strong visual document that explains the skills, techniques and vocational quality that qualifies a student to work as a "Stylist" in Fashion Industry.
- To familiarize students with various methods of business communication.

Course Outcomes (CO)

- To make students understand an indepth study of the "Stylist role" in Fashion which is in tune with industry requirement.
- To enhance the creative skills in sketching and rendering for designing garments
- To impart knowledge and skill in presentations & business communication.
- To Create an Awareness and Understanding of the Evolution and Current Structure of the Apparel Retailing Industry in India
- To Develop and Understanding and Appreciation of the Four Ps of Marketing, Basic Principles of Visual Merchandising and Effective Customer Handling Practices
- To awaken the creativity of a community, to create a sustainable product line for the recent fashion scenario.
- To acquaint students with basics of merchandising.
- To introduce the concept of sourcing strategies and sales promotion.

13. FMS

DIPLOMA IN DIGITAL MARKETING

S.No.	Subject Paper Code	Subject Name	Course Outcome

1	FMS/DMD101	English and Communication	English and Communication: The outcome of this paper is to equip the students with the necessary techniques and skills of communication and enlist their activity and willing cooperation in the performance of their jobs.
2	FMS/DMD102	Functional Management:	Functional Management: The idea is to enhance the managerial skills of students so that they can lead in the best possible way.
3	FMS/DMD103	Computer Skills and Internet Proficiency:	Computer Skills and Internet Proficiency: Looking at the digitalization in the routine life, the outcome of this course is to make students able to handle the internet and other web components.
4	FMS/DMD104	Website Planning and Designing:	Website Planning and Designing: After going through this course, students became proficient in Graphic designing tools and their applications along with knowing concepts like web planning etc.
5	FMS/DMD105	Social media and search marketing	Social media and search marketing: Knowledge of digital marketing platforms, SEOs etc. has been indulged among the students.
6	FMS/DMD106	Email Marketing & Affiliate Marketing:	Email Marketing & Affiliate Marketing: The present scenario calls for content writers and this course is contributing towards the same by engaging topics like related Tools and techniques and strategies.

7	FMS/DMD107	Content Creation and Management:	Content Creation and Management: This further enhanced the content creation framework along with platforms for blogging etc. and measuring and analyzing content.
8	FMS/DMD108	Practical Project:	Practical Project: The students got an aid in applying the knowledge in the practical world and students engaged in hands-on of the applications and their implementation.

DIPLOMA IN RETAIL MARKETING MANAGEMENT

Objective of the programme:

With an emphasis on retail management and marketing topics, the diploma explores key developments and trends in this area. The course is job oriented targeting the growing retail industry. The students will be able to deliver the expected skill set required by the industry after completion of the programme. This course aims at providing a comprehensive view of retailing, and an analysis of the retail environment and exposure to issues and developments in the industry. The students, who are pursuing the course of retail management are taught about the introduction and concept of retail management, retailing trends, pricing and merchandising, segmentation, relationship marketing and information technology in retailing.

Subject specific outcomes are as follows:

Subject Code	Subject Name	Course Outcome
Paper 1: (FMS/DRMM101)	Basics of Marketing and Retailing	This subject provides a comprehensive view of retailing, and an analysis of the retail environment and exposure to issues and developments in the industry
Paper 2: (FMS/DRMM102	Marketing and Communication in Retailing	This subject gives introduction and concept of retail management, retailing trends, pricing and merchandising, segmentation, relationship marketing and information technology in retailing
Paper 3: (FMS/DRMM103)	Retention in Retail Marketing	This subject provides a comprehensive view of customer relationship management in retail industry, an overview of the Indian rural market & opportunities and benefits of going global
Paper 4: (FMS/DRMM104)	Training with Dissertation	A project dissertation/report based on the internship/training will have to be submitted in the fifth month from the commencement. The written part for

		project study FMS/DRMM104 shall account for 50% of marks and the viva-voce to be conducted by a duly constituted examination board for the remaining 50% of marks.

CERTIFICATE DIGITAL MARKETING

S.No.	Subject Name	Course Outcome
1	Functional Management:	Functional Management: The idea is to enhance the managerial skills of students so that they can lead in the best possible way.
2	Computer Skills and Internet Proficiency:	Computer Skills and Internet Proficiency: Looking at the digitalization in the routine life, the outcome of this course is to make students able to handle the internet and other web components.
3	Social media and search marketing	Social media and search marketing: Knowledge of digital marketing platforms, SEOs etc. has been indulged among the students.

4	Email Marketing & Affiliate Marketing:	Email Marketing & Affiliate Marketing: The present scenario calls for content writers and this course is contributing towards the same by engaging topics like related Tools and techniques and strategies.
5	Practical Project:	Practical Project: The students got an aid in applying the knowledge in the practical world and students engaged in hands-on of the applications and their implementation.

THE PROGRAMME MBA EXECUTIVE

The Master of Business Administration- Executive (MBA-Executive) is a two-year full-time programme. The program shall run in hybrid mode or as per the UGC guidelines. The course structure and programme administration are as follows:

COURSE STRUCTURE

The programme has been organized in two years-First Year and Second Year, each year comprising two semesters. The list of papers offered during First Year and Second Year of the programme shall be as follows:

FIRST YEAR-

MBAEX-101 Management Process and Organizational Behavior –

The Study of organizational behavior includes areas of research dedicated to Improving job performance, increasing job satisfaction, promoting innovation and encouraging leadership , promoting team building and states various ways of stress management.

MBAEX102- STATISTICS AND RESEARCH METHODOLOGY

The aim of statistics is to draw a conclusion from data…performing descriptive data analysis.
Using appropriate statistical methods to solve the research problem and application of various tests such as - Z-Test, T-Test, F- Annova Test, Chi-Square Test.

MBAEX103: MANAGERIAL ECONOMICS

The Objectives of this

MBAEX-104 ENVIRONMENT MANAGEMENT

The objectives of this course is to consider the relationship between human beings and the world, from air pollution to the depletion of natural resources. It covers the importance of sustainability and started studying the moral and ethical relationship between humans and the environment.

It covers pollution and waste management and various standards such as ISO 14000,9000,20000.

MBAEX-105: MANAGERIAL SKILL DEVELOPMENT

The course is aimed at equipping the students with the necessary & techniques and skills of communication to inform others, inspire them and enlist their activity and willing cooperation in the performance of their jobs.

MBAEX-106: INDIAN ETHOS AND VALUES

Indian Ethos in Management refers to the values and practices that the culture of India (Bharatheeya Sanskriti) can contribute to service, leadership and management. These values and practices are rooted in Sanathana Dharma (the eternal essence), and have been influenced by various strands of Indian philosophy

MBAEX- 107: ACCOUNTING FOR MANAGERS

Objectives

The basic purpose of this course is to develop an insight of postulates, principles and techniques of accounting and utilisation of financial and accounting information for planning, decision-making and control.

MBAEX-108: COMPUTER APPLICATIONS IN MANAGEMENT

Objectives:
The objectives of this course include developing an appreciation of different software and hardware systems available in the industry among the participants and build up the experience of computer usage in business organizations with specific reference to commercial data processing systems

MBAEX-201: ORGANIZATION EFFECTIVENESS AND CHANGE

Objectives

To familiarize the students with basic organizational processes to bring about organizational effectiveness and change.

MBAEX – 202: MANAGEMENT SCIENCE

Course Objectives:
The real world problems are complex problems; they require finding of an optimum solution subject to a large number of constraints and decision variables. Handling them so as to achieve OPTIMUM SOLUTIONS is one of the biggest challenges among the players of the real world. Keeping this in mind, the whole Course is targeted to equip the students with necessary quantitative techniques (especially mathematical optimization methods) so that they become capable of solving managerial and financial decision problems in an objective and a scientific manner.

MBAEX-203: HUMAN RESOURCE MANAGEMENT

Objectives

In a complex world of industry and business, organisational efficiency is largely dependent on the contribution made by the members of the Organisation. The Objectives of this course is to sensitize students to the various facets of managing people and to create an understanding of the various policies and practices of human resource management.

MBAEX-204: FINANCIAL MANAGEMENT

Objectives:
The purpose of this course is to acquaint the students with the broad framework of financial decision making in a business unit.

MBAEX-205: MARKETING MANAGEMENT

Objectives

The purpose of this course is to develop and understanding of the underlying concepts, strategies and issues involved in the marketing of products and services

MBAEX- 206: PRODUCTION AND OPERATIONS MANAGEMENT

Objectives

The Course is designed to acquaint the students with decision making in: Planning, scheduling and control of Production and Operation functions in both manufacturing and services; Productivity improvement in operations through layout engineering and quality management etc.; Effective and efficient flow, replenishment and control of materials with reference to both manufacturing and services organizations.

MBAEX-207 E- COMMERCE

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

After Completion of the subject student should able to

- Understand the basic concepts and technologies used in the field of management information systems
- Have the knowledge of the different types of management information systems
- Understand the processes of developing and implementing information systems
- Be aware of the ethical, social, and security issues of information systems.

MBAEX-208: INTERNATIONAL BUSINESS ENVIRONMENT AND MANAGEMENT

Objectives

The primary Objectives of this course is to acquaint the students to emerging global trends in business environment

MBAEX-301: BUSINESS POLICY & STRATEGIC MANAGEMENT

Objectives
The Objectives of this course is to develop understanding about strategic processes and their impact on a firm.

MBAEX-302: DECISION SUPPORT SYSTEMS AND MANAGEMENT INFORMATION SYSTEM

Objective
The objective of the course is to develop the basic understanding of the decision support system of the Artificial Intelligence for Business Organization

MBAEX-303: BUSINESS LEGISLATION

Objectives
The course is designed to assist the students in understanding basic laws affecting the operations of a business enterprise.

MBAEX-304: SUMMER TRAINING PROJECT

At the end of second semester, all students will have to undergo summer and training of 8-10 weeks with industrial, business or service organization by taking up a project study.

This helps the students in developing practical understanding about the industries and about their world culture.

MBAEX 401- BUSINESS ANALYTICS
Objective-

This course aims to devlop overall anatytical skills of the students and to help them to apply analytical techniques to business decision making.

FM-3102: SECURITY ANALYSIS AND INVESTMENT MANAGEMENT

Objectives
The objective of this course is to impart knowledge to students regarding the theory and practice of Security Analysis and Investment Decision Making Process

FM-3103: PORTFOLIO MANAGEMENT

Objectives
The objective of this course is to give the students an in-depth knowledge of the theory and practice of Portfolio Management.

FM-3105: MANAGEMENT OF FINANCIAL SERVICES

Objectives

The main objective of this course is to help students to learn the various financial services and their role in the overall financial system.

FM-3109: FINANCIAL DERIVATIVES

Objectives
The objective of this course is to give an in depth knowledge of the functioning of derivative securities market.

FM-3110: PROJECTS PLANNING, ANALYSIS AND MANAGEMENT

Objectives
The basic purpose of this course is to understand the framework for evaluating capital expenditure proposals, their planning and management in the review of the projects undertaken.

FM-3114: FOREIGN EXCHANGE MANAGEMENT

Objectives
To acquaint the participants with the mechanism of the foreign exchange markets, measurement of the foreign exchange exposure, and hedging against exposure risk.

MBA EX-3201: CONSUMER BEHAVIOUR

OBJECTIVES:
To understand the conceptual foundations of consumer buying behavior. To equip the learner to apply the principles and prepare for a career in Product and Brand Management in the FMCG and consumer durables industry

MBA EX-3202: ADVERTISING AND SALES PROMOTION MANAGEMENT

OBJECTIVES: To equip students for a career in Product and Brand Management, Advertising – with special reference to Client servicing, Media planning and research.

MBA EX-3203: STRATEGIC MARKETING

Objectives

The basic objective of this course is to develop skills for analysing market competition and design appropriate competitive marketing strategies for higher market share.

MBA EX-3205: SALES AND DISTRIBUTION MANAGEMENT

Objectives

The purpose of this paper is to acquaint the student with the concepts which are helpful in developing a sound sales and distribution policy and in organising and managing sales force and marketing channels.

MBA EX-3208: MARKETING OF SERVICES

Objective: To differentiate between product and service businesses and equip for a career in marketing in the service industry.

MBA EX-3211: BRAND MANAGEMENT

Objective:
The objective of this course is to impart in-depth knowledge to the students regarding the theory and practice of Brand Management

MBA EX - 3213 PLANNING AND MANAGING RETAIL BUSINESS

Objectives :
The Course will focus manufacturers' perspective on retailers and understanding of the retail business

MBA EX 3215: LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Objectives:

To introduce process and functions of physical distribution system. To introduce the major building blocks, functions, business process, performance metrics and decision making in supply chain network. To provide an insight into the role of Internet Technologies and electronics commerce in supply chain management

MBA EX3216- Digital Marketing

Objectives

The objective of this paper is to create awareness about Digital Marketing and educate the learner about use of electronics in marketing management.

MBAEX-3301: MANAGEMENT OF INDUSTRIAL RELATIONS

Objectives

Organisational efficiency and performance are intricately interlinked with industrial relations. This course is an attempt to appreciate the conceptual and practical aspects of industrial relations at the macro and micro levels.

MBAEX- 3305: LEGAL FRAMEWORK GOVERNING HUMAN RELATIONS

Objectives

Understanding of the legal framework is important for the efficient decision making relating to man management and industrial relations. The course aims to provide an understanding, application and interpretation of the various labour laws and their implications for industrial relations and labour issues.

MBAEX-3306: MANAGEMENT TRAINING AND DEVELOPMENT

Objectives

The purpose of this paper is to provide an in-depth understanding of the role of Training in the HRD, and to enable the course participants to manage the Training systems and processes.

MBAEX-3308: ORGANIZATIONAL CHANGE AND INTERVENTION STRATEGIES

Objectives

The objective of this paper is to prepare students as organizational change facilitators using the knowledge and techniques of behavioural science.

MBAEX-3310: HUMAN RESOURCE DEVELOPMENT: STRATEGIES AND SYSTEMS

Objectives

The purpose of this course is to facilitate an understanding of the concepts, methods and strategies for HRD.

MBAEX-3311: HUMAN RESOURCE PLANNING AND DEVELOPMENT

Objectives

The objective of this paper is to develop a conceptual as well as a practical understanding of Human Resource Planning, Deployment and Development in organizations

MBAEX-3311: Hospital Planning

Course Objectives:

The objectives of the course are to enable the participants to - develop a basic understanding of the hospital planning and designing process; enable them to understand functional requirements; layout parameters in planning of the departments of the hospital; to learn new concepts in designing of healthcare facilities; and, to understand safety issues in hospital buildings and legal.

Describe the functional requirements and layout of various departments of the hospital.

- Have adequate knowledge of space and equipment planning for the departments of the hospital.
- Evaluate the legal compliances for hospital buildings
- Develop understanding of safety issues in hospital buildings
- Understand the modern and emerging trends in hospital architecture.
- To develop an understanding for efficient and economic hospital designs.

MBAEX-3412: Analytics for Health Care Management

Course Objectives:

In an environment where complexity is growing, decision makers in healthcare systems need to use data to make pertinent and accurate decisions. Their practices and policies should be supported and strengthened by data. Tools of analytics provide the capability to identify patterns in data

and to implement this knowledge in developing strategies and improving performance. The objectives of this course are to enable the participants to develop an understanding of basic principles of data analysis and familiarize them with key tools and techniques that would enable them to take data-driven decisions in a hospital/healthcare delivery setting.

Course Learning Outcomes:

After the course, participants should be able to:

• Identify sources of data, suggest methods for collecting, sharing and analyzing data
• Understanding the issues involved in data quality and their management
• Discuss the difference between descriptive, predictive and prescriptive analytics
• Able to use basic data presentation and visualization tools and manipulate simple data-sets
• Discuss the basics of big-data, machine learning and artificial intelligence
• Able to identify decision problems amenable for analytics-based solutions. Understand how data analytics can provide potential solutions to improve quality and lower cost
• Able to lead team comprising of data scientists

MBAEX-3413: Health Care Ethics, Governance and Society

Course Objective:

The aim of the course is to help students gain understanding of how healthcare needs and delivery systems depend on the socio- cultural context of recipients of the society. The course contents focus on developing a People Centered Approach in health care professionals and creating health care delivery systems aligned with its principles. Finally, the course will sensitize participants towards ethics and regulation involved in private or public health care practice and engages in critical thinking to solve ethical dilemmas.

Course Learning Outcomes:

• To understand changing global trends with respect to disease and planning for the health care of the future in a progressively global, aging and urbanized context.
• Understanding what is culture and examining the elements of landmark and successful culture centered health interventions

To become familiar with elements of People Centered health care systems so that effective and equitable preventive, secondary and tertiary health care is available to all sections of the society.

• Special needs of marginalized sections of society like women, street children, those from war and disaster ravaged environments and others.
• Ethics involved in issues like surrogacy, organ donation, clinical trials, euthanasia and others.
• Governance, regulation and ethical protocols during practice for doctors and health practitioners and learning how to solve ethical dilemmas.

MBAEX-3414: Total Quality Management and Accreditation for Health Care

Course Objectives:

The key objective of this course is to acquaint the students with the conceptualization of Total Quality (TQ) from design assurance to processes' assurance to service assurance. TQM is to be linked with business excellence through management frameworks and award criteria. Additional

objective is to give focus on Quality Management Systems (QMS) like 1SO-9001.The course would also aim to closely link management of quality with that of reliability and maintainability for total product assurance. Integration of operations systems like ISO 14001 (EMS) and occupational safety and health (OSH) and total productive maintenance (TPM) is also to be analyzed. The dimensions of quality in services in the contemporary environment are also to be focused. Course Learning Outcomes:

• Appreciate the nature, need and scope of total quality management and its relationship with operational and then business excellence.
• Appreciate the quality of design, off-line control, losses and costs of quality.
• Develop and analyses tools for hazard analysis
• Understand conceptual framework of TPM and study concept of OEE.
• Build knowledge about statistical process control through process capability studies.
• Deploy total quality principles in supply and vendor management
• Develop knowledge and skills about quality improvement tools.
• Develop total quality relationship with environment and safety systems.

MBAEX-3416: Innovations in Health Care and Health Care Entrepreneurship

Course Objectives:

The objectives of this are to introduce the participants to a wide range of advances and innovations that are happening in healthcare services. The innovations relate to use of technology, information technology, business and service delivery models. The objective of this course is to help the executives develop an entrepreneurial mind set and gain an understanding of the entire entrepreneurial process through analysis of various situations in health care organizations. Additionally, the purpose of the course is also to gain insights about the critical role of creativity and innovation to the development of new products and services in entrepreneurial start-ups in the health care sector.

Course Learning Outcomes:

• Familiarization with innovations in healthcare technology – diagnostics, medical devices, etc., their impact on future of healthcare and their relevance to the Indian healthcare industry
• Introduction to the concepts of advances in Healthcare Information Technology like mHealth, Big Data, Artificial Intelligence, Genomics, etc.
• Introduction to newer models of service delivery like – telemedicine, remote health monitoring, home healthcare, etc., understanding opportunities and challenges posed by these models
• Introduction to newer business models in healthcare – mobile health apps, doctor discovery and networking platforms, understanding opportunities and challenges posed by these models
• Critically analyze issues involved in utilizing these advances in current and anticipated healthcare delivery models.

MBAEX-3417: Regulation and Laws in Health Sector and International Health Systems

Course Objectives:

The objective of this course is to make the participants familiar with the laws that govern health care services in the country. The course is aimed at enabling the participant in understanding the rationale behind existing legal framework and its tenets in India to safeguard the interests of the

health care service providers (organizations and individuals) and consumers.
The objectives of this course is to enable the participants to - develop an understanding of basic healthcare delivery models of various developed and developing countries; to understand in detail about different approaches to the organization, financing and delivery of health services in these countries; to understand the health care reform programs and perform a strengths, weaknesses, opportunities, and threats (SWOT analysis) of healthcare delivery system of a country; and, to develop and understanding of healthcare reform strategies in different countries.

Course Learning Outcomes:
• Understand the existing legal framework in India that governs health care delivery
• Understand expected standards of ethical behavior and promote standards of ethical behavior
• Analyze role of legal system in health policy and health care delivery
• Contribute to legal reasoning in running of a healthcare organization
• Understand the rationale of legal system in the country
• Interpret legal provisions under various laws related to health care system
• Have adequate knowledge of all the laws that are currently in force in matters related to health care delivery
• Critically evaluate the legal provisions and interpret the laws and byelaws
• Develop skills to judiciously exercise powers, responsibilities and protect one's own rights as health care provider
• Understanding of the concept of various healthcare delivery models of countries both in developed and developing economics.
• Understanding demographic and macroeconomic indicators of various countries.
• Ability to evaluate health system performance of different countries in terms of efficiency and equity.
• Ability to identify specific health system strengths, weaknesses, opportunities, and threats
(SWOT analysis) employing comparative analysis as a research tool.
• To compare the health system performance of the one country with other economically similar and different country.
• Understanding health care reform programs of several countries and to apply these reforms for betterment of healthcare delivery in India.
• Discussion on newer initiatives and strategies of Govt. of India in healthcare delivery.

MBAEX-3418: Management of Hospital Support Services

Course Objectives:
The objective of this course is to familiarize the participants with support services in the hospitals. It is aimed at enabling the participants to understand the framework of support services in hospital and their role in assisting clinical departments in the hospital to achieve clinical and service excellence. Support services under the purview of this course include Biomedical engineering department, Engineering department, clinical nutrition and dietetics, administration, human resource department, Front Office (OPD+IPD), laundry & housekeeping department, security department, food and beverages department, commercial department, medical records and Information technology department, etc.

Course Learning Outcomes:
At the end of the course, the learner should be able to know and understand:

- Major support services in the hospitals.
- Their contribution in achieving service excellence in hospital along with clinical excellence.
- Impact of support services on patient care.
- Impact of support services on the business of a hospital.
- Rationale of the support services- policies and procedures
- Roles and responsibilities of the managers and other functionaries in support services.
- Coordination among all the support services departments.

14. Geography

DEPARTMENT OF GEOGRAPHY

University College of Social Sciences & Humanities
Mohanlal Sukhadia University, Udaipur, Raj. - 313001

(Programme Specific Outcomes and Course Outcomes)

Programme Specific Outcomes: (B.A. Three Year Pass Course)

PSO 1. To introduce the students to the importance of the discipline to understand the surroundings.

PSO 2. To understand the fundamental approaches and branches of the discipline.

PSO 3. To impart comprehensive knowledge of the regional geography of the State, country and the world.

PSO 4. To enable students to prepare for competitive examinations relevant for graduate students.

PSO 5. To develop an understanding of the cartographic tools and methods for representation of geographical data, surveying and mapping.

Proposed Scheme of Courses in Geography
Three-Year Pass Course (B. A.) 2015-16
TDC I Year Arts
Paper I : Physical Geography
Paper II : Human Geography
Practical : Cartography-I (Scales and presentation of geomorphic and climatic data)
TDC II Year Arts
Paper I : World Regional Geography

Paper II : Economic & Resource Geography
Practical : Cartography-II (Projections and presentation of socio-economic data & elementary statistical methods)
TDC III Year Arts
Paper I : Geography of India
Paper II : Geography of Rajasthan
Practical : Surveying and Remote Sensing
Notes:
1. Each theory paper will be of 70 marks each with minimum pass marks of 28
2. Each practical will be of 60marks with minimum pass marks of 23.
3. Teaching hours for each theory paper and practical will be three hours per week.
4. Practical batch will comprise of twenty Five students in one batch.
5. Use of map stencils (outline of political boundaries only) and simple function calculators are allowed in the examination.
6. Each theory paper of three hour duration will be divided into five units and questions will be asked as per following scheme:

Sections	Marks Distribution of	Questions To be Asked	Questions To be Attempted	
1. Very Short (20-50 Words Answers)	10	10	20	
2. Short Answers Proportionately from each Unit with internal choice	10	5	20	from each Unit (250 words) with internal
3. Analytic/Descriptive Answers (500 words)	5	2	30	
Total	25	17	70	

DEPARTMENT OF GEOGRAPHY
Faculty of Earth Sciences
Mohanlal Sukhadia University, Udaipur
Course Outcomes: B.A. Geography (First Year) – Course – P (I) Physical Geography
CO 1. To make students understand their immediate surroundings
CO 2. To develop an understanding of theoretical concepts related with formation of the earth
CO 3. To create strong foundation of various geomorphological phenomena shaping the earth

surface.
CO 4. To extend knowledge of landform dynamics, atmospheric phenomena and oceanography: three fundamental elements of the earth crust.
CO 5. To cover basic contents for various competitive examinations such as civil services, state level PSC exams, school education exams and so on.
B.A. First Year
Subject: Geography
Paper I - Physical Geography
Unit – I
a) Definition and scope of physical geography.
b) Origin of the earth - Tidal Hypothesis of James Jeans and Big Bang theory.
c) Interior of the earth.
d) Origin of the continent and oceans:- Wegner's theory of Continental drift and Plate tectonics.
e) Theories of mountain building:- Geosynclines Organ theory of Kober and Plate tectonic theory.
Unit – II
a) Isostacy :- Concept and Views of Airy and Pratt.
b) Diastrophism: - Faults & folds.
c) Weathering: - Physical, Chemical and Biological.
d) Drainage pattern and Cycle of erosion :- Davis & Penck.
e) Landforms: - Fluvial, coastal and arid.
Unit – III
a) Composition and structure of the atmosphere.
b) Atmospheric temperature: – Isolation and heat budget.
c) Atmospheric pressure :- Vertical and horizontal distribution of air pressure.
d) Winds: - Planetary, periodic and local winds.
e) Jet stream.
Unit – IV
a) Air masses: - Source region and classification of air masses.
b) Fronts :- Front genesis and frontolysis , Type of fronts.
c) Cyclones :- Tropical and temperate cyclones.
d) Anti cyclones.
e) Climatic classification by Koeppen.
Unit – V
a) Reliefs of the ocean basins - Bottom reliefs of the Indian ocean.
b) Distribution of temperature and Salinity of oceans.
c) Ocean currents : - Atlantic ocean and Pacific ocean currents.

d) Tides :- Type and theory of origin (Progressive wave and Stationary Wave theory.
e) Coral reefs :- Conditions of growth, types and origin according to Darwin and Murray.

Suggested Readings:

1. Dayal, P., A Text book of Geomorphology, Shukla Book Depot, Patna, 1996.
2. Dury, G. H., The Face of the Earth, Penguins, 1980.
3. Ernst, W.G., Earth Systems: Process and Issues, Cambridge University Press 2000.
4. ICSSR, A Survey of Research in Physical Geography, Concept, New Delhi, 1983.
5. Kale, V. and Gupta, A., Elements of Geomorphology, Oxford University Press, Calcutta, 2001.
6. Monkhouse, F. J., Principles of Physical Geography, Hodder and Stoughton, London, 1960.
7. Pitty, A., Introduction to Geomorphology, Methuen, London, 1974.
8. Sharma, H. S., Tropical Geomorphology, Concept, New Delhi, 1987.
9. Singh, S., Geomorphology, Prayag Pustakalaya, Allahabad, 1998.
10. Small, R. J., The Study of Landforms, McGraw Hill, New York, 1985.
11. Sparks, B. W., Geomorphology, Longmans, London, 1960.
12. Steers, J. A., The Unstable Earth: Some Recent Views in Geography, Kalyani Publishers, New Delhi, 1964.
13. Strahler, A. N., Environmental Geo-Science, Hamilton Publishing, Santa Barbara, 1973.
14. Strahler, A. N. and A. H. Strahler, Modern Physical Geography, John Wiley & Sons, 1992.
15. Summerfield, M. A., Global Geomorphology, Longman, 1991
16. Thornbury, W. D., Principles of Geomorphology, Wiley Eastern, l969.
17. Wooldridge, S. W. and R. S. Morgan, The Physical Basis of Geography: An Outline of Geomorphology, Longman Green & Co., London, 1959.
18. Wooldridge, S. W., The Geographer as Scientist, Thomas Nelson and Sons Ltd., London, 1956.
19. Barry, R. G. and R. J. Chorley, Atmosphere, Weather and Climate, Routledge, 1998.
20. Critchfield, H., General Climatology, Prentice-Hall, New York, 1 975.
21. Das, P. K., The Monsoons, National Book Trust, New Delhi, 1968.
22. Lydolph, Paul E., The Climate of the Earth, Rowman and Allanheld, Totowa, N. J., 1985.
23. Mather, J. R., Climatology, McGraw Hill, New York, 1974.
24. Patterson, S., Introduction of Meteorology, McGraw Hill Book Co., London, 1 969.
25. Stringer, E. T., Foundation of Climatology, Surjeet Publications, Delhi, 1982.
26. Trewartha, G. T., An Introduction to Climate, International Students Edition,

McGraw Hill, New York, 1980.
27. Anikouchine, W. A. and R. W. Sternberg, The World Oceans: An Introduction to Oceanography, Englewood Cliffs, N. J. 1973.
28. Gerald, S., General Oceanography: An Introduction, John Wiley & Sons, New York, 1980.
29. Garrison, T., Oceanography, Wadsworth Co. USA, 1998.
30. King, C. A. M., Beaches and Coasts, E. Arnold, London, 1972.
31. King, C. A. M., Oceanography for Geographers, E. Arnold, London, 1975.
32. Sharma, R. C. and M. Vatel, Oceanography for Geographers, Chetnya Publishing House, Allahabad, 1970.
33. Shepard, F. P., Submarine Geology, Harper & Sons, New York, 1948.
34. Thurman, H. B., Introductory Oceanography, Charles Webber E. Merril Publishing Co., 1984.
35. Weisberg, J. and Howard, Introductory Oceanography, McGraw Hill Book Co., New York, 1976.
36. lfoUnfz lag % HkkSfrd Hkwxksy] olqU/kjk izdk'ku] xksj[kiqj] 1997
37. 'kekZ ,p-,l- % ^^HkkSfrd Hkxw ksy** iap'khy izdk'ku] t;iqj
38. prqHkqZt ekeksfj;k ,o tSu % HkkSfrd Hkwxksy ,oa tho e.My] lkfgR; Hkou vkxjk] 1996
39. ohjsUn z flag pkSgku % HkkSfrd Hkwxksy] jLrksxh ifCyds'kUl] esjB] 1996
40. mik/;k; ,y- ,u- % HkkSfrd Hkwxksy] jkt- fgUnh xUz Fk vdkneh] t;iqj
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Course Outcomes: B.A. Geography (First Year) – Course - P (II) Human Geography

CO 1. To extend knowledge of core concepts, theories and ideologies of Human Geography.

CO 2. To develop fundamental understanding of evolution of human races and distribution and socio-economic fabric of major tribes in the world and India.

CO 3. To foster knowledge about distribution of population in the world, fundamental demographic concepts and population challenges with respect to India.

CO 4. Basic contents for various competitive examinations for civil services, state PSC exams, school education exams, and so on.

B.A. First Year

Subject: Geography

Paper: II Human Geography

Unit – I

a) Definition and scope of Human geography.

b) Its relation with other social sciences.

c) Schools of Human geography: - Determinism, Possibilism and Neo

– Determinism.
d) Concept of Man – Environment relationship.
e) Fundamental principles of Human geography: Principles of activities, Principle of areal differentiation, Principle of terrestrial unity.

Unit – II

a) Stages of evolution of man
b) Races of mankind: - criteria of classification according to G. Taylor
c) Classification and distribution of races according to G. Taylor
d) Factors of evolution of human races
e) Migration zone theory by Griffith Taylor

Unit – III

a) Distribution of Tribes in the world.
b) Habitat, Occupation & social organization: Pigmies, Badawins, Eskimos and Khirgiz,
c) Distribution of Tribes in India
d) Habitat, economic activities and social organization of Bhil, Naga, Toda and Santhal.
e) Early economic activities of mankind :- Food gathering, Hunting, Fishing & Shifting cultivation.

Unit – IV

a) Distribution of population: world distribution pattern physical, economic and social factors influencing spatial distribution.
b) Concept of over population, under population, optimum population and zero population growth.
c) Demographic transition theory.
d) Migration-internal and international, general laws of Migration
e) Concept of human development and population problems and policy of India.

Unit – V

a) Settlement: origin and types of settlement.
b) Rural settlement-Pattern of rural settlements, house types and building materials, rural settlement in India
c) Urban settlement- origin of towns, patterns of cities.
d) Functional classification of cities, zoning of cities, Christaller's theory
e) Urbanization and problems: slums, town planning, concept and principles.

*Note – Stencils are to be permitted in the examination.

Suggested Readings:

1. Brunhes, J. : Human Geography
2. Huntington, E.: The Principles of Human Geography, John Wiley & Sons, N.Y.
3. Perpillou, A.V. : Human Geography, Longmans, 1965
4. Money, D.C.: An Introduction to Human Geography; U.I.P. London
5. Karan, M.P. : Manav Bhugol ke Siddhant, Kitabghar, Kanpur

6. Mamoria, C.B. : Principles of Human Geography
7. Negi, B.S. : Human Geography- An Ecological Aproach, Kedarnath
Ramnath, Meerut,1982
8. Dwivedi, R.L. & Singh, R.L. : Manav Bhugol ki Samiksha
9. Blache Vidal de la : Manav Bhugol ke Siddhant (in Hindi)

Course Outcomes: B.A. Geography (First Year) – Course - Practical: Cartography – I

CO 1. To develop an understanding of fundamentals of scales.
CO 2. To develop skills of representing geomorphic features using cartographic methods.
CO 3. To train students to represent climatic data using various graphs.
CO 4. To impart sound knowledge of weather symbols and instruments.

B. A. First Year (Geography)

PRACTICAL

UNIT – I

a) History of Cartography (as art and science)
b) Scales: definition, types – Statement scale, Representative Fraction (R.F.) and Graphical scale. Inter-conversion of R.F. and Statement scale. Construction of Plain, Comparative, Diagonal, Time and Vernier scales 10 exercises
c) Enlargement, reduction and combination of maps 02 exercises

UNIT – II

a) Methods of representation of relief – Hachures, Formlines, Contours and Layer Tint methods 04 exercises
b) Composite features to be drawn with help of contours patterns representing glaciated, arid and fluvial topography (any two of either youth, mature and old stage)
06 exercises
c) Profiles- types of profiles. Construction of serial (at least four),superimposed, projected and composite profiles 02 exercises

UNIT - III

a) Principles and working of weather instruments – thermometer, thermograph, barometer, barograph, hygrometer, hygrograph, rain gauge, wind vane and cup anemometer
b) Weather symbols. 01 exercise
Interpretation of Indian weather maps (One each of December- January and July- August)
02 exercises
c) Representation and interpretation of climatic data – Rainfall histogram, Hythergraph, Climograph, Rainfall variability graph (departure from mean) 04 exercises

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Notes

1. Each exercise should be drawn on 1/4th of a full drawing sheet.
2. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
3. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.

Scheme of examination

1. Candidates will be examined by Internal Examiner as per existing norms of the Univers ity
2. The distribution of marks will be as follows:

a) Test Paper 36 marks
b) Record 14 marks
c) Viva Voce 10 marks

Total 60 marks

Suggested Readings

1. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
2. Robinson, A. R.,Elements of Cartography, Chapman & Hall.
3. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
4. Raize, E., General Cartography, McGraw Hill Book Co., London.
5. Singh, R. N. and Kanaujia L. R. S., Map Work & Practical Geography, Central Book Depot, Allahabad.
6. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
7. 'kekZ] ts- ih- % izk;ksfxd Hkwxksy] jLrksxh izdk'ku] esjB
8. tSu] 'ks"key % iz;ksxkRed Hkwxksy] lkfgR; Hkou] vkxjk
9. HkYyk] vkj- ,y- % izk;ksxkRed Hkwxksy] ds- M+h izdk'ku] vtesj
10. ekeksfj;k] prqHkZt % ekufp= foKku ,oa izk;ksxkRed Hkwxksy] lkfgR; Hkou] vkxjk
11. oekZ] ,y- ,u- o yks<+k] vkj- ,e- % izk;ksxkRed Hkwxksy] jkt- fgUnh xzaFk vdkneh] t;iqj
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Course Outcomes: B.A. Geography (Second Year) – Course - P (I) World Regional Geography

CO 1. To develop an understanding of terrain, climate, natural vegetation and soil of various

continents.
CO 2. To gain knowledge about demographic and economic aspects of major continents of the world.
CO 3. To enrich the knowledge of regional geography of various continents.
CO 4. Basic contents for various competitive examinations for civil services, state level PSC exams, school education exams and so on.

B.A. Second Year
Subject: Geography
Paper I: World Regional Geography

UNIT I: Japan (Asia)
a) Geographical Location and Importance of Japan in Asia
b) Physical Division, Drainage and Climate
c) Population Distribution and Urbanization
d) Horticulture and Natural Resources: Vegetation and Major Minerals
e) Industrial Regions of Japan

UNIT II: Egypt (Africa)
a) Geographical Location and Importance of Egypt in Africa
b) Physical Division, Drainage and Climate
c) Population Distribution and Natural Resources: Vegetation and Major Minerals
d) Agricultural Development in Nile Valley: Aswan Project & Irrigation
e) Industrial Development

UNIT III: United State of America (North America)
a) Geographical Location and Importance of USA in North America
b) Physical Division, Drainage and Climate
c) Population Distribution and Development of Megalopolis (East Coast)
d) Agricultural Belts: Wheat, Corn and Cotton
e) Industrials Regions: Iron-Steel and Engineering Industry

UNIT IV: Brazil (South America)
a) Geographical Location and Importance of Brazil in South America
b) Physical Division, Drainage and Climate
c) Population Distribution and Natural Resources: Vegetation and Major Minerals
d) Agricultural Development: Coffee & Sugarcane: Distribution and Production
e) Industrial development and Urbanization

UNIT IV: France (Europe) & New Zealand (Oceania)
a) Geographical Location and Importance of France in Europe
b) Physical Division, Drainage and Climate of France

c) Population Distribution and Paris basin: Agriculture, Industrial Regions, Transportation
d) Geographical Location, Physical Division and Climate of New Zealand
e) Population Distribution and Dairy Farming

References:

1. Cole, J., A Geography of the World's Major Regions, Routledge, London, 1996.
2. Cole, J. P., Latin America - Economic and Social Geography, Butterworth, USA, 1975.
3. Cole, M. M., South Africa, Dutton, New York, 1961.
4. de Blij, H. J., Geography: Regions and Concepts, John Wiley & Sons Inc., New York, 1994.
5. Dickenson, J. P. et al., The Geography of the Third World, Routledge, London, 1996.
6. Gourou, R., The Tropical World, Longman, London, 1980.
7. Jackson, R. H. and L. E. Hudman, World Regional Geography: Issues for Today, John
8. Kolb, A., East Asia: Geography of a Cultural Region, Methuen, London, 1977.
9. Minshull, G. N., Western Europe, Hoddard & Stoughton, New York, 1984.
10. Patterson, J. H., Geography of Canada and the United States, Oxford University Press, 1985.
11. Songquiao, Z., Geography of China, John Wiley & Sons Inc., New York, 1994.
12. Ward, R. W. and A. Miller, World Regional Geography: A Question of Place, John Wiley &Sons Inc., New York, 1989.
13. oekZ] y{eh ukjk;.k] Ikzknsf'kd Hkwxksy] jktLFkku fgUnh xzUFk vdkneh] t;iqj
14] gqlSu] ekftn] fo'o dk Hkwxksy] jkor ifCyds'ku] ubZ fnYyh
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Course Outcomes: B.A. Geography (Second Year) – Course - P (II) Economic & Resource Geography

CO 1. To enhance spatial knowledge of various economic activities of man in relation to his natural milieu.
CO 2. To develop an understanding of classification and conservation of natural resources.
CO 3. To develop insight into distribution, production and status in international trade of selective agricultural and industrial activities.
CO 4. To develop a comprehensive understanding of international trade and transport activities and trade organizations at world level.

B. A. SECOND YEAR
SUBJECT: GEOGRAPHY
Paper-II: Economic & Resource Geography
Unit – I
a) Definition, nature and scope of economic geography
b) Recent trends in economic geography; its relation with economics, and allied subjects.
c) Classification of economies and spatial organization.
d) Sectors of economy: primary, secondary and tertiary.
e) Impact of economic activities on environment.

Unit – II
a) Natural resources: meaning; Classification of resources.
b) Conservation of resources; Water and forest resource conservation.
c) Changing nature of economic activities: Mining and forestry,
d) Changing nature of economic activities: Agriculture and industry.
e) Changing nature of economic activities: Trade and transport.
Unit – III
a) Agricultural types and classification.
b) Agriculture: physical, social, cultural environment influencing crop production.
c) Spatial distribution, production and international trade of rice and wheat
d) Spatial distribution, production and international trade of cotton and rubber.
e) Spatial distribution, production and international trade of coffee and tea.
Unit – IV
a) Classification of minerals; distribution, production and trade of iron ore and bauxite.
b) Distribution and production of coal, petroleum and hydroelectricity.
c) Factors of localization of industries; iron and steel industry.
d) Chemical and cement industries.
e) Textile and ship building industries.
Unit – V
a) Trade and transport: geographical factors in their development.
b) Major water, land and air transport routes.
c) Internal and international trade.
d) World Trade Organization (WTO) and globalisation.
e) Impact of WTO and globalisation on developing countries of the world.
Suggested Readings:
1. Bengston, N. A. and V. L. Royen, Fundamental of Economic Geography, Prentice Hall, New York.
2. Boesch, H., A Geography of World Economy, D. Van-Nostrand Co., New York, 1964.
3. Chapman, J. D., Geography and Energy, Longman, London, 1989.
4. Gregor, H. F., Geography of Agriculture, Prentice Hall, New Jersey, USA, 1970.
5. Griggs, D. B., The Agricultural Systems of the World, Cambridge University Press, New York, 1974.
6. Hartshorne, T. N. and J. W. Alexander, Economic Geography, Prentice Hall, New Delhi, 1988.
7. Jones, C. F. and G. G. Darkenwald, Economic Geography, McMillan Co., New York. 1975.
8. Millar E., Geography of Manufacturing, Prentice Hall, New York, 1962.
9. Pickes, L. D., The Wealth of The World, Dan & Co., London.
10. Raza. M. and Y. Agrawal, Transport Geography of India, Concept, New Delhi, 1986.
11. Robinson, H., Economic Geography, Longmans.

12. Smith, D. M., Industrial Location - An Economic Geographical Analysis, John Wiley, New York, 1971.
13. Stamp, L. D., A Commercial Geography, Longmans.
14. Thomas, R. S., The Geography of Economic Activities, McGraw Hill, New York 1962.
15. UNO, Statistical Year Book (Latest Edition).
16. nkl] xqIrk ,o a dijw %vkfFkZd vkSj okf.kT; Hkwxksy] ,l pakn ,.M dEiuh] fnYyh
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Course Outcomes: B.A. Geography (Second Year) – Course – Practical: Cartography-II (Projections and Presentation of socio-economic data)

CO 1. To develop a fundamental understanding of various types and use of map projections.

CO 2. To understand the pre-conditions, suitability and limitations of various maps and diagrams.

CO 3. To learn the various techniques for cartographic representation of socio-economic phenomena using thematic maps, diagrams and graphs.

CO 4. To learn fundamentals of quantitative techniques.

B. A. Second Year (Geography)

PRACTICAL

UNIT – I

a) Maps – definition and classification; map elements, principles of map composition

b) Drawing of Dot, Chorochromatic, Choroschematic, Isopleth (temperature and rainfall data of Rajasthan/ India) maps, Choropleth 06 exercises

c) Topographical sheets- history, conventional symbols, scheme of classification-old and new

Study and interpretation of Survey of India toposheet at 1: 50,000 representing typical areas of Rajasthan in respect of relief, drainage, land use, settlement and means of transportation 04 exercises

Scale of slope 02 exercises
UNIT – II
a) Graphs – elements, characteristics and construction of poly, band and triangular graphs 03 exercises
b) Diagrams – Elements and characteristics of one, two and three dimensional diagrams using appropriate socio-economic data 08exercises
c) Flow diagram (traffic/population data) 01 exercise
UNIT - III
a) Utility of statistical methods in Geography, Frequency distribution, histograms
b) Measures of central tendency – Arithmetic mean, median and mode
c) Measures of dispersion – standard deviation and coefficient of variation
d) Measures of correlation – Scatterplot, Spearman's rank correlation and Karl Pearson's Product Moment correlation

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Notes
1. Each exercise should be drawn on 1/4th of a full drawing sheet.
2. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
3. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.

Scheme of examination
1. Candidates will be examined by Internal Examiner as per existing norms of the University
3. The distribution of marks will be as follows:
a) Test Paper 36 marks
b) Record 14 marks
c) Viva Voce 10 marks
Total 60 marks
4. The distribution of marks will be as follows:
a. Paper 36 Marks
b. Record Work* 14 Marks
c. Viva-voce** 10 Marks
* Record work will be assessed by the teacher in-charge of the practical group and the external examiner.
** Viva-voce will be based on the record work.

5. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.

Suggested Readings:

Suggested Readings

1. Bygott, J., An Introduction to Map Work and Practical Geography, University Tutorial Press, London.
2. Cole, John P. and Cuchlaine A. M. King, Quantitative Geography: Techniques and Theories in Geography, John Wiley & Sons Ltd., London, 1970.
3. Hammond, Robert and McCullagh Patrick, Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford, 1978.
4. Meux, A. H., Reading Topographical Maps, University of London Press.
5. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
6. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
7. Raize, E., General Cartography, McGraw Hill Book Co., London.
8. Robinson, A. R., Elements of Cartography, Chapman & Hall.
9. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
10. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
11. Singh, R. N. and L. R. S. Kanaujia, Map Work & Practical Geography, Central Book Depot, Allahabad.
12. Tamaskar E. G. and V. M. Deshmukh, Geographical Interpretation of Indian Topographical Maps, Orient Longman.
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22. Ahmed, K. S., Simple Map Projection, Friends Book House, Aligarh.
23. Bygott, J., An Introduction to Map Work and Practical Geography, University Tutorial Press, London.

24. Meux, A. H., Reading Topographical Maps, University of London Press.
25. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
26. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
27. Raize, E., General Cartography, McGraw Hill Book Co., London.
28. Robinson, A. R., Elements of Cartography, Chapman & Hall.
29. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
30. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
31. Singh, R. N. and L. R. S. Kanaujia, Map Work & Practical Geography, Central Book Depot, Allahabad.
32. Tamaskar E. G. and V. M. Deshmukh, Geographical Interpretation of Indian Topographical Maps, Orient Longman.
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Course Outcomes: B.A. Geography (Third Year) – Course - P (I) Geography of India

CO 1. To develop a sound understanding of natural and cultural landscape of India.

CO 2. To develop comprehensive understanding of the physical, economic and demographic aspects of the country.

CO 3. To develop an understanding of the planning regions and developmental challenges on regional basis.

CO 4. To cover the fundamental contents of general studies for various competitive examinations such as civil services, state level PSC exams, school education exams and so on.

B.A. Third Year

Subject: Geography

Paper-I: Geography of India

Unit – I

a) India in the context of Southeast and South Asia.

b) India: a land of diversities; unity within diversities.
c) Major terrain elements of India and their role in shaping physical landscape of India.
d) Drainage systems of India and their functional significance.
e) The morphological regions of India.

Unit – II

a) Regional and seasonal variations of climate: the monsoon, western disturbance, norwesters, climatic regions of India.
b) Soil types of India: their distribution and characteristics
c) Vegetation types and their distribution; forest resources
d) Status, use and need for conservation of mineral resources
e) Status, use and need for conservation of power resources

Unit – III

a) Spatial distribution of population and density; socio-economic implications of population growth; urbanization;
b) Changing nature of Indian economy.
c) Agricultural growth during the plan period; Green Revolution vis-à-vis traditional farming;
d) Major crops and their status; wheat, Rice, Sugarcane, cotton
e) Regionalization of Indian agriculture;

Unit – IV

a) Industrial development and Indian economy.
b) Industrial regions of India and their industrial structure.
c) Major industries: Iron and steel, Cotton, cement, chemical Industries
d) Means of transportations: Roads, Railways and Railways
e) Composition of Domestic and International trade.

Unit – V

a) Basis of regional divisions of India.
b) Classification of Economic Regions of India: P. Sen Gupta
c) Comparative Analysis of macro regions.
d) Resource regions of India.
e) Planning region of India

Suggesting Readings:

1. Deshpande, C. D., India - A Regional Interpretation, Northern Book Centre, New Delhi, 1992.
2. Farmer, B. H., An Introduction to South Asia, Methuen, London, 1983.
3. Govt. of India, India - Reference Annual, Pub. Div, New Delhi, (latest edition)
4. Govt. of India, National Atlas of India, NATMO Publication, Calcutta.
5. Govt. of India, The Gazetteer of India, Vol. I & III Publication Division, New Delhi, 1965.
6. Khullar, D. R., India: A Comprehensive Geography, Kalyani Publishers, Ludhiana, 2000.

7. Learmonth, A. T. A. et al (ed), Man and Land of South Asia, Concept, New Delhi.
8. Manorama Press, Manorma Year Book, Kottayam (Kerala), (Latest Edition).
9. Mitra, A., Levels of Regional Development of India, Census of India, Vol. 1, Part I-A (i) and (ii), New Delhi, 1967.
10. Routray, J. K., Geography of Regional Disparity, Asian Institute of Technology, Bangkok, 1993.
11. Shafi, M, Geography of South Asia, McMillan & Co., Calcutta, 2000.
12. Singh, G., Geography of India. Atmaram & Sons, Delhi.
13. Singh, R. L. (ed), India: A Regional Geography, National Geographical Society, India,
14. Spate, O. H. K. and Learmonth, A. T. A., India and Pakistan - Land, People and Economy Methuen & Co., London, 1967.
15. Times of India Press, Times of India Year Book, Bombay (Latest Edition)
16. Vaidiya, K. S., Dynamic Himalaya, University Press, Hyderabad, 1998,
17. Wadia, D. N., Geology of India, McMillan & Co., London, 1967.
18- xkSM d`ik'kadj % Hkkjr dh HkkSxksfyd leh{kk] fgUnh izpkj iqLrdky;] okjk.klh
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Course Outcomes: B.A. Geography (Third Year) – Course - P (II) Geography of Rajasthan

CO 1. To provide a comprehensive understanding of the geographical landscape of the state including all physical, socio-economic and cultural aspects.

CO 2. To develop a sound understanding of demographic composition, distribution and their challenges in the state.

CO 3. To understand the fundamental environmental challenges of the state associated at regional level.

CO 4. To cover the basic contents for various competitive examinations viz. civil services, state level PSC exams, school education exams and so on.

B. A. Third year

Subject:Geography

Paper-II: Geography of Rajasthan

Unit – I

a) Rajasthan in the context of India; diversity and unity; history of emergence.

b) Geological structure and formation of the state.

c) Relief features and physiographic regions; drainage characteristics.

d) The monsoon rhythm and weather conditions; climatic regions; climate and man.

e) Vegetation; forests; soils types.
Unit – II
a) Distribution of population: status, factors and implications.
b) Population characteristics: gender, literacy and workforce.
c) Urbanization and migration.
d) Tribal population: composition, concentration and principal tribal groups.
e) Population growth and associated problems.
Unit – III
a) Agriculture and economy of Rajasthan
b) Cropping pattern: detailed study of bajra, maize, wheat, pulses and oilseed crops
c) Source of irrigation; irrigation system of Indira Gandhi Canal and Chambal Command Area; problem of depleting ground water resources
d) Livestock resource: distribution by composition and size; dairy development
e) Major agricultural problems and their solution.
Unit – IV
a) Minerals, industries and economy of Rajasthan.
b) Detailed study of minerals: rock phosphate, mica, marble, soapstone and limestone.
c) Status and potential of energy minerals: lignite, petroleum and natural gas.
d) Detailed study of industries: zinc, cement, chemical, cottage and small-scale industries.
e) Industrial problems and prospects of the state.
Unit – V
a) Tourism: basis of tourism in Rajasthan; major destinations; tourists by place of origin.
b) Means of transportation: net work of roads and railways and related problems.
c) Droughts in Rajasthan: nature, causes, implications and coping measures.
d) Basis of regions of Rajasthan and study of different schemes of regionalization.
e) Detailed study of Marusthali and Aravalli regions.
Suggesting Readings:
1. Bhalla, L. R., Rajasthan ka Bhugol, Kuldeep Publication, Ajmer (Hindi).
2. Census of India, Rajasthan Series, General Population Tables of 1961to 2001.
3. DST (Govt. of Rajasthan), Resource Atlas of Rajasthan, Jaipur.
4. Govt. of Rajasthan, Statistical Abstract (latest edition), Jaipur.
5. Mishra, V. C., Geography of Rajasthan, National Book Trust, New Delhi.
6. NCEAR, Techno-economic Survey of Rajasthan, Vol. I and II, New Delhi.
7. Publication Division, Govt. of India, India (Latest edition), New Delhi.
8. Spate, O. H. K., India and Pakistan, Methuen, 1960.
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Course Outcomes: B.A. Geography (Third Year) - Course - Practical: Surveying, Topographical Maps and Remote Sensing

CO 1. To develop skills to map locations of real-world features.
CO 2. To develop a sound knowledge of basic surveying techniques and instruments.
CO 3. To learn fundamentals of studying and interpreting topographic maps with particular reference to Rajasthan.
CO 4. To understand the fundamentals of aerial photographs and satellite imageries in order to introduce the students to the field of remote sensing.

B. A. Third Year (Geography)

PRACTICAL

UNIT – I

a) Graticule, Meridians and parallels - definition and characteristics
b) Map Projections – definition, basic concepts, classification, characteristics and choice of projections
c) Graphical construction of Conical projections-one standard parallel, two standard parallels, Bonne's and Polyconic
04 exercises

UNIT – II

a) Graphical construction of Cylindrical projections – Natural Cylindrical, Equi-distant, Equal Area, Gall's Stereographic, Mercator's. Great circle and Loxodrome
b) Graphical construction of Zenithal projections (polar case only) - Gnomonic, Stereographic, Orthographic
c) Introduction to conventional projections
08 exercises

UNIT – III

a) Surveying – Objectives, primary division and classification, principles of surveying
b) Prismatic Compass Survey – types and conversion of bearings
Radiation and Intersection methods; open and closed traverse (with minimum of five stations) 04 exercises
Calculation of included angles, correction of bearings, closing of the error

c) Plane Table survey – Radiation
and Intersection methods; open and closed traverse (with minimum of five stations)
04 exercises
Resectioning - three point problem (mechanical method) 01 exercise
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Notes
1. Exercises on projections should be drawn on 1/4th of a full drawing sheet.
2. Survey exercises should be drawn on full drawing sheets.
3. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
4. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.
5. Field work will be of two hours duration including preparation of final sheet.
Scheme of examination
Candidates will be examined by External Examiner in consultation with Internal Examiner.
The distribution of marks will be as follows:
a) Test Paper 30 marks
b) Field Work (Survey Instruments) 10 marks
c) Record work 10 marks
d) Viva Voce 10 marks
Total 60 marks
Suggested Readings
1. Ahmed, K. S., Simple Map Projection, Friends Book House, Aligarh.
2. Kanetkar, T. P., Surveying and Levelling, Vol. I, A. V. GrihaPrakashan, Bombay, 1985.
3. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
4. Raize, E., General Cartography, McGraw Hill Book Co., London.
5. Robinson, A. R., Elements of Cartography, Chapman & Hall.
6. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
7. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
8. Singh, R. N. and L. R. S. Kanaujia, Map Work & Practical Geography, Central Book Depot, Allahabad.
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DEPARTMENT OF GEOGRAPHY
Faculty of Earth Sciences
Mohanlal Sukhadia University, Udaipur
(Programme Specific Outcomes and Course Outcomes)
Programme Specific Outcomes: (M.A./M.Sc. (Geography) (CBCS Scheme))
PSO 1. Developing a strong theoretical foundation and research orientation in the subject covering all major sub-disciplines.
PSO 2. Training the students in field specific state of the art tools and methodologies to develop vocational skills, and research skills as well.
PSO 3. Enabling preparation of various competitive examinations- particularly relating to school/higher education and civil services – along with PG studies.
PSO 4. Developing entrepreneurship skills by imparting quality training in geospatial technology, statistical software based analysis with activities enabling personality development.
M.A. / M.Sc. Geography (Semester I) - Course – P (I) (M1GEOG1-CT01) Geographical Thought
Course outcomes: On the completion of this course students will be able to learn the following:
CO 1. To develop an understanding of historical and evolutionary perspective of the subject
CO 2. To make students learn new concepts and recent developments in the subject.
CO 3. To develop fundamental understanding of various approaches to geographical studies.
CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.
Paper – I (M1GEOG1-CT01) Geographical Thought
Unit – I
a) Definition, philosophy and nature of geography
b) Scope and contents of geography

c) Detailed study of Greek and Roman scholars
d) Nature of geographical thought in ancient India
Unit – II
a) Geographical knowledge during the ancient & medieval period
b) Dark age of geography
c) The Arabic period
d) Contribution of Varenius and Kant
Unit – III
a) Main characteristics of German school of thoughts- contribution of Alexander von Humbolt
b) Contribution of Carl Ritter & Ratzel
c) Main characteristics of French school of thought-Contributions of Paul Vidal de la Blache
d) Contribution of Jean Brunhes
Unit – IV
a) Main characteristics of American school of thoughts- Contribution of W. M. Davis
b) Contribution of Carl O. Sauer
c) Main characteristics of British school of thoughts
d) Changing methods & techniques in Geography.
Unit – V
a) Environmental determinism, possibilism and neo-determinism
b) Concept of Region, study of aerial differentiation
c) Dichotomies in geography, systematic and regional, qualitative and quantitative geography
d) Impact of Positivism, Humanism, Radicalism & Behaviouralism in Geography.
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M.A. / M.Sc. Geography (Semester I) - Course – P (II) (M1GEOG2-CT02)

Geomorphology

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of major relief features and process of their formation on the earth surface.

CO 2. To develop an understanding of landform dynamics and predict their changes on the earth surface.

CO 3. To develop knowledge and skills to carry out geomorphological mapping and field investigations.

CO 4. To develop research aptitude in the field of Geomorphology.

CO 5. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – II (M1GEOG2-CT02) Geomorphology

Unit – I

a) Development in geomorphology

b) Concept & scope of geomorphology

c) Development of slopes: approaches to the study of slopes; views of W. Penck, A. Wood and A. N. Strahler

d) Isostasy : concept and theories

Unit – II

a) Continental Drift Theory and Plate Tectonic theory

b) Theories of mountain building

c) Processes: weathering, types of weathering

d) Processes: cycle of erosion, views of Davis and Penck

Unit – III

a) Geomorphic processes and landforms – fluvial

b) Geomorphic processes and landforms – glacial and fluvio-glacial

c) River forms and processes – stream flow, hydrographs and flood frequency analysis

d) Geomorphic processes and landforms – aeolian

Unit – IV

a) Geomorphic processes and landforms – coastal

b) Geomorphic processes and landforms – karst

c) Submarine relief

d) Geomorphometry: geomorphology and topographic analysis

Unit – V

a) Extra-terrestrial geomorphology

b) Environmental change – causes, effects on processes and landforms

c) Soil processes and conservation

d) Dams and reservoirs: geomorphic consideration and environmental impact

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M.A. / M.Sc. Geography (Semester I) - Course – P (III) (M1GEOG3-CT03) Economic Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To enhance spatial knowledge of various economic activities of man in relation to his natural milieu.

CO 2. To develop an understanding of diversified economic regions of the world in context of case studies.

CO 3. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

CO 4. To develop insight into various issues for applied research in the field of economic geography.

CO 5. To develop a comprehensive understanding of the agro, economic and industrial landscape at regional level.

Paper – III (M1GEOG3-CT03) Economic Geography

Unit –I

a) Definitions, aims and scope of Economic Geography

b) Approaches and recent trends in Economic Geography

c) Classification of economies – sectors of economy- primary, secondary, tertiary & quaternary occupations

d) Relationship between economic activities & environment

Unit –II

a) Location – importance , Christaller – Central Place Theory

b) Movement & interaction in the simplified and heterogeneous economic landscape

c) Significance & elements of production cost – raw materials, labour, capital, technical knowledge –spatial variation in production costs & locational impact

d) Spatial variation in transportation cost-location & structure of transport cost, factors affecting the transportation cost

Unit- III

a) World agricultural regionalization – Whittlesey’s classification of agricultural region

b) Subsistence intensive agriculture

c) Mediterranean agriculture & tropical plantation

d) Commercial grain farming and Cohen region of USA

Unit – IV

a) Major industrial regions of the world : study of Great Lake industrial region of USA

b) Study of Ruhr industrial region

c) Study of industrial region of Ukraine

d) Study of industrial belt of Japan

Unit - V

a) Means of transportation : factors affecting the choice of particular means of transport

b) World pattern of water transportation & trade : oceanic transport routes

c) International trade : types of trade

d) Economic regions of the world

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M.A. / M.Sc. Geography (Semester I) - Course – P (IV) (M1GEOG4-CT04) Climatology and Oceanography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To extend knowledge of major climatic and oceanic phenomena and their inertrelated processes taking place on the earth surface.

CO 2. To develop an understanding of applying knowledge of day to day weather and climatic phenomenon which is very significant in everyday life.

CO 3. To develop a perspective of impact of climatic change on our ecosystem.

CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – IV (M1GEOG4-CT04) Climatology and Oceanography

Unit-1: Basic Concepts and Atmospheric Phenomenon

a) Nature and scope of Climatology

b) Composition and layered structure of the atmosphere

c) Insolation; energy balance of the Earth; horizontal and vertical distribution of temperature

d) Atmospheric pressure and pressure belts

Unit-2: Atmospheric Circulation

a) Winds: forces-PGF, CF, FF

b) Planetary, periodic and local winds; jet streams

c) Atmospheric humidity–process and forms of precipitation: types of rainfall; world distribution of rainfall.
d) Air masses and fronts; tropical and temperate cyclones

Unit-3: Climate Types and Climate Change

a) Approaches to classification of world climates; Koppen's classifications
b) Major climates of the world: Characteristics of Equatorial, Tropical Monsoon, Savanna, Hot Desert, Mediterranean and Mountain type of climate
c) Ocean atmosphere interaction: El Nino- La Nina; Walker's circulation & El Nino Southern Oscillation (ENSO)
d) Ozone depletion; greenhouse effect; global warming

Unit-4: Oceans-Physical Characteristics

a) Nature and scope of Oceanography
b) Ocean bottom relief; relief of Indian and Atlantic oceans
c) Ocean temperature and salinity: factors and distribution patterns
d) Coral reefs: types and theories of formation

Unit-5: Dynamics of Ocean Water and Human-marine Interface

a) Tides: types, theories of origin of tides
b) Ocean currents: currents of Indian, Atlantic and Pacific ocean
c) Marine resources: food, mineral and energy resources
d) Sea level changes; human impact on marine communities

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M.A. / M.Sc. Geography (Semester I) - Course – Practical -I (M1GEOG2-CP01): Surveying & Levelling

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop skill to map locations of real-world features.

CO 2. Develops skill to determine the distances on ground and height of various features on the earth.

CO 3. Develops a sound knowledge of surveying and levelling instruments with focus on improving precision in field measurements.

CO 4. To develop vocational expertise for work as surveyors, town planners and cartographers.

Practical -I (M1GEOG2-CP01) Surveying & Levelling

Unit – I Introduction

a) Surveying as an art and science, principles of surveying

b) General errors and inaccuracies in surveying

c) Precautions in using survey instruments

d) Trignometrical methods of solution of triangles and computation of lengths

Unit – II Plane table

a) Use of Plane Table in composite surveys and related methods, methods of resectioning

b) General planning of large area plane surveys

c) A composite survey of college campus or village/neighborhood

d) Drawing of control points and surveyed plan

Unit – III Theodolite and Tacheometer

a) Theodolite as an instrument of surveying and leveling, adjustment of Theodolite

b) Computation of Theodolite bearings

c) Computation of length of triangles and plotting of control points

d) Telemetry: stadia and tangential

Unit – IV Clinometer

a) Use of Clinometer as instrument of leveling

b) Measuring spot heights

c) Contouring and interpolation of contours

d) Drawing of profiles

Unit – V Dumpy level

a) Use of Dumpy level as an instrument of leveling and adjustment of the dumpy level

b) Principles: calculation of difference of level, series leveling, back sights, foresights, intermediate sights

c) Level book and computation of reduced level: Rise and Fall and collimation method

d) Plotting of profiles

Note:

1. Candidates will submit following exercises as record work:

i. Resectioning: 3 exercises of geographical methods of Llano's, Bessel's and trial and error

ii. Profiles: 2 exercises based on leveling measurements obtained with dumpy level

iii. Contouring: 1 exercise based on leveling measurements obtained with dumpy level

iv. Contouring: 1 exercise based on leveling measurements obtained with clinometers

v. Measuring and plotting reduced levels using tacheometer: 2 exercises

vi. Triangulation survey based on a minimum of 15 control points using theodolite: 2 exercises including one related to composite survey

vii. Plan of un-surveyed campus/neighbourhood/village area based on composite survey: 1 exercise (10 day's camp)

viii. Thematic maps showing characteristics of the surveyed area: form of built-up area, and building material: 6 exercises

2. All exercises will be based on surveying and leveling work done by the candidates

themselves for areas hitherto un-surveyed

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Practical Exam Scheme

Distribution of Marks: - Total Marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. Test paper - 10 Marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner

The distribution of 80 marks will be as follows:

A. Test paper - 20 Marks
B. Survey exercise - 25 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks
E. Performance in survey camp - 10 marks

A- Test Paper – 20 marks

The practical test paper of two hours duration and candidates will be required to answer two questions out of four questions.

B- Survey exercise – 25 marks

Working on each instrument with following distribution of marks:

Instrument Exercise Marks
Time
(minutes)
A. Plane Table Resectioning 5 35
B. Theodolite Measurement of angle between two points 5 10
C. Dumpy Level Measuring level difference between two distant points 5 10
D. Clinometer
Measuring heights of and level difference between two
distant points
5 10
E. Tacheometer Measurement distance of any distant point 5 10

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester I) - Course – Practical -II (M1GEOG2-CP02): Air Photo Interpretation

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the basic structure of remote sensing data.

CO 2. To understand process of acquisition and geometry of remotely sensed data and visualization of various earth features using aerial photos.

CO 3. Develops skill for use of aerial photographic techniques and instruments.

Develops skill to extract features and create thematic maps using aerial photos.

Practical -II (M1GEOG2-CP02) Air Photo Interpretation

Unit – I: Introduction

a) Definition

b) Scope

c) Development of aerial photography

d) Interpretation techniques

Unit – II: Types and quality of aerial photographs

a) Types of aerial photographs

b) Factors affecting quality of aerial photographs

c) Aerial photographs versus maps

d) Usages of aerial photographs in interdisciplinary research

Unit – III: Tools and geometry of air photography and interpretation:

a) Pocket stereoscope and mirror stereoscope

b) Aerial camera, lens and filters

c) Geometry of aerial photographs

d) Stereogram, stereo triplet and mosaic

Unit – IV: Basic air photo measurements:

a) Photographic scale

b) Measuring height of object

c) Calculation of area, number of strips and number of air photos

d) Measuring angles, direction and slope measurement

Unit – V

a) Elements of object identification,

b) Interpretation and mapping of natural landscapes

c) Interpretation and mapping of cultural landscapes

d) Field checking

Practical Exercises

Notes:

Students are required to perform one experiment from each unit during examination.
1) Stereo test
2) Orientation of stereo model under mirror stereoscope (1 exercise)
3) Calculate the photo base & flight line. (2 exercises)
4) Determination of photo/image scale (1exercise)
5) Determination of heights using single photograph (1exercise)
6) Objects identification by Pocket Stereograph (1 exercises)
7) Interpretation and mapping of natural landscapes :physical aspects, drainage patterns, river basins, and vegetation (8 exercises)
8) Interpretation and mapping of cultural landscapes: land use, agricultural utilisation, field patterns, cultural aspects, settlements and transportation lines (8 Exercises)
One local field trip will be conducted for field verification of aerial photographs of Udaipur city and nearby areas. Students will be required to prepare a Field Report and submit along with the Record Work.
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Practical Exam Scheme
Distribution of marks: - Total marks (100) = Internal marks (20) + External marks (80)
Internal marks - 20
1. The identification of objects (at least 10) on the air photo pairs shall be of 30 minutes duration and will carry 10 marks

2. Objective paper -10 marks (10 objective questions)
External marks - 80
Candidates will be examined by an external examiner in consultation with the internal examiner.
The distribution of 80 marks will be as follows:
A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks
A- Test Paper – 25 marks
The Practical test paper of two hours duration and candidates will be required to answer two questions out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on aerial photographs.
C- Record work – 15 marks
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.
Course Outcomes: M.A. Geography (I Semester) – Anandam
CO 1. To introduce for the community service and inspired by the Gandhian approach of the holistic development.
CO 2. To provide a comprehensive education to the students of higher education to contribute to society and earn academic credits in return.
CO 3. To develop leadership qualities in the youth by connecting them with society and its problems.
CO 4. To develop leadership qualities in the youth by connecting them with society and its problems.
M.A. / M.Sc. Geography (Semester II) - Course –P (I) (M2GEOG1-CT05) Geography of India
Course outcomes: On the completion of this course students will be able to learn the following:
CO 1. To develop a sound understanding of natural and cultural landscape of India.
CO 2. To develop comprehensive understanding of the physical, economic, demographic, social and environmental aspects of the country.
CO 3. To develop understanding of the resource base and developmental challenges on regional basis.
CO 4. To cover the fundamental contents of general studies for various competitive examinations.
Paper – I (M2GEOG1-CT05) Geography of India

UNIT I: Physical Aspects
a) Historical/administrative background of India, Physical divisions of India
b) Climate: seasonal variations in climate; mechanism of Indian monsoon; climatic regionalization by Koppen
c) Forests: types and distribution
d) Soil regions; problem of soil erosion
UNIT II: Human Aspects
a) Population distribution, density and growth
b) Population problems
c) Population policy of India
d) Tribal population: distribution pattern and belts
UNIT III: Economic Aspects: Resource Base
a) Water resources: status and problems
b) Agriculture: major characteristics and problems; green revolution; agro-climatic regions
c) Minerals: distribution, production and development potential with special reference to Iron-ore, Manganese, Bauxite and Copper
d) Power resources: distribution, production and potential with respect to coal, petroleum, natural gas, hydel, solar and atomic power.
UNIT IV: Industrial Development and Transportation
a) Major industries: mineral based- Iron & Steel, cement; agro based – cotton textile, sugar industry
b) Industrial regions of India
c) Industrial development in five year plans
d) Transportation development-road, rail, air, ports.
UNIT V: Regionalization and Problems
a) Geographical regions of India- outline of scheme proposed by R.L.Singh
b) Resources regions of India
c) Regional disparities in socio-economic development in India
d) Geographical problems of India; cyclones, earthquake, floods, drought
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M.A. / M.Sc. Geography (Semester II) - Course –P (II) (M2GEOG2-CT06) Geography of Resources

Course outcomes: On the completion of this course students will be able to learn the

following:
CO 1. To develop an understanding of distribution of various resources in the world.
CO 2. To foster knowledge about conservation of resources and their role in regional planning for development.
CO 3. To develop perspective towards sustainable utilization of resources.
CO 4. Basic contents for various competitive examinations for lecturership, school education and so on.

Paper – II (M2GEOG2-CT06) Geography of Resources

Unit – I

a) Meaning, scope of Resource Geography
b) Approaches and recent trends of resource geography
c) Resources: meaning & clarification
d) Concepts of resources

Unit –II

a) Conservation of resources : concept & aims
b) World distribution, production and problems of conservation of Iron & Manganese
c) World distribution, production and problems of conservation of Coal, Petroleum & Hydroelectricity
d) Forest & water resources : world distribution, utility & conservation

Unit –III

a) Human as a sources and a resources
b) World distribution, density and growth of human resources
c) Distribution, density and growth of human resources of India
d) Population –resource equilibrium & population resource region of world

Unit - IV

a) Problems of resource utilization
b) Resource conservation and preservation
c) Problems of conservation & trends of resource development
d) Planning of conservation of natural resources

Unit –V

a) Resource region - meaning & determinant elements of resource region
b) Major resource region of the World
c) Region of bounty resources & region of resource scarcity
d) Indian resource region – a case study of Aravali region

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M.A. / M.Sc. Geography (Semester II) - Course – P (III) (M2GEOG2-CT07) Regional Development and Planning

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop understanding of the fundamentals of regional planning.
CO 2. To assess the impact of government policies on regional development and planning
CO 3. To gain knowledge of various schemes and models on regionalization of India.
CO 4. To impart a strong conceptual base regarding development patterns, disparities, planning, challenges and priorities for students opting for administrative services as career.

Paper – III (M2GEOG2-CT07) Regional Development and Planning

Unit – I

a) Concept of space, area and locational attributes
b) Development: concepts and indicators; planning: concept need and levels
c) Region: concept, types and delineation
d) Planning regions: Planning regions of India

Unit – II

Main themes of regional development theories

a) Economic growth doctrines and their impact on regional development
b) Theories of transmission of economic growth: (G. Myrdal, A.O. Hirschmann, Friedmann
c) Debate on the relevance of development theories: D. Seers, Marxists

d) Multifaceted paradigms of regional development: Eco-development, sustainable development

Unit – III

Regional planning strategies

a) Urban-industrial growth pole strategies as a tool of diffusion of modernisation

b) Neo-populist regional development strategies: Integrated rural development, basic need approach, target area and target group approach

c) Multi-level regional planning

d) Peoples participation in the planning process; Panchayati Raj system; role and relationship of Panchayati Raj Institutions (Gram Panchayat, Panchayat Samiti and Zila Parishad) and administrative structure (village, block and district)

Unit – IV

a) Delineating regions for planning: planning regions v/s geographical regions

b) Schemes of regionalization V. Nath, L.S. Bhat, P. Sengupta, territorial production complexes

c) The role of cities and the urbanization process in regional development in India; Planning for supra-urban spaces

d) The state and regional policy in India; the status of regional planning in the Five Year Plans

Unit – V

a) National plans: South East resource region plan and The Western Ghat plan

b) Administrative machineries of regional planning in India: The Planning Commission, the Town and Country Planning Organization, district level planning

c) Regional social movements in India and their linkages with state regional policy and development strategies

d) The New Economic Policy and its impact on the regional structure and regional planning problems in India

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27. Singh, Tarlok, India's Development Experience, McMillan, New Delhi, India, 1974
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M.A. / M.Sc. Geography (Semester II) – Course - P (IV) (M2GEOG4-CT08) Political Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. Helps in understanding the fundamentals of political phenomenon across the world.

CO 2. To extend knowledge on various Geopolitical models.

CO 3. To learn electoral behaviour patterns in context of India and Rajasthan.

CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – IV (M2GEOG4-CT08) Political Geography

Unit – I

a) Nature, scope and subject matter of political geography

b) Geopolitics: meaning and contributions of Emmanuel Kant, Karl Ritter, Friedrick Ratzel, H. V. Tritischke, Rudolf Kjellen and Karl Haushofer

c) Development of political geography

d) Contributions of Alfred Thayer Mahan, H. J. Mackinder and Alexander-de-Seversky, D.W. Meining, N.J. Spykman and Hooson

Unit – II

a) Recent trends in political geography

b) The functional approach in political geography

c) The unified field theory of political geography

d) Nature of administrative areas and geography of public policy and finance

Unit – III

a) Concept of nation, state and nation state

b) The state as a politico-geographical region: location, shape, size

c) Resources of state: natural, cultural and human

d) Frontiers and boundaries: types and functions, boundary making and boundary problems

Unit – IV

a) Core areas and capitals

b) Unitary and federal states

c) The impress of government on landscape

d) Politics of world resources; globalization and WTO

Unit – V

a) Electoral studies in political geography

b) Conceptual model of voting decision; Gerrymandering: gerrymandering in relation to India

c) Geographical influence on voting behavior of the electors in India
d) Spatial pattern of voting behavior in Rajasthan

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19. Pearcy, G. E. and R. H. Fifield, World Political Geography, Thomas Y. Crowell Co., London
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22. Prescott. J. R. V., The Geography of Frontiers and Boundaries, Aldine, Chicago
23. Sukhwal, B. L., Modern Political Geography of India, Sterling Publishers, New Delhi. 1986
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25. Taylor, Peter and John House, Political Geography: Recent Advances, Barnes and Nobel Books Totowa, New Jersey
26. Taylor, Peter; Political Geography Longman, London. 1985
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M.A. / M.Sc. Geography (Semester II) - Course – Practical – I (M2GEOG1-CP03):
Cartography-I (Basics of Cartography and Physical Aspects)

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To learn the fundamentals of cartography, manual map-making - the basic element of geographical studies.

CO 2. To understand the techniques of extraction of geomorphological attributes from base maps and representation of relief.

CO 3. To learn the techniques of representation of climatic data through diagrams and graphs.

CO 4. To enhance cartographic skills for applied research.

Practical -I (M2GEOG1-CP03) Cartography I

Basics of Cartography and Physical Aspects

Unit – I

Introduction

a) Definition and nature of cartography
b) Scope & history of cartography
c) Cartographic techniques.
d) Cartographic materials and tools

Unit – II

Maps and Diagrams

a) Map: definition and basic concepts
b) Classification of maps
c) Distributional maps and cartograms
d) Representation of statistical data: Diagrams- one, two, three dimensional (3 exercises)

The representation of data, information, features related to the following geographical aspects through maps and diagrams and their interpretation (To be submitted along with the record work)

Unit – III

Geomorphic aspects based on toposheets of 1:50000 or 1:25000 (5 exercise)

a) Stream orders and basin demarcation
b) Drainage density and texture
c) Slope : average slope maps according to Wentworth's method
d) Profiles : serial, composite, super- imposed & projected Profiles

Unit – IV

Climatic aspects: I (4
exercises)

a) Rainfall variability graphs (running average, cumulative deviation & trend line).
b) Rainfall dispersion diagram
c) Isohyets or isotherms
d) Temperature variation graph.

Unit – V

Climatic aspects: II (5
exercises)

a) Ergograph & Ogilvie's ergograph
b) Climatograph
c) Climograph
d) Hythergraph

References:

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8. Raisz, E., General Cartography, McGraw Hill Book Co., New York.
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11. Singh, R. N., Map Work and Practical Geography, Central Book Depot.
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Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. Test paper - 10 marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner.

The distribution of 80 marks will be as follow:

A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record Work - 15 Marks
D. Viva-voce - 10 Marks
A- Test Paper – 25 marks
The practical test paper of two hours duration and candidates will be required another two question out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises.
C- Record work – 15 marks
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester II) - Course – Practical – II (M2GEOG2-CP04):
Basics of Remote Sensing and Image Interpretation

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the fundamentals of Remote Sensing.
CO 2. To understand various aspects of digital images acquired from satellites.
CO 3. To develop technical skills to interpret satellite data and extraction of required information in image processing softwares.
CO 4. To train the students in geospatial technology with state-of-the-art technical, research and professional skills.
CO 5. To create a strong foundation for students planning to opt for employment as GIS analyst and consultancy as their career.

Practical -II (M2GEOG2-CP04) Basics of Remote Sensing and Image Interpretation

UNIT I Basics of Remote Sensing

a) Historical development; significance of remote sensing in geographical studies
b) Electromagnetic Radiation (EMR) Spectrum; Laws of radiation
c) Stages of Remote Sensing, EMR interaction with earth’s surface
d) Spectral signatures, typical spectral reflectance curves of vegetation, soil and water

UNIT II Remote Sensing Satellites and Platforms

a) Orbits and platforms for earth observation; Swath, Row, Path
b) Satellite and sensor types: geo-synchronous and polar satellites, active and passive systems
c) Sensor types: Along Track, Across Track

d) Sensor specifications of IRS and Landsat satellite series
UNIT III Image Characteristics
a) Image formats - BIL, BIP, BSQ; Image display, color composites
b) Fundamental image statistics, image histogram
c) Image resolutions - spatial, spectral, radiometric and temporal resolution
d) Characteristics of major satellite systems: IRS, Landsat, NOAA, IKONOS, World-View satellite System
UNIT III Image Preparation
a) Geometric errors: Types
b) Geometric corrections: Image to map rectification, georeferencing
c) Resampling techniques
d) Contrast enhancement techniques: stretching, histogram equalization, density slicing
Unit V Image Interpretation and Thematic Map Generation
a) Visual Image Interpretation: principles, elements, interpretation keys
b) Manual Digitization and map composition
c) Interpretation and mapping of natural landscapes using satellite image.
d) Interpretation and mapping of cultural landscapes using satellite image.
Practical Exercises:
1. Familiarization with the software –ILLWIS/ Erdas Imagine/ ENVI/ SAGA
2. Data acquisition-accessing satellite data of area of interest, digital referencing system
3. Data import and subset
4. Observation and identification of earth's features in various spectral bands and different types of images (PAN/ multi-spectral)
5. Observation of spectral profiles of water, soil and vegetation
6. Analysis of image histograms
7. Image display – Grey scale, pseudo color, TCC, FCC
8. Georeferencing toposheets
9. Geometric correction- Image to map rectification: NN, Bi-linear and Cubic interpolation
10. Image enhancement: Stretching, interpretation of results
11. Image enhancement: Histogram Equalization, interpretation of results
12. Image enhancement: Density Slicing, interpretation of results
13. Identification of features using elements of visual interpretation
14. Thematic map generation using visual interpretation and on-screen manual digitization/ analog multi-spectral images: Natural landscape
15. Thematic map generation using visual interpretation and on-screen manual digitization/ analog images: Cultural landscape
16. Computation of area of different classes
Exercises will be implemented in ERDAS, ENVI, ILLWIS, SAGA or any other DIP Software as per

availability. One computer system will be provided to each student for conducting practical exercises. One local field trip will be conducted for field verification of satellite image of Udaipur city and nearby areas. Students will be required to prepare a Field Report and submit along with the Record Work.

Suggested Readings

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2. Barrett, E. C. and L. F. Curtis, 1992. Fundamentals of Remote Sensing and Air Photo Interpretation, Macmillan, New York
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WEB RESOURCES

1. Ebook on Remote Sensing Applications, www.nrsc.gov.in/Learning_Centre_EBook.html
2. E-Tutorial on Fundamentals of Remote Sensing, Canada Centre for Mapping and Earth Observation, Natural Resources Canada, accessible at http://www.nrcan.gc.ca/earthsciences/geomatics

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks - 20

1. The identification of objects (at least 10) on the satellite imagery shall be of 30 minutes duration and will carry 10 marks.
2. Objective paper – 10 marks (10 objective questions)

External marks -80

Candidates will be examined by an external examiner in consultation with the internal examiner. The distribution of 80 marks will be as follows:

A- Test paper - 25 Marks
B- Lab exercise - 30 Marks
C- Record work - 15 Marks
D- Viva-voce - 10 Marks

A- Test paper – 25 marks
The practical test paper of two hours duration and candidates will be required another two question out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises one based on the satellite imagery.
C- Record work – 15 marks
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester II) - Course – Skill-I (M2GEOG1-SKILL-01):
Digital Cartography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To create an understanding of handling geographical data in softwares with special focus on cartographic modelling.
CO 2. To introduce the students to proprietary and open source GIS softwares such as ArcGIS, and QGIS.
CO 3. To develop preliminary expertise of statistical analysis and representation of geographical data in MS Excel and SPSS.
CO 4. To learn tools and techniques of digital representation of physical, climatic and socio-economic data in form of maps and diagrams using GIS softwares
CO 5. Enhancing technical skills for self-employment and job opportunities relating to cartographic services across public and private sector.

M.A./M.Sc. Geography
Second Semester
Skill-I (M2GEOG1-SKILL-01) Digital Cartography
Unit-I: Introduction
a) Nature & Scope
b) Concepts in Digital Cartography
c) Cartographic Visualization
d) Geo-visualization
Unit II: Overview of Software Packages
a) ArcGIS
b) QGIS
c) Microsoft Excel, SPSS
d) AUTOCAD
Unit-III: Maps

a) Introduction to maps: types
b) Cartographic communication – virtual, cognitive, temporal and permanent maps
c) Mapping techniques: preparation of dot, choropleth, isopleths chorochromatic and choroschematic maps
d) Map composition: symbolization, map layout, labeling and annotation

Unit IV: Diagrams

a) Construction of simple line, poly line, trend graphs
b) Construction of simple, multiple, compound bar diagrams, histograms
c) Construction of cartograms, value area cartograms
d) Preparation of maps using proportional squares, circles, spheres

Unit V: Cartographic Modeling

a) Cartographic modeling and its types
b) 3D modeling
c) TIN
d) DEM

Lab exercises

a) Preparation and editing of data in microsoft excel
a) Preparation and editing of data in SPSS
b) Generation of vector point, line, polygon map and cartographic symbolization
c) Map composition

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Practical Exam Scheme

Distribution of Marks: - Total marks (100) = Internal marks (20) + External marks (80)
Internal marks- 20

1. One assignment based on computer – 10 marks
2. Objective Paper- 10 marks (10 objective questions)
External marks-80
Candidates will be examined by an external examiner in consultation with the internal examiner.
The distribution of 80 marks will be as follows:
A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks
A- Test Paper – 25 marks
The Practical test paper of two hours duration and candidates will be required another two question out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on computer.
C- Record work – 15 marks
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.
M.A. / M.Sc. Geography (Semester III) - Course –P (I) (M3GEOG1-CT09) Agricultural Geography
Course outcomes: On the completion of this course students will be able to learn the following:
CO 1. To learn fundamentals of agricultural geography
CO 2. To gain knowledge about world agricultural systems and models of agricultural land use.
CO 3. To develop sound understanding of the use of quantitative techniques in agricultural studies.
CO 4. To develop understanding regarding the course of agricultural development in India, problems, policies, planning and agricultural regionalization.
CO 5. To impart comprehensive theoretical and conceptual understanding for a potential field of applied geographical research.
Paper – I (M3GEOG1-CT09) Agricultural Geography
Unit – I
a) The nature and development of agricultural geography
b) Approaches recent trends in agricultural geography
c) Origin and dispersal of agriculture
d) Sources of agricultural data
Unit – II

a) Factors affecting agriculture: physical, institutional and technological
b) Agricultural systems of the world
c) Critical review of classification of agricultural types of Whittlesy
d) Detailed study of intensive subsistence, commercial grain farming and tropical plantation agriculture

Unit – III

a) Land use classification; landuse pattern in India; and land capability classification
b) Von Thunen's agricultural model of agricultural land use and recent modification in it
c) Nutrition and food balance sheet; food surplus and food deficient regions of India
d) Diffusion model

Unit – IV

a) Concept and techniques of delimitation of agricultural regions; agricultural regions of India and their characteristics
b) Measures of agricultural productivity and efficiency levels and other characteristics
c) Crop combination methods: Weaver's, Doi's and Rafiullah's methods and their applications
d) Agricultural typology: concept and methodology; patterns with special reference to the world and Rajasthan

Unit – V

a) Sustainable development of agriculture
b) Green and white revolutions: their components, impact and consequences
c) Specific problems in Indian agriculture and their management and planning
d) Agricultural policy of India

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M.A. / M.Sc. Geography (Semester III) - Course –P (II) (M3GEOG2-CT10) Urban Geography & Planning

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand site evolution, growth and classification of cities.
CO 2. To provide scientific study of urban settlements and morphology.
CO 3. To understand potential solutions to problems of urbanization.
CO 4. Focuses on core concepts of town planning, helping students to prepare for better careers in this field.

Paper – II (M3GEOG2-CT10) Urban Geography & Planning

Unit – I

a) Nature, scope and development of urban geography; urban concepts
b) Origin and growth of urban centers: ancient and medieval age
c) Process of urbanization: trends of urbanization in the world
d) Urbanization In India , development of metropolitan cities in India

Unit – II

a) Classification of urban centers: views of Mum ford and Griffith Taylor
b) Development of conurbation and megalopolises : North Eastern Sea board of USA , Rhine- Ruhr conurbations, Mumbai and Kolkata conurbations in India
c) Theories of urban system: the law of primate city and the rank-size rule
d) Central place theories: Christaller’s central place system, Losch’s economic landscape

Unit – III

a) Urban land use: human ecology and urban land use models of Burgess, Harris-Ullman and Hoyt; land economics and urban land use

b) Central business district (CBD): criteria and methods of areal definition, historical process and CBD; the zone in transition
c) Functional classification of cities: empirical and statistical methods
d) Centripetal and centrifugal forces of urban growth

Unit – IV

a) Rural urban fringe : concept, criteria's of delimitation and characteristics
b) Morphology of Indian cities : ancient , medieval and modern planned cities of India with special studies of Jaipur and Chandigarh cities
c) Concept of basic and non-basic functions, internal functional structure of urban centers
d) Social structure in urban areas of India , social segregation in Indian cities

Unit – V

a) Urban problems: development of slums in urban areas and their problems, problems of housing and social infrastructure
b) Urban planning: principles of urban planning , layout plans of cities
c) Urban environment: industrial pollution and environmental panning
d) Sustainable urban development: studies of master plans of Udaipur and Jaipur cities.

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M.A. / M.Sc. Geography (Semester III) - Course –P (III - A) (M3GEOG3-ET11-A)

Environmental Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of man and environment relationship.

CO 2. Creating awareness about current environmental issues, related laws and global initiatives to combat environmental degradation.

CO 3. To study various types of ecosystems.

CO 4. To provide knowledge regarding tools and methods of environmental management

and planning.

Paper – III-A (M3GEOG3-ET11-A) Environmental Geography

Unit – I

a) Environment: meaning, elements, and types

b) Human ecology: meaning, scope and concepts

c) Principles of environmental geography

d) Man-environment relationship: review of different perspectives

Unit – II

a) Ecosystem: concept, definitions, characteristics and types

b) Components and functioning of ecosystem

c) Trophic level, food chain and ecological pyramids; energy flow in ecosystem

d) Geo-chemical cycles and circulation of element in the ecosystem: carbon cycle, nitrogen cycle and oxygen cycle

Unit – III

a) Fresh water ecosystems: meaning, types and their properties

b) Marine ecosystems: meaning, types and their properties

c) Terrestrial ecosystems: meaning, types and their properties

d) Biomes: concept, types, characteristics and distribution; detail study of tropical desert biomes

Unit – IV

a) Environmental hazards and disasters: meaning, types and impacts

b) Environmental degradation and pollution: meaning, process, causes, types and impacts

c) Environmental planning and management: concept, objectives and strategies

d) Sustainable development: concept, need, problems and strategies

Unit – V

a) Ecology of tropical farming systems

b) Mountain ecosystem with special reference to Aravalli hills

c) The Stockholm Conference and the Earth Summit

d) Environmental laws in India related to wild life, water, forest and environment

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M.A. / M.Sc. Geography (Semester III) - Course –P (III - B) (M3GEOG3-ET11-B)

Geography of Rajasthan

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To provide a comprehensive understanding of the geographical landscape of the state including all physical, socio-economic and cultural aspects.

CO 2. To develop a sound understanding of resource base, its distribution and challenges of utilization.

CO 3. To understand the major developmental and environmental challenges of the state.

CO 4. To cover the basic contents for various competitive examinations viz. civil services, state level PSC exams, lecturership, school education and so on.

Paper – III-B (M3GEOG3-ET11-B) Geography of Rajasthan

UNIT I: Physical Aspects

a) Geographical and political introduction of Rajasthan

b) Physical divisions of Rajasthan

c) Climate: seasonal variations in climate; monsoon; climatic regions

d) Water resources: status and problems

UNIT II: Resources

a) Forests: types and distribution

b) Soil regions; problems of soil

c) Demographic characteristics: distribution, density, growth rate, literacy, sex ratio

d) Major tribes of Rajasthan; Bhil, Meena, Sahriya, Kathodi (distribution and socioeconomic characteristics)

UNIT III: Economic Aspects: Resource Base

a) Agriculture: major characteristics, problems, solutions and agro-climatic regions

b) Livestock and dairy development

c) Minerals: distribution, production and development potential with special reference to zinc-lead, copper, marble, lime stone and rock phosphate

d) Power resources: distribution, production and potential with respect to coal, petroleum, natural gas, solar and wind power.

UNIT IV: Industrial Development and Transportation

a) Major industries: mineral based- zinc, cement and marble

b) Agro based industries- cotton textile and sugar industry

c) Major problems in industrial development

d) Transportation development-road, rail, air

UNIT V: Tourism, Regionalization and Problems

a) Tourism: basis of tourism in Rajasthan and major destinations

b) Geographical regions of Rajasthan- outline of scheme proposed by R.L. Singh

c) Special area development programs in Rajasthan (ADP, DPAP, DDP, IGC)

d) Geographical problems of Rajasthan; desertification, drought, water logging, depleting ground water and flood

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M.A. / M.Sc. Geography (Semester III) - Course –P (IV - A) (M3GEOG4-ET12-A)

Cultural Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand various cultural realms and cultural regions of the world.

CO 2. To understand socio-cultural trends of various tribes and human races.

CO 3. To understand the cultural conflicts in context of globalization.

CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – IV-A (M3GEOG4-ET12-A) Cultural Geography

Unit – I

a) Definition, nature, development and scope of cultural geography
b) Cultural elements, environment and culture, components of culture
c) Divergence process and convergence process
d) Cultural changes: perception, behaviouralism and cultural relativism

Unit – II

a) Races of mankind: origin, traits and classification
b) Cultural diversity: nature and bases
c) Language: evolution, dispersion, classification and distribution
d) Religion: evolution, dispersion, classification and distribution

Unit – III

a) Origin and dispersion of agriculture
b) Industrial revolution and cultural development
c) Economy and society of tribal groups, theories of tribal groups; dwelling places as cultural explorations
d) Economy and cultural landscape

Unit – IV

a) Human settlements: relation to ideology
b) Social structure and technology
c) Pattern of rural & urban society
d) Social process in the city

Unit – V

a) World cultural realms and regions
b) Cultural regions of Europe
c) Cultural regions of Indian Sub-continent
d) Globalization and culture conflicts

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M.A. / M.Sc. Geography (Semester III) - Course –P (IV - B) (M3GEOG4-ET12-B)
Transport Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the movement of people, goods and ideas in transport network.
CO 2. To understand the concept and models of transport system.
CO 3. To understand spatial relations in transport network – flow, connectivity and accessibility.
CO 4. To understand the problems related to urban transportation systems and potential solutions.

Paper – IV-B (M3GEOG4-ET12-B) Transport Geography

Unit – I

a) Meaning, scope and development of transportation geography
b) Factors associated with the development of transport system: historical, technological, physical, economic, political and social
c) Spatial interaction: ideas of Edward Ullman; functional approach of M. E. Hurst
d) Concepts of distance: point to point distance and distance in a group of points; measures of distance

Unit – II

a) The functional region, linkages and nodes, diagrammatic representation of hinterlands and hierarchies
b) Transportation and spatial processes: regional specialization and agglomeration economies
c) Cost of overcoming distance: transportation cost, price and rate structure; transport costs as factor of production
d) An idealized process of transport development

Unit – III

a) Graph theoretic concepts; networks as models
b) Types of connectivity: concept and indices of connectivity
c) Measures of nodal accessibility: the network as a matrix; degree of connectivity: direct and indirect connectivity
d) Indices of accessibility: accessibility matrix, matrix T, shortest path matrix and valued

matrix; sinuosity
Unit – IV
a) Spatial patterns of flow
b) Gravity model: basic model and its modifications related to traffic and commodity flow
c) Allocation model: transportation problem and optimum solution
d) Flow in a capacitated network
Unit – V
a) Negative impacts of transportation: social, accidents and other impairments
b) Economic and environmental aspects of urban transport problems and their control
c) Alternative transport systems in mega cities; transport systems in the developing countries
d) Development of the Indian surface transport system
References:
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24. White H. P. and M. L. Senior, Transport Geography, Longman, London, 1983
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26. Yeates, Maurice, An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill Book Company, New York

M.A. / M.Sc. Geography (Semester III) - Course – Practical – I (M3GEOG1-CP05): Advanced Cartography II (Techniques of Demographic Data Analysis and Projections (Mathematical))

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop a thorough understanding of various types and use of map projections.
CO 2. To learn the various techniques for cartographic representation of socio-economic and demographic phenomena.
CO 3. To understand the pre-conditions, suitability and limitations of various maps and diagrams.
CO 4. To cover basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Practical – I (M3GEOG1-CP05) Advanced Cartography II
Techniques of Demographic Data Analysis and Projections (Mathematical)
Unit – I
a) Quantitative & qualitative symbols.
b) Sources of geographic data (India)
c) Rules of constructing diagram & graphs
d) Special diagrams – star, triangular, scatter (3 exercises)
Unit – II
Map projections – classification, characteristics, use and mathematical constriction along with outline maps of the following projections (4 Exercises)
a) Bonne,s projection
b) Conical projection –two standard parallel
c) Gall’s projection

d) Mollweide's projection
Unit – III
Demographic aspects - at least with 20 administrative units (4 Exercises)
a) Population distribution (Dot method)
a) Density of population (Choropleth maps)
b) Age and sex composition (Pyramid)
b) Urban and rural composition/population by religion
Unit – IV
Economic and social aspects (at least 20 administrative units):
a) Occupational structure.
b) Crop production and area.
c) SC and ST population distribution
d) Literacy rate
Unit – V
Transport and settlement aspects (at least with 20 administrative units)
a) Traffic flow cartogram
b) Isochronic cartogram (speed of travel)
c) Nearest neighbor analysis
d) Histogram – based on human settlement distribution
References:
1. Arthur G., Advance Practical Geography, Heinemann.
2. Campbell, J., Introductory Cartography, Prentice Hall Inc., New York.
3. Govt. of Rajasthan, District Census Handbooks, latest as well as of previous Census,
4. Keates, J. S., Cartographic Design and Production, Longman, London.
5. Loxton, J., Practical Map Production, John Wiley & Sons, New York.
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11. Singh, R. N., Map Work and Practical Geography, Central Book Depot.
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Practical Exam Scheme
Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)
Internal marks- 20
1. Test paper - 10 marks
2. Objective paper- 10 marks (10 objective question)
External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner Distribution of 80 marks will be as follows:
A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks
A- Test Paper – 25 marks
The Practical test paper of two hours duration and candidates will be required another two question out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises.
C- Record work – 15 marks
Note: Record work will comprised of a minimum of 20 exercises drawn on one fourth of a full drawing sheet and with methodological and analytical interpretation of each one.
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.
M.A. / M.Sc. Geography (Semester III) - Course – Practical – II (M3GEOG2-CP06): Basics of Geographical Information System
Course outcomes: On the completion of this course students will be able to learn the following:
CO 1. To train the students in state-of-the-art geospatial technology.
CO 2. To introduce the fundamental concepts of GIS, methods of geospatial data generation and visualization and the vast repository of data available on web-geoportals.
CO 3. To develop working skills in open source and proprietary GIS softwares.
CO 4. To create awareness regarding the potential of GIS in decision making and planning.
CO 5. To foster technical skills for employment opportunities as GIS consultant/analyst/project associates/entrepreneurs across private and public sector.
Practical – II (M3GEOG2-CP06) Basics of Geographical Information System
UNIT I: Introduction to GIS
a) Definition, evolution and components of GIS
b) Representation of geographical data in GIS
c) Geospatial data structure and formats
d) Data models: raster and vector data models
UNIT II: Coordinate Systems and Transformation
a) Datums, ellipsoid , geoid

b) Projected and Geographic Coordinate Systems, UTM coordinate system
c) Geometric transformation: map to map, image to map
d) Resampling, Root Mean Square Error
UNIT III: Data Generation and Database Management
a) Data Input, Spatial data editing
b) Topology
c) Attribute data input and management: data types, data entry, joining and relating tables
d) Attribute data manipulation
UNIT IV: Data Exploration
a) Descriptive statistics
b) Spatial data query, attribute data query, raster data query
c) Data generalization; data classification; zonal statistics
d) Data visualization and map composition
UNIT V: Introduction to Web Data Sources
a) Google Earth
b) Bhuvan
c) Water Resources Information System (India-WRIS)
d) Open Street Maps (OSM)
Practical exercises will be done using available GIS software - QGIS & ArcGIS - any other GIS software available in the department. One computer per student will be provided. Students will be required to prepare a record work of the outputs of all exercises conducted in the lab. In addition the students will also be required to submit the outputs in soft copy in a CD.
Lab Exercises (No. of exercises):
1. Familiarization with the software (1)
2. Importing raster data in GIS (1)
3. Geo-referencing and projecting a toposheet (1)
4. Geo-referencing and projecting a scanned map (1)
5. Generation of vector- point, line & polygon data - generating attribute data - GIS software (3)
6. Generation of vector- point, line & polygon data - generating attribute data - Google Earth (3)
7. Linking spatial and aspatial data- Table join (Excel file) (1)
8. Data visualization (2)
9. Computation of descriptive statistics (2)
10. Attribute data query (1)

11. Spatial data query (1)
12. Raster data query (1)
13. Data generalization (1)
14. Data classification (1)
15. Map composition (1)
16. Use of web sources for data acquisition using Bhuvan/ Google Earth/ India-WRIS/ OSM (3)

Suggested Readings

1. Bernhardsen, Tor, 1992. Geographic Information Systems: An Introduction. Wiley India
2. Burrough, P.A. and McDonnell, R., 1998. Principles of Geographic Information Systems. Oxford University Press, Oxford
3. Chang, Kang-tsung, 2003. Introduction to Geographical Information Systems. Tata McGraw Hill Publ. Co., New Delhi
4. Chauniyal, D.D., 2004. Remote Sensing and Geographical Information Systems (in Hindi), Sharda Pustak Bhawan, Allahabad
5. Clarke, Keith C., 2003. Getting Started with Geographical Information Systems. Prentice Hall
6. Demeers, Michael N., 2000. Fundamentals of Geographical Information Systems, John Wiley, Singapore
7. Heywood, Ian, 2003. An Introduction to Geographical Information Systems. 2nd Ed. Pearson Publ. Co., Singapore
8. Lo, C.P. and Yeung, Albert K. W. 2002. Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
9. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. 1999. Geographic Information Systems. Principles, Techniques, Management, Applications. John Wiley, New York.
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11. Vyas P.R.,Remote Sensing and Geographical Information System and Remote Sensing : Basics and Applications, Rawat Publications, Jaipur, New Delhi-2014

WEB RESOURCES

1. www.qgistutorials.com
2. http://www.pasda.psu.edu/tutorials/gisbasics.asp
3. https://earth.google.com
4. bhuvan.nrsc.gov.in
5. india-wris.nrsc.gov.in
6. https://openstreetmap.org
7. http://openstreetmap.in

Practical Exam Scheme

Practical exercise will be done using GIS software – QGIS, ArcGIS, Arc View, TNTMips, ERDAS or

any other GIS Software available in the department. One computer per student will be provided.
Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)
Internal marks- 20
1. One assignment based on computer – 10 marks
2. Objective paper- 10 marks (10 objective questions)
External marks-80
Candidates will be examined by an external examiner in consultation with the internal examiner
The distribution of 80 marks will be as follows:
A- Test paper - 25 Marks
B- Lab exercise - 30 Marks
C- Record work - 15 Marks
D- Viva-voce - 10 Marks
A- Test paper – 25 marks
The Practical test paper of two hours duration and candidates will be required another two question out of four questions.
B- Lab exercise – 30 marks
Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on different GIS Software.
C- Record work – 15 marks
Student will be required to prepare a record work of the output of all exercise conducted in the lab. In addition the students will also be required to submit the output in soft copy in a CD.
D- Viva-Voce - 10 marks
The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester IV) - Course – P (I) (M4GEOG1-CT13) Industrial Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To impart sound understanding of factors, theories and models of industrial location.
CO 2. To learn about the distribution of major industries and industrial regions in the world with special reference to India.
CO 3. To develop proficiency in use of various quantitative techniques in the field.
CO 4. To develop understanding of various environmental issues related to industrialization.
CO 5. Basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Paper – I (M4GEOG1-CT13) Industrial Geography

Unit – I

a) Nature and scope of industrial geography, recent development in industrial geography

b) Classification of industries: bases and characteristics
c) Elements and factors of industrial localization, centralization and decentralization of industrial enterprises
d) Horizontal, vertical and diagonal linkages of industries

Unit – II

Basic economic concepts, theories and models of industrial locations:
a) Demand, supply and price; marginal cost and average cost
b) Economies of scale and agglomeration and related concepts
c) A. Weber, E. M. Hoover, August Losch, A. Fetter, G. T. Renner
d) A. Pred, Palander Tord, D. M. Smith, E. M. Rawstron, Bos H. C. & Hamilton

Unit – III

Geographical analysis of selected industries in the world with reference to India:
a) Copper, aluminum and iron and steel
b) Pulp and paper, textile
c) Oil refining, shipbuilding and software industries
d) Locational analysis of zinc and cement industries of Rajasthan

Unit – IV

a) Industrial location and spatial distribution analysis and measures: coefficients of localisation, specialisation, geographic association and index of diversification
b) Delimitation of industrial regions: indices and methods
c) Study of major industrial regions of the world: Great Lakes region and Lancashire region
d) Major industrial regions of India

Unit – V

a) Environmental degradation and hazards caused by manufacturing industries
b) Impact of industries on economic development
c) Role of globalization on manufacturing sector in less developed countries
d) Shifting of industries and its impact on the urban fringe

References:

1. Adam, Watter, Structure of American Industry, Macmillan & Co., New York
2. Alexander, J. W., Economic Geography, Prentice Hall, New York
3. Alexanderson, G., Geography of Manufacturing, Prentice Hall, New York, 1967
4. Bengston, N. A. and V. L. Royen, Fundamental of Economic Geography, Prentice Hall, New York
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10. Joshi, Hemlata , Industrial Geography of India: A Case History of Fertiliser Industry, Rawat Publishers, Jaipur
11. Lloyd, P. and P. Dicken, Location in Space: A Theoretical Approach to Economic Geography, Harper and Row, New York, 1978
12. Losch, August, The Economics of Location, Yale University Press, London, 1973
13. McCarty, Harold H. and Lindberg, A Preface to Economic Geography, Prentice Hall, New York
14. Miller, E. W., A Geography of Manufacturing, Prentice Hall, New York, 1962
15. Renner, G. T., Geography of Industrial Localisation, Economic Geography, Vol. 23, 1947
16. Riley, R. C., Industrial Geography, Chatto and Windus, London, 1973
17. Saushkin, Yu. G., Economic Geography: Theory and methods, Progress Publishers, Moscow, 1980
18. Smith, D. M., Industrial Location: An Economic Geographical Analysis, Wiley, New York, 1971
19. Weber, Alfred, Alfred Weber's Theory of Location of Industries, Chicago University Press, Chicago, 1929
20. Yaseen, Leonard, Plant Location, American Research Council, New York
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M.A. / M.Sc. Geography (Semester IV) - Course – P (II) (M4GEOG2-CT14) Population and Settlement Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the world distribution of population, demographic dividend and demography attributes and population policy with special reference to India.

CO 2. To foster knowledge of trends of population growth and migration patterns.

CO 3. To understand the development, typology, structure, models and theories of rural and urban settlements.

CO 4. Basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Paper – II (M4GEOG2-CT14) Population and Settlement Geography

Unit – I

a) Meaning, scope and development of population geography

b) Sources of data: population counts and census; sample data; reliability of data and problems of mapping population data; data errors and their detection and correction

c) Measures of population distribution; world pattern of population distribution; determinants of population distribution

d) Population distribution in India: patterns and determinants

Unit – II

a) Population growth since prehistoric period; demographic transition theory and population growth models

b) Mortality analysis, patterns and its determinants

c) Fertility analysis, fertility patterns and its determinants

d) Growth of population in India: patterns, components and determinants

Unit – III

a) Age structure and sex composition

b) Educational composition; urbanization

c) Economic characteristics and occupational structure

d) Population composition of India: characteristics and problems

Unit – IV

a) Migration: types and determinants

b) Population and development; population-resource regions

c) Population and environment

d) Population policies in developed and less developed countries; population policy of India

Unit – V

a) Evolution, size and spatial distribution pattern of human settlements and related theories and models

b) Physical structure of settlements; internal characteristics and external forms

c) Functional structure of settlements; functional classification of towns and functional typology of villages; functional landscape of settlements

d) Settlement hierarchy: concept and contributing factors

References:

1. Bhende, Asha A. and Tara Kanitkar, Principles of Population Studies, Himalaya Publishing House

2. Bilasborrow, Richard E. and Daniel Hogan, Population and Deforestation in the Humid Tropics, International Union for the Scientific Study of Population, Belgium, 1999

3. Bogue, D. J., Principles in Demography, John Wiley and Sons, New York, 1969

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5. Census of India, India: A State Profile, 1991

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7. Chisholm, M. (1962): 'Rural Settlements and Land use', London

8. Clarke, John I., Population Geography and the Developing Countries, Pergamon Press Inc., Oxford, 1971

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13. Garnier, Beaujeu J., Geography of Population, Longman, London, 1970
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15. Kochhar, Rajesh, The Vedic People: Their History and Geography, Orient Longman Ltd., New Delhi, 2000
16. Mamoria, C. B., India's Population Problems, Kitab Mahal, New Delhi, 1981
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20. Premi, M. K., India's Population: Heading Towards a Billion, S. R. Publishing Corporation, New Delhi, 1991
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22. Srinivasan, K. and M. Vlassoff, Population Development Nexus in India: Challenges for the New Millennium, Tata McGraw Hill, New Delhi, 2001
23. Srinivasan, K., Basic Demographic Techniques and Applications, Sage Publications, New Delhi, 1998
24. Sundaram K. V. and Sudesh Nangia (eds.), Population Geography, Heritage Publications, Delhi, 1986
25. Trewartha, G. T., A Geography of Population: World Patterns, John Wiley & Sons, New York, 1973
26. Trewartha, Glenn T. (ed.), The More Developed Realm, A Geography of its Population, Pergamon Press, Oxford, 1978
27. UNDP, Human Development Report, Oxford University Press, Oxford, 2000
28. United Nations, Methods for Projections of Urban and Rural Populations, No VIII, New York 1974
29. United Nations, The Determinants and Consequences of Population Trends, Volume I, Population Studies No 50
30. Woods, Robert, Population Analysis in Geography, Longman, London, 1979
31. Zelinsky, Wilbur, A Prologue to Population Geography, Prentice Hall, 1966

M.A. / M.Sc. Geography (Semester IV) - Course – P (III - A) (M4GEOG3-ET15 – A)

Geographical Research Methodology

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To prepare sound theoretical background for scientific research in the field of

Geography.
CO 2. To introduce the concepts of research problem, hypotheses, research design and methodology.
CO 3. To impart knowledge regarding various sources of data, methods of data collection, sampling techniques, processing, qualitative and quantitative analysis of data.
CO 4. To master the skills of literature review and thesis/report writing.
CO 5. To develop aptitude for applied research with due awareness of research ethics.
Paper – III A (M4GEOG3-ET15 A) Geographical Research Methodology
Unit – I Research Methodology: An Overview
a) Research methodology- an overview; procedure of scientific research
b) Some methodological controversies and explanation in geography
c) Selection and relevance of research theme, defining research problem
d) Formulation of hypothesis, objectives, nature, type and characteristics of hypothesis
Unit II : Research Design
a) Research design, methodology and data base, outline of the research; research design.
b) Sources and types of data: primary and secondary data, published and unpublished sources, toposheet, satellite imageries
c) Methods of data collection: observation, questionnaire, schedule and interview
d) Sampling: need for sampling methods, size of sampling
Unit III: Measurement
a) Measurement in research, measurement scales
b) Scales of measurement: nominal, ordinal, interval and ratio
c) Sources of error in measurement; scaling: meaning of scaling
d) Scale of classification bases, important scaling techniques
Unit-IV: Processing and Analysis of Data
a) Processing-editing, coding
b) Classification and tabulation
c) Significance of quantitative techniques
d) Descriptive and inferential statistics - overview
Unit-V: Interpretation and Preparation of Research Reports
a) Meaning and techniques of interpretation, steps & layout
b) Types of reports
c) Appendices, notes, references, citation and bibliography
d) Writing of the dissertation/ thesis & defense of the thesis at viva voce
References:
1. Chou, Ya-Lun, Statistical Analysis: With Business and Economic Applications, Holt, Rinehart and Winston, New York, 1975

2. Cole, J. P. and C. M. A. King, Quantitative Geography: Techniques and Theories in Geography, John Wiley and Sons Ltd., London, 1970
3. Gregory, S., Statistical Methods and the Geographer, Longman Group Ltd. London, 1978
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M.A. / M.Sc. Geography (Semester IV) - Course – P (III - B) (M4GEOG3 – ET15 – B)

Social Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand social structure and their spatial attributes.

CO 2. To understand socio-cultural trends of various tribes and human races of the world.

CO 3. To understand about social relations, identities and inequalities from geographical perspective.

CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – III B (M4GEOG3-ET15 B) Social Geography

Unit – I

a) Nature, scope and development of social geography, philosophical bases of social geography

b) Positivist, structuralist and radical

c) Humanist, post-modern, and post-structuralist

d) Social geography in the realm of social sciences

Unit – II

a) Space and society

b) Understanding society and its structure and processes

c) Geographical bases of social formations; power relations and space

d) Contribution of social geography to social theory

Unit – III

a) Towards a social geography of India; nature and problems of social geographic data

b) Social differentiation and region formation; evolution of socio-cultural regions in

India
c) Bases of social region formation; role of caste, ethnicity, religion, dialect and languages
d) Indian unity and diversity; social transformation and change in India.
Unit IV
a) Concepts of social well-being and physical quality of life
b) Human development: concept, components, indices and measurement
c) Patterns and bases of rural and urban society; rural-urban deprivation with respect to shelter, health and education
d) Social exclusion, deprivation and discrimination issues relating to women and underprivileged groups
Unit – V
a) Spatial distribution of social groups: tribes, castes, religious and language groups
b) Social groups and power relations in India
c) Review of five-year plans and area plans towards social policy in India
d) Strategies to improve social well-being in tribal, hill and drought prone areas; social and environmental impact assessment of development projects
References:
1. Ahmad, Aijazuddin, Social Geography, Rawat Publication, New Delhi, 1999
2. Casino, Vincent J. Del, Social Geography: A Critical Introduction, Wiley-Blackwell, 2009
3. Churye, B. S., Caste and Class in India, Popular Prakashan
4. Davis, K., Population of India and Pakistan, Princeton University Press
5. de Blij, H. J., Human Geography, John Wiley and Sons, New York
6. Dreze, Jean and Amartya Sen, Economic Development and Social Opportunity, Oxford University Press, New Delhi, 1996
7. Dubey, S. C., Indian Society, National Book Trust, New Delhi, 1991
8. Geddes, A. and A. T. A. Learmonth (eds.), Man and Land in South Asia, Concept Publishing Co., New Delhi
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12. Guha, B. S., Racial Elements in India's Population, Oxford University Press, London
13. Haq, Mahbubul, Reflections on Human Development, Oxford University Press, New Delhi
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23. Singh, K. S., Tribal Situation in India, IIAS, Shimla
24. Smith, David, Geography: A Welfare Approach, Edward Arnold, London, 1977
25. Sopher, David: An Exploration of India, Cornell University Press, 1980

M.A. / M.Sc. Geography (Semester IV) - Course – P (IV-A) (M4GEOG4-ET16-A)

Quantitative Methods in Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of basic and advanced quantitative methods of data analysis and interpretation.

CO 2. To provide a thorough understanding of the use, applicability and interpretation of various descriptive and inferential statistical techniques relevant to geographical research.

CO 3. To implement quantitative analysis in statistical softwares.

CO 4. To develop statistical skills with software expertise providing an edge for various employment opportunities - UGC NET-JRF, lecturership, research consultants, project associates, public service examinations and avenues for self-employment.

Paper – IV A (M4GEOG4-ET16 A) Quantitative Methods in Geography

Unit –I

a) Definition & history of Quantitative Geography

b) Significance & utilization of quantitative methods in geography

c) Nature & levels of measurement – qualitative and quantitative

d) Graphical presentation of data –bar, pie, ogive (cumulative histogram), frequency curve

Unit –II

a) Measure of central tendency – mode, median & mean

b) Skewness and kurtosis

c) Measures of deviation – types

d) Mean deviation, standard deviation, Coefficient of variation, Z-scores

Unit –III

a) Gini coefficient of concentration and Lorenz Curve

b) Geographic relationship- correlation
c) Carl Pearson correlation; Spearman's rank correlation
d) Regression analysis – linear regression
Unit –IV
a) Assessment of probability –Z Score
b) Tests of statistical significance : T-test ,Chi-Square test , ANOVA
c) Composite indices analysis
d) Matrices – types and inversion of matrices
Unit –V
a) Advantages of using software for quantitative analysis; Interface
b) Data entry and manipulation, generation of graphs
c) Data analysis in statistical software – computation of descriptive statistics
d) Regression and Correlation using software
*Available statistical software with introduction to SPSS
Suggested Readings
1. Chou, Ya-Lun, Statistical Analysis: With Business and Economics Application, Holt, Rinehart and Winston, New York, 1975.
2. Cole, J. P. And C. M. A. King, Quantitative Geography: Techniques and Theories in Geography, John Willey and Sons Ltd., London, 1970.
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8. Silk, J., Statistical Concept in Geography, George Allen and Unwin, London, 1980.
9. Wilson, A. H. And M. J. Kirkby, Mathematics for Geographers and Planners, Oxford University Press London 1982.
10. Nagar, Kailashnath: Basic Elements of Statistical, Meenaxi Publications.
M.A. / M.Sc. Geography (Semester IV) - Course – P (IV-B) (M4GEOG4-ET16-B)
World Geography
Course outcomes: On the completion of this course students will be able to learn the following:
CO 1. To develop an understanding of terrain, climate, natural vegetation and soil of continents.
CO 2. To gain knowledge about demographic and economic of all continents of the world.

CO 3. To enrich the knowledge of regional geography of various continents.
CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – IV B (M4GEOG4-ET16 B) World Geography

Unit – I: Asia

a) Asia in the context of the world
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Spatial distribution of population and economic base of the continent in general; regional study - West Asia

Unit- II: Europe

a) Europe in the contest of Asia and Africa
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; regional study -Western Europe

Unit- III: Africa

a) Africa in the context of Europe and North America
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; regional study -Southern Africa

Unit- IV: North and South America

a) North and South America in the context of the Atlantic and Pacific Rim states
b) Terrain and drainage
c) Climate, natural vegetation and Soils
d) Demographic and economic characteristics; regional study of Middle America

Unit- V: Oceania; Global issues

a) Australia & New Zealand in the context of Polynesia, Micronesia and South Asia
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; globalization and W. T. O.; population, environment and sustainable development

Reference:

1. Cole, J., A Geography of the World's Major Regions, Routledge, London, 1996
2. Cole. M.M. , South Africa, Dutton, New York, 1961
3. Blij, H.J. , Geography: Regions and Concepts, John Wiley & Sons Inc., New York, 1994
4. Dickenson, J.P. et al, The Geography of the Third World Routledge, London, 1996
5. Jackson, R.H. and L. E. Hudman, World Regional Geography: Issues for Today, John
6. Kolb, A., East Asia : Geography of a Cultural Region, Methuen, London, 1977

7. Minshull, G. N., Western Europe, Hoddard & Stoughton, New York, 1984
8. Patterson, J. H., Geography of Canada and the United States, Oxford University Press, 1985
9. Songquiao, A., Geography of China, John Wiley & Sons Inc., New York, 1994
10. Ward, R. W. and A. Miller, World Regional Geography; A Question of Place, John Wiley & Sons Inc. , New York, 1989

M.A. / M.Sc. Geography (Semester IV) - Course – Practical – I (M4GEOG1-CP07): Geospatial Techniques for Applied Geographical Research

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To learn the various steps of image processing and information extraction workflow from satellite imageries.

CO 2. To learn the various advanced techniques of GIS based analysis for applied research, decision making and planning.

CO 3. To develop working skills in various open source and proprietary image processing and GIS softwares - ArcGIS, Erdas Imagine, ENVI, ILWIS, QGIS, SAGA, etc.

CO 4. To produce professionals with an edge as researchers trained in state-of-the-art technology with sound theoretical base; planners and decision makers with thorough understanding of the capabilities and tools of geospatial technology; and avenues for self-employment as technical/geo-spatial consultants.

Practical - I (M4GEOG1-CP07)

GEOSPATIAL TECHNIQUES FOR APPLIED GEOGRAPHICAL RESEARCH

UNIT I: Digital Image Processing: Data Preparation

a) Data preparation: geometric corrections, reprojection

b) Radiometric errors & corrections - image normalization, Dark Object Subtraction

c) Contrast enhancement - linear stretching techniques, non-linear -histogram equalization

d) Band ratioing- NDVI & NDWI

UNIT II: Thematic Map Generation

a) Image statistics, feature space

b) Unsupervised classification- Minimum distance

c) Supervised classification - training, signature evaluation, parametric (Maximum Likelihood) and non-parametric classifiers (Parallelepiped, Minimum Distance)

d) Accuracy assessment - overall, user's & producer's accuracy, Kappa

UNIT III: Spatial Analysis in GIS

a) Types of spatial analytical functions in GIS

b) Buffer, clip, update, union, intersection

c) Map overlay

d) Remote sensing and GIS data integration; sources of error

UNIT IV: Statistical Surfaces

a) Generation of statistical surfaces

b) Methods of spatial interpolation: linear, nonlinear- IDW

c) DEM, TIN and their derivatives

d) Terrain analysis

UNIT V: Spatial Pattern Analysis

a) Point pattern analysis: Nearest Neighbour analysis

b) Spatial auto-correlation

c) Global indices (Geary's c, Global Moran's I & Getis-Ord General G Index)

d) Local indices (Local Moran's I & Getis- Ord Gi * index)

* Laboratory Practical Exercises (No. of exercises)

1 Introduction to Bhuvan/NASA portal (2)

2 Acquisition of satellite data and DEM (2)

3 Geo-referencing of toposheets (1)

4 Image to map rectification (1)

5 Radiometric correction of satellite images- DOS (1)

6 Contrast enhancement (2)

7 Image ratioing - generation and interpretation of NDVI image (1)

8 Thematic map generation using supervised classification (1)

9 Thematic map generation using unsupervised classification (1)

10 Extraction of topographic attributes and landscape features using DEM (3)

11 Spatial interpolation of point data using IDW and evaluation of results (4)

12 Settlement pattern analysis- Nearest Neighbor technique (1)

13 Computation of Geary's c, Global Moran's I & Getis-Ord General G Index and interpretation of results - population data (3)

14 Computation of Local Moran's I & Getis- Ord Gi * index and interpretation of results - population data (2)

Exercises will be implemented in ERDAS, ENVI, Illwis, QGIS, TNT Mips, Arc View, ArcGIS or any other DIP and GIS Software as per availability. One computer per student will be provided.

Suggested Readings

1. Chang, Kang-tsung, 2003: Introduction to Geographical Information Systems. Tata McGraw Hill Publ. Co., New Delhi

2. Chauniyal, D.D., 2004. Remote Sensing and Geographical Information Systems (in Hindi), Sharda Pustak Bhawan, Allahabad

3. Dobesch Hartwig, Dumolard Pierre & Dyras Izabela, 2007. Spatial Interpolation for Climate Data (Ed.), Geographical Information Systems Series, ISTE Ltd., USA

4. Goodchild, M.F., Park, B.O. and Steyaert, L.T. (Ed.) 1993, Environmental Modelling with GIS. Oxford University Press, Oxford.
5. Jenson J.R., 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey
6. Jenson, J.R., 2000. Remote Sensing of the Environment: An Earth Resource Perspective. Perason Education
7. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi
8. Lloyd, Christopher D., 2010. Spatial Data Analysis: An Introduction for GIS Users, Oxford University Press
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16. Barrett, E. C. and L. F. Curtis, 1992. Fundamentals of Remote Sensing and Air Photo Interpretation, Macmillan, New York
17. Campbell, J., 1989. Introduction to Remote Sensing, Guilford, New York
18. Chauniyal, D.D., 2004. Remote Sensing and Geographical Information Systems (in Hindi), Sharda Pustak Bhawan, Allahabad
19. Curran, Paul J., 1985. Principles of Remote Sensing, Longman, London
20. Jenson J.R., 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey
21. Jenson, J.R., 2000. Remote Sensing of the Environment: An Earth Resource Perspective. Perason Education
22. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. Remote Sensing and Image Interpretation. John Wiley & Sons, New Delhi
23. Pratt W.K., 1978. Digital Image Processing. Wiley, New York

WEB RESOURCES

1. Ebook on Remote Sensing Applications, www.nrsc.gov.in/Learning_Centre_EBook.html
2. E-Tutorial on Fundamentals of Remote Sensing, Canada Centre for Mapping and Earth

Observation, Natural Resources Canada, accessible at http://www.nrcan.gc.ca/earthsciences/geomatics

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. One assignment based on computer - 10 marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner

The distribution of 80 marks will be as follows:

A- Test paper - 25 Marks
B- Lab exercise - 30 Marks
C- Record work - 15 Marks
D- Viva-Voce - 10 Marks

A- Test paper – 25 marks

The practical test paper of two hours duration and candidates will be required answer two questions out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on different GIS Software.

C- Record work – 15 marks

Student will be required to prepare a record work of the outputs of all exercises conducted in the lab. In addition the students will also be required to submit the output in soft copy in a CD.

D- Viva-Voce - 10 marks

The practical exercises, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester IV) - Course – Practical – II (M4GEOG2-CP08):

Project Work on Natural Resource Management Using RS-GIS

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To impart practical experience of using geospatial technology for solving real world problems related to various fields viz. natural resource management, urban planning, land-use planning, water resource, agriculture and health management.

CO 2. To develop an understanding of the work flow of project conceptualization, planning and implementation using geospatial techniques.

CO 3. To develop presentation skills and defending the work in open viva.

CO 4. To impart research experience enabling the students to carry out small projects and present their work on various platforms such as conferences/seminars.

Practical - II (M4GEOG2-CP08)

PROJECT WORK ON NATURAL RESOURCE MANAGEMENT USING RS-GIS

UNIT I: Overview of Applications of Remote Sensing and GIS

a) Natural resource evaluation and management

b) Urban planning and management

c) Land use planning and management

d) Environmental management & hazard mapping

UNIT II: Overview of Applications of Remote Sensing and GIS

a) Socio-economic applications

b) Health GIS

c) Water resource management

d) Agricultural studies

UNIT III-V: Project Planning, Execution and Writing of Project Report

Theme of project may be selected from any of the fields outlined in Unit I & II or any other problem of student's/ supervisor's choice with a geographical perspective analysed using geo-spatial methodology. The theme may range from methodological issues to real world geographical applications. Students will be required to get the selected theme approved by the concerned supervising faculty by way of presentation of synopsis in a class seminar.

The paper is divided into two parts. Part 1 (Unit I & II) comprises class room teaching. The students will be introduced to applications of RSGIS technology for applied geographical research. Subsequently, students will be required to take up a small case study as Part 2 (Unit III -V), essentially applying the geospatial tools for decision making and analysis. The case study will be carried out under supervision of internal faculty of the department. The project report will be of approximately 30-50 pages.

References

1. Ebook on Remote Sensing Applications, www.nrsc.gov.in/Learning_Centre_EBook.html

2. Chauniyal, D.D., 2004. Remote Sensing and Geographical Information Systems (in Hindi), Sharda Pustak Bhawan, Allahabad

3. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. Remote Sensing and Image Interpretation. John Wiley & Sons, New Delhi

4. Vyas P.R.,Remote Sensing and Geographical Information System and Remote Sensing : Basics and Applications, Rawat Publications, Jaipur, New Delhi-2014

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

Seminar presentation: 20 marks

External marks-80

The project will be based and analysed by using RS data in any of the GIS Software.

Project report will be examined by external examiner.

Project report: 80 marks

M.A. / M.Sc. Geography (Semester IV) - Course – Skill – II (M4GEOG1-Skill-02):
Statistical Analysis Using Software

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop professional skills of using statistical softwares such as SPSS, MS Excel for quantitative analysis.

CO 2. To make students learn analysing geographical data using robust statistical tools provided by these softwares.

CO 3. To develop skills of data handling and manipulation in softwares.

CO 4. To develop them as professionals capable of working as data analysts across public and private sectors and also self-employment as technical consultants.

M.A./M.Sc. Geography

Fourth Semester

Skill -II (M4GEOG1-Skill-02) Statistical Analysis Using Software

UNIT I – Data

a) Measurement levels

b) Data types, database file formats

c) Cases and variables

d) Defining variables

UNIT II – Data Entry

a) Data import

b) Data entry

c) Data editing

d) Data manipulation

UNIT III – Data Distribution

a) Preparation of line graphs

b) Preparation of bar diagrams

c) Preparation of histograms

d) Preparation of pie diagrams

UNIT IV – Data Analysis: Computation of Fundamental Descriptive Statistics

a) Mean, median, mode

b) Measures of dispersion – standard deviation, Z-Scores, box plots

c) Measures of symmetry – skewness

d) Kurtosis

UNIT V – Analyzing Relationships

a) Preparation of scatter plot

b) Computation of correlation
c) Computation of regression
d) Output generation and export in different formats
*Exercises will be done in available statistical software – Microsoft Excel and SPSS

Practical Exam Scheme

Distribution of marks: Total marks (100) = Internal marks (20) + External marks (80)
Internal marks- 20
3. One assignment based on statistical software using valid data – 10 marks.
4. Objective paper – 10 marks (10 objective questions)
External marks - 80
Candidates will be examined by an external examiner in consultation with the internal examiner.
The distribution of 80 marks will be as follow:
A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks

DEPARTMENT OF GEOGRAPHY
Faculty of Earth Sciences
Mohanlal Sukhadia University, Udaipur
(Programme Specific Outcomes and Course Outcomes)
Programme Specific Outcomes: (Ph.D. Programme in Geography)

PSO 1. To identify domain specific research problems and finding solutions to the same through scientific research.
PSO 2. To develop expertise in doctoral candidates in conducting scientific research.
PSO 3. To develop expertise in use of tools and methods of geospatial technology in applied geographical research.
PSO 4. To encourage application of software based cartographic and quantitative analysis
PSO 5. To cater to regional needs with respect to resource management, policy, planning and governance.
PSO 6. To identify priority areas for planning and management with specific focus on western part of India.

15.Microbiology

PROGRAMME OUTCOME OF M.Sc. MICROBIOLOGY (CBCS)

Upon completion of this programme, students will able to:

- Acquired knowledge and understanding of the microbiology concepts as applicable to diverse areas such as medical, industrial, environment, genetics, agriculture, food and others

- State of art knowledge about various methodological and analytic approaches that are used within the specialization

- Understand the regulation of biochemical pathway and possible process modifications for improved control over microorganisms for microbial product synthesis.

- Can compete in national level competitive exams such as NET-JRF or GATE or International exams such as GRE-TOEFEL and can pursue career in higher studies

- Demonstrate practical skills in the use of tools, technologies and methods common to microbiology, and apply the scientific method and hypothesis testing in the design and execution of experiments.

- Develop ability to independently carry out a complete scientific work process, including the understanding of theoretical background, hypothesis generation, collection and analysis of data, and interpretation and presentation of results.

- Has high competence and multidisciplinary project experience within selected topics related to microbiology and ability to contribute in a multidisciplinary team.

- Can communicate scientific results to the general public and experts by writing well structured reports and contributions for scientific publications and posters, and by oral presentations

M.Sc. MICROBIOLOGY I SEM: Course Outcome

Paper I: (M1MCB01-CT01) Instrumentation and Analytical Techniques (Theory)

Upon completion of this course, the students will able to:

- This skill based course will teach the various instrumentations that are used in the analytical laboratories
- The students has the basic knowledge on the theory, operation and function of analytical instruments

Paper II: (M1MCB02-CT02) Cell Biology and Molecular Genetics (Theory)

Upon completion of this course, the students will able to:

- Gives a strong foundation on the basic unit of life and functions of cell
- The course outcome is to train the students in understanding genetics and relate modern DNA technology for disease diagnostics and therapy

Paper III: (M1MCB03-CT03) Fundamentals of Microbiology (Theory)

Upon completion of this course, the students will able to:

- Throws light on types of microorganisms in and around humans
- Understanding on the concept of culturing microbes, sterilization techniques and estimating number of microbes in given sample

Paper IV: (M1MCB04-CT04) Biomolecules and Metabolism (Theory)

Upon completion of this course, the students will able to:

- Trains students about the salient features of biomolecules in the organization of life
- Helps the students in appreciating the integrated approach of interrelated pathways of catabolism and anabolism.

M.Sc. MICROBIOLOGY II SEM: Course Outcome

Paper I: **(M2BT01-CT05) Molecular Biology (Theory)**

Upon completion of this course, the students will able to:

- Learn fundamental molecular principles of genetics
- Understand relationship between phenotype and genotype in human genetic traits.
- Describe the basics of genetic mapping and understand how gene expression is regulated.

Paper II: **(M2BT02-CT06) Immunology and Enzymology (Theory)**

Upon completion of this course, the students will able to:

- Understand the role of the immune system, its organization and function.
- Develop immunological concepts and methods to diagnose immune disorders.
- Learn the mechanism of action and kinetics of enzyme.

Paper III: **(M2BT03-CT07) Bioinformatics and Biostatistics (Theory)**

Upon completion of this course, the students will able to:

- Understand the basic concepts of biostatistics.
- Learn the formula and principles used in biology.
- Explore methods and software tools for understanding biological data.

Paper IV: **(M2BT04-CT08) Genetic Engineering (Theory)**

Upon completion of this course, the students will able to:

- Know about implementation of genetic engineering for different purposes.
- Understand the principles of genetic engineering and the vectors used in cloning, methods of introduction of gene and expression.
- Investigate the different strategies of recombinant DNA technology and resolve the problems encountered.

M.Sc. BIOTECHNOLOGY/ MICROBIOLOGY III SEM: Course Outcome

Paper 1: (M3MB01CT09) Microbial Genetics (Theory)

Upon completion of this course, the students will able to:

- To become familiar with the foundation concepts of microbial genetics
- To identify and distinguish genetic regulatory mechanism at different levels

Paper 2: (M3MB02CT10) Industrial Microbiology (Theory)

Upon completion of this course, the students will able to:

- To learn about fermentation techniques, fermentation processes, fermentors
- To learn to isolate industrially important organisms

Paper 3: (M3MB03CT11) Microbial Ecology (Theory)

Upon completion of this course, the students will able to:

- To gain the knowledge of how important the microbes are for a sustainable environment
- To familiarize the various methods of detecting and solving environmental issues caused by microorganisms

Paper 4: (M3MB04CT12) Microbial Physiology and Metabolism (Theory)

Upon completion of this course, the students will able to:

- It features the regulatory aspects of metabolism for better understanding of physiology and therapeutic applications
- Know the various physical and chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurements

M.Sc. MICROBIOLOGY IV SEM: Course Outcome

Industrial Training: ***Major research Project at research laboratory or institute of repute (6 months)***

Upon completion of this course, students will able to:

- Carry out a substantial research-based project
- Demonstrate capacity to improve student achievement, engagement and retention
- Demonstrate capacity to lead and manage change through collaboration with others
- Demonstrate an understanding of the ethical issues associated with practitioner research
- Analyse data and synthesize research findings
- Report research findings in written and verbal forms
- Use research findings to advance education theory and practice.

16. Pharmacy

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

Program Name	**Program outcome**
B. Pharmacy (B. Pharm.)	On completion of the B. Pharm. program, a student will be able to: 1. Demonstrate knowledge of the basic pharmaceutical sciences and the ability to acquire, manage and use current information for problem solving. 2. Describe the synthesis, formulation, analysis and pharmacological aspects of drugs and pharmaceuticals. 3. Identify the rules and regulations involved in the drug discovery and development, manufacture, distribution and sale of medicines.

	4. Observe record, analyze, criticize, organize, improvise and manage documents, data and information related to pharmaceutical products and practices. 5. Develop problem-based learning approach and analytical thinking in his/her academic and professional life. 6. Demonstrate the ability to plan and implement professional activities. 7. Act efficiently as a leader in the diverse areas of the profession. 8. Write, interpret and communicate effectively and scientifically. 9. Apply the knowledge and skills gained through education to gain recognition in professional circle and society. 10. Partnering with other health care communities to provide innovative solutions. 11. Create awareness in society about the effective and safe use of medicines. 12. Demonstrate eco-friendly products and processes to maintain public health. 13. Imbibe ethical practices and moral values in personal and professional endeavors. 14. Tackle future challenges through lifelong learning.

Course Outcomes (CO)

B.Pharm 1 sem		
Subject with code	**Scope**	**Learning outcome**

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.	Upon completion of this course the student should be able to 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the various experiments related to special senses and nervous system. 5. Appreciate coordinated working pattern of different organs of each system
BP102T. PHARMACEUTICAL ANALYSIS (Theory)	This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs	Upon completion of the course student shall be able to · understand the principles of volumetric and electro chemical analysis · carryout various volumetric and electrochemical titrations · develop analytical skills
BP103T. PHARMACEUTICS- I (Theory)	This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.	Upon completion of this course the student should be able to: · Know the history of profession of pharmacy · Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations · Understand the professional way of handling the prescription · Preparation of various conventional dosage forms

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)	This subject deals with the monographs of inorganic drugs and pharmaceuticals.	Upon completion of course student shall be able to · know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals · understand the medicinal and pharmaceutical importance of inorganic compounds
BP105T.COMMUNICATION SKILLS (Theory)	This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.	Upon completion of the course the student shall be able to 1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Communicate effectively (Verbal and Non Verbal) 3. Effectivelymanage the team as a team player 4. Develop interview skills 5. Develop Leadership qualities and essentials
BP 106RBT.REMEDIAL BIOLOGY (Theory)	To learn and understand the components of living world, structure and functional system of plant and animal kingdom.	Upon completion of the course, the student shall be able to · know the classification and salient features of five kingdoms of life · understand the basic components of anatomy & physiology of plant · know understand the basic components of anatomy & physiology animal with special reference to human

BP 106RMT.REMEDIAL MATHEMATICS (Theory)	This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.	Upon completion of the course the student shall be able to:- 1. Know the theory and their application in Pharmacy 2. Solve the different types of problems by applying theory 3. Appreciate the important application of mathematics in Pharmacy
B.Pharm 2nd sem		
Subject with code	**Scope**	**Learning outcome**
BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.	Upon completion of this course the student should be able to: 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. 5. Appreciate coordinated working pattern of different organs of each system 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)	This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. identify/confirm the identification of organic compound
BP203 T. BIOCHEMISTRY (Theory)	Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.	Upon completion of course student shell able to 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

BP 204T.PATHOPHYSIOLOGY (THEORY)	Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.	Upon completion of the subject student shall be able to – 1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases; and 3. Mention the complications of the diseases.
BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)	This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.	Upon completion of the course the student shall be able to 1. know the various types of application of computers in pharmacy 2. know the various types of databases 3. know the various applications of databases in pharmacy

BP 206 T. ENVIRONMENTAL SCIENCES (Theory)	Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.	Upon completion of the course the student shall be able to: 1. Create the awareness about environmental problems among learners. 2. Impart basic knowledge about the environment and its allied problems. 3. Develop an attitude of concern for the environment. 4. Motivate learner to participate in environment protection and environment improvement. 5. Acquire skills to help the concerned individuals in identifying and solving environmental problems. 6. Strive to attain harmony with Nature.
B.Pharm 3 rd sem		
Subject with code	Scope	Learning outcome
BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)	This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. prepare organic compounds

BP302T. PHYSICAL PHARMACEUTICS-I (Theory)	The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms 2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)	Study of all categories of microorganisims especially for the production of alchol antibiotics, vaccines, vitamins enzymes etc..	Upon completion of the subject student shall be able to; 1. Understand methods of identification, cultivation and preservation of various microorganisms 2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry 3. Learn sterility testing of pharmaceutical products. 4. Carried out microbiological standardization of Pharmaceuticals. 5. Understand the cell culture technology and its applications in pharmaceutical industries.

BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)	This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.	Upon completion of the course student shall be able: 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process. 4. To carry out various test to prevent environmental pollution. 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources. 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
B.Pharm 4th sem		
Subject with code	Scope	Learning outcome
BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)	This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.	At the end of the course, the student shall be able to 1. understand the methods of preparation and properties of organic compounds 2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions 3. know the medicinal uses and other applications of organic compounds
BP402T. MEDICINAL CHEMISTRY – I (Theory)	This subject is designed to impart fundamental knowledge on the structure,	Upon completion of the course the student shall be able to 1. understand the chemistry of drugs with

	chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.	respect to their pharmacological activity 2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. know the Structural Activity Relationship (SAR) of different class of drugs 4. write the chemical synthesis of some drugs
BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)	The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms 2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP 404 T. PHARMACOLOGY-I (Theory)	The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as	Upon completion of this course the student should be able to 1. Understand the pharmacological actions of different categories of drugs 2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

	well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.	4. Observe the effect of drugs on animals by simulated experiments 5. Appreciate correlation of pharmacology with other bio medical sciences
BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)	The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.	Upon completion of the course, the student shall be able 1. to know the techniques in the cultivation and production of crude drugs 2. to know the crude drugs, their uses and chemical nature 3. know the evaluation techniques for the herbal drugs 4. to carry out the microscopic and morphological evaluation of crude drugs
B.Pharm 5th sem		
Subject with code	Scope	Learning outcome
BP501T. MEDICINAL CHEMISTRY – II (Theory)	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis	Upon completion of the course the student shall be able to 1. Understand the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. Know the Structural Activity Relationship of different class of drugs 4. Study the chemical synthesis of selected drugs

	of important drugs under each class	
BP 502 T. Industrial PharmacyI (Theory)	Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.	Upon completion of the course the student shall be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Know various considerations in development of pharmaceutical dosage forms 3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
BP503.T. PHARMACOLOGY-II (Theory)	This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition,emphasis on the basic concepts of bioassay	Upon completion of this course the student should be able to 1. Understand the mechanism of drug action and its relevance in the treatment of different diseases 2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments 3. Demonstrate the various receptor actions using isolated tissue preparation 4. Appreciate correlation of pharmacology with related medical sciences

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)	The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine	Upon completion of the course, the student shall be able 1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents 2. to understand the preparation and development of herbal formulation. 3. to understand the herbal drug interactions 4. to carryout isolation and identification of phytoconstituents
BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)	This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India	Upon completion of the course, the student shall be able to understand: 1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. 2. Various Indian pharmaceutical Acts and Laws 3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 4. The code of ethics during the pharmaceutical practice
B.Pharm 6th sem		
Subject with code	Scope	Learning outcome

BP601T. MEDICINAL CHEMISTRY – III (Theory)	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.	Upon completion of the course student shall be able to 1. Understand the importance of drug design and different techniques of drug design. 2. Understand the chemistry of drugs with respect to their biological activity. 3. Know the metabolism, adverse effects and therapeutic value of drugs. 4. Know the importance of SAR of drugs.
BP602 T. PHARMACOLOGY-III (Theory) 45	This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in	Upon completion of this course the student should be able to: 1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases 2. comprehend the principles of toxicology and treatment of various poisoningsand 3. appreciate correlation of pharmacology with related medical sciences.

	addition,emphasis on the principles of toxicology and chronopharmacology	
BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)	This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs	Upon completion of this course the student should be able to: 1. understand raw material as source of herbal drugs from cultivation to herbal drug product 2. know the WHO and ICH guidelines for evaluation of herbal drugs 3. know the herbal cosmetics, natural sweeteners, nutraceuticals 4. appreciate patenting of herbal drugs, GMP .

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)	This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.	Upon completion of the course student shall be able to: 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. 3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance. 4. Understand various pharmacokinetic parameters, their significance & applications.
BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)	Biotechnology has a long promise to revolutionize the biological sciences and technology. · Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technologymakes the subject interesting. · Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. · Biotechnology has already produced transgenic crops and	Upon completion of the subject student shall be able to; 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology

	animals and the future promises lot more. · It is basically a research-based subject.	
B.Pharm 7th sem		
Subject name with code	Scope	Objective/learning outcome

BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)	This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.	Upon completion of the course the student shall be able to 1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis 2. Understand the chromatographic separation and analysis of drugs. 3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.
BP 702 T. INDUSTRIAL PHARMACYII (Theory)	This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market	Upon completion of the course, the student shall be able to: 1. Know the process of pilot plant and scale up of pharmaceutical dosage forms 2. Understand the process of technology transfer from lab scale to commercial batch 3. Know different Laws and Acts that regulate pharmaceutical industry 4. Understand the approval process and regulatory requirements for drug products

BP 703T. PHARMACY PRACTICE (Theory)	In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.	Upon completion of the course, the student shall be able to 1. know various drug distribution methods in a hospital 2. appreciate the pharmacy stores management and inventory control 3. monitor drug therapy of patient through medication chart review and clinical review 4. obtain medication history interview and counsel the patients 5. identify drug related problems 6. detect and assess adverse drug reactions 7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states 8. know pharmaceutical care services 9. do patient counseling in community pharmacy; 10. appreciate the concept of Rational drug therapy.
BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)	This subject is designed to impart basic knowledge on the area of novel drug delivery systems.	Upon completion of the course student shall be able 1. To understand various approaches for development of novel drug delivery systems. 2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation
BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)	Practical aspect of analysis of chemistry	Very useful in pharmaceutical industry, chemical industry for purificaiton and synthesis of compund & testing them
B.Pharm 8th sem		

Subject name with code	Scope	Objective/learning outcome
BIOSTATISITCS AND RESEARCH METHODOLOGY (Theory) (BP801T.)	To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.	Upon completion of the course the student shall be able to • Know the operation of M.S. Excel, SPSS, R and MINITAB ® , DoE (Design of Experiment) • Know the various statistical techniques to solve statistical problems • Appreciate statistical techniques in solving the problems.
SOCIAL AND PREVENTIVE PHARMACY (BP 802T)	The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.	Objectives: After the successful completion of this course, the student shall be able to: · Acquire high consciousness/realization of current issuesrelated to health and pharmaceutical problems within the country and worldwide. · Have a critical way of thinking based on current healthcare development. · Evaluate alternative ways of solving problems related tohealth and pharmaceutical issues

BP803ET. PHARMA MARKETING MANAGEMENT (Theory)	The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.	The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.
BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)	This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia,UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.	Upon completion of the subject student shall be able to; 1. Know about the process of drug discovery and development 2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 3. Know the regulatory approval process and their registration in Indian and international markets

BP 805T: PHARMACOVIGILANCE (Theory)	This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.	At completion of this paper it is expected that students will be able to (know, do, and appreciate): 1. Why drug safety monitoring is important? 2. History and development of pharmacovigilance 3. National and international scenario of pharmacovigilance 4. Dictionaries, coding and terminologies used in pharmacovigilance 5. Detection of new adverse drug reactions and their assessment 6. International standards for classification of diseases and drugs 7. Adverse drug reaction reporting systems and communication in pharmacovigilance 8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle 9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation 10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India 11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning 12. CIOMS requirements for ADR reporting 13. Writing case narratives of adverse events and their quality.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)	Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function. · This is done both on a microscopic and molecular level. · Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organismssuch as humans, plants, and sponges.	Upon completion of the subject student shall be able to; · Summarize cell and molecular biology history. · Summarize cellular functioning and composition. · Describe the chemical foundations of cell biology. · Summarize the DNA properties of cell biology. · Describe protein structure and function. · Describe cellular membrane structure and function. · Describe basic molecular genetic mechanisms. · Summarize the Cell Cycle
BP809ET. COSMETIC SCIENCE(Theory)	Cosmetic Industry	Science of cosmetics can be learn
BP810 ET. PHARMACOLOGICAL SCREENING METHODS	This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results	Upon completion of the course the student shall be able to, · Appreciate the applications of various commonly used laboratory animals. · Appreciate and demonstrate the various screening methods used in preclinical research · Appreciate and demonstrate the importance of biostatistics and researchmethodology · Design and execute a research hypothesis independently

BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES	This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.	:Upon completion of the course the student shall be able to · understand the advanced instruments used and its applications in drug analysis · understand the chromatographic separation and analysis of drugs. · understand the calibration of various analytical instruments · know analysis of drugs using various analytical instruments.
Elective course on Pharmaceutical Product Development	Dosage form development	In Pharmaceutical industry how product is developed

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agenc defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other area identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the Nat Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensi exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these alr stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institut website.

Department of Geology Faculty of Earth Sciences

Mohanlal Sukhadia University, Udaipur

Outcome of M. Sc. Geology Programme

After getting M.Sc. degree students get jobs in Central Government Department like Geological survey of India, Indian Bureau of Mines, Central Groundwater Board etc. Public enterprises and MNC like ONGC, Oil India, Cairn Energy etc. They also get jobs in state Government Department like Department of Mines and Geology, Groundwater Department, state government enterprises like RSMM. All mineral, cement and building stone industries employ them as geologist. Also working as private consultants.

Course/Paper Code	Course/Paper Name	Objective of Course	Outcome of Course
M1GEO01-CT01	Tectonics and Geomorphology	It is aimed to learn about the role of tectonics in landscape evolution, the coupling of tectonics and climate, tools and methods used in the investigation of landforms and landscape responses to deformation in different timescales	Outcomes are expected in terms of coupled knowledge of tectonics and geomorphology. It is expected that the students bear the knowledge to understand the processes of geomorphology with the role of tectonics.
M1GEO02-CT02	Mineralogy	The objective of the course is to understand the distribution of minerals in different Earth's spheres and evaluate different processes of the Physico-chemical environment of their formation. The course also includes minerals, which are of economic significance and learn the basic principles to identify them.	At the end of the course the successful students able to identify and characterize the common minerals based on their physical, chemical and optical properties. The students will also get the idea of preliminary knowledge on instrumentation techniques used for mineralogical studies.

M1GEO03-CT03	Palaeontology -I	To explain the origin and evolution of life is intricately linked with the geological history of the Earth. Students explore knowledge about the evolutionary history of organism.	Through the fossil records students will explore topics such as evolutionary diversity, exceptional preservation and palaeoclimates. Through the key groups of invertebrate fossils students will come to know about the major concepts such as the origin of life, patterns of evolution and extinction, the importance of exceptional fossil assemblages, and the relationship between ecology and evolution.
M1GEO04-CT04	Precambrian Stratigraphy	It is aimed to make understand almost 90% of Earth's geological history through this paper by pertaining knowledge of lithology, crustal evolution and geochronology.	Students are expected to carry with them knowledge based upon geochronological sequence of rock layers formed in India and World all over during Precambrian time. The knowledge imparted will bear characterization of Precambrian rocks with respect to lithology, structure, extension, location, age & life preserved in them if any.
M2GEO01-CT05	Structural Geology	The objective of the course is to teach the students how does the Earth respond to applied forces. This course looks at how rocks deform and change shape, and how we can recognise and use structures within rocks to determine ancient magnitudes and orientations of stress fields. Basic concepts of the rheological properties of rocks and their control on the deformation processes.	At the conclusion of this class, students should be able to quantitatively describe the three-dimensional structure of rocks in the earth's crust, using geologic maps and/or outcrop data and reconstruct the deformation history of deformed rocks based on fabrics and geometric relationships.
M2GEO02-CT06	Sedimentary Petrology	Students will understand the nature of sediment formation, transport and deposition as well as different types of sedimentary rocks, their textures and structures in interpretation and reconstruction of sedimentary facies, paleogeography, paleoclimates and depositional histories.	After successful completion of this course the student will be able to classify different sedimentary rocks. Also this course will help them in interpreting different sedimentary depositional environment.

M2GEO03-CT07	Palaeontology – II	Students come to know some important groups of fauna and flora keeping importance in the geologic history of the earth.	Through the key groups of invertebrate fossils students will come to know about the major concepts such as the origin of life, patterns of evolution and extinction, the importance of exceptional fossil assemblages, and the relationship between ecology and evolution. Through the vertebrate's evolution and Gondwana Plants study students will come to know their importance in geological history.
M2GEO04-CT08	Phanerozoic Stratigraphy	Phanerozoic periods exceptionally covers important geological history of evolution of life that stands buried in the rocks but need to be revealed through study of outcrops, fossils, rocks that includes distribution and age components.	It is expected that the outcomes from the study of paper will include stratigraphic sequencing during Phanerozoic time. The knowledge based outcome will include characterization, lithology, structure, extension, location, age and life preserved in these rocks.
M3GEO01-CT09	Economic Geology	The course educates the concepts of Economic Geology in general, starting with details of various ore forming processes, their controls and relation with tectonic processes. The course also enables students to learn about important metallic and non-metallic minerals, their ore, geologic and geographic distribution. The course further introduces students about fuel minerals including coal and petroleum.	The students upon successful completion of this course will be well versed with various processes involved in formation of ore deposits. It is expected that student will be able to better appreciate the potential of various mineral commodities across the country.
M3GEO02-CT10	Igneous Petrology	To impart knowledge about the magmatic systems To train the students about the dynamism of the earth in the field of igneous petrology. To gain an appreciation for how the igneous rocks is controlled by chemical and physical properties of magmas.	Upon successful completion of course the students would be able to Understand the mantle system and magmatic processes. Understand the basic principles of phase rule and its relation with binary and ternary systems and origin of different igneous rocks.

M4GEO01-CT11	Metamorphic Petrology	• To impart knowledge on Metamorphism and metasomatism process. • To train the students to understand the different processes of formations of metamorphic rocks and their significance.	Upon successful completion of course the students would be able to • Understand the factors and agents of metamorphism. • Understand the textures and mineral assemblages of different zones of metamorphism. • Understand the processes of metasomatism and their types. • Understand the representation of mineral paragenesis & graphical representation of metamorphic rock.
M4GEO02-CT12	Mineral Exploration & Mining Geology	• To impart knowledge of geological field survey. • To train the students to understand functioning of necessary instruments required during geological field survey. • To Understand various geological structures found at outcrops. • To Understand fundamentals of geological processes and stratigraphic correlation. • To Understanding observations and recording of important filed information and to classify various types of features procured from field study. • To Understand fundamentals of the geophysical methods of mineral exploration. • To Understand the principles of mineral economics and bore hole logging.	Upon successful completion of course the students would be able to:- • Understand the basic concept of geological field work and various instruments used in field work. • Learn about the geological processes that lead to the formation of mineral deposits in nature, and about which minerals and rocks represent important resources for society. At the end of the study period, will be in a position to contribute to the exploitation of known mineral deposits, and to contribute to exploration for new deposits. You will also learn how exploitation of mineral deposits can take place with minimal negative consequences for the environment, and how harmful emissions from mines and mineral deposits can be stopped or limited. • Field work including geological and structural mapping. • Preparation of field report based on the recorded data, mapping data as well as laboratory work on the rock samples collected

			during the field work
M1GEO05-CP01	Practical – I : Tectonics and Geomorphology & Mineralogy	For Tectonics and Geomorphology To be able to recognize, analyze, and describe landforms, materials of which they are composed, and processes by which they form. Students come to know about to explain the concepts and theories of plate tectonics, mass balance, dynamics and hydrology and will be able to understand the processes by which transportation of earth material occurs through fluvial and gravitational processes. For Mineralogy The student will learn the basic principles behind the arrangement of atoms how these atoms are coordinated and bonded and how this is reflected in the external form and its link with chemical composition. The student will learn how to identify the most common minerals in hand specimen and, by using optical techniques, learn how to identify the common minerals in thin section	For Tectonics and Geomorphology Students will have knowledge of represent relief features of the plateaus, hills, foothills, valleys, plains and flood plains through superimposed, composite, serial or projected profiles. Will be able to demarcate basin with representation of basin relief through profiles and will draw interpretations. Will become able to express slope and gradients from a topographical map, draw longitudinal profiles of rivers from topographical maps, chalk out water discharge curve and calculate the sediment transport and erosion within a landscape. For Mineralogy At the completion of the course student will be able to • Explain why different minerals have distinctly different structures. • Demonstrate how the internal structure of minerals affects the external structureand physical properties of a minerals. • Identify minerals based on megascopic and microscopic observations.

M1GEO06-CP02	Practical – II : Palaeontology I & Precambrian Stratigraphy	For Paleontology I To explore students knowledge with the basic practical approach through the hand specimens of mode of preservation and groups of Foraminifera, Trilobita and Echinodermata. For Precambrian Stratigraphy To make learn students about distribution of Precambrian Stratigraphic units of India along with the palaeogeographic conditions	For Paleontology I Students will be able identify to morphological features through hand specimens of types of fossils. Through specimens of Foraminifera, Trilobita and Echinodermata of organism, practically he/she will be able to study about palaeoenvironment, stratigraphic position, age and correlation with other organism. For Precambrian Stratigraphy Student is expected to come out with the knowledge of extension of lithostratigraphic units in relevance to chronostrtaigraphy with sum-toto knowledge of the Indian subcontinent specifically during Precambrian time.
M2GEO05-CP03	Practical – III : Structural Geology & Sedimentary Petrology	For Structural Geology Measurement of various orientation data from the structures, plotting them in suitable diagrams and make a quantitative analysis. For Sedimentary Petrology To give students hands-on practical classes aimed at 1. Developing skill for identifying the different types of sedimentary rocks in hands specimen as well as under microscope 2. Using graphic, mathematical calculations and other means for data analysis and interpretation	For Structural Geology To prepare the students for future research and teaching career in the field of Structural Geology. For Sedimentary Petrology After completion, students will learn 1. How to identify and differentiate between different sedimentary rocks in field as well as thin sections under microscope 2. How to represent data in different ways and to interpret data for paleocurrent analysis and other objectives

M2GEO06-CP04	Practical – IV : Palaeontology II & Phanerozoic Stratigraphy	For Paleontology II To explore students knowledge for the study of fossil groups of Anthozoa, Gastropoda, Bivalvia, Chephalopoda, Brachiopoda, Gondwana plant and some vertebrate fauna. For Phanerozoic Stratigraphy It is intended for students to learn anout distribution of Phanerozoic Stratigraphic units of India along with the changing palaeogeographic conditions relevant to distribution of landmass, sea and fresh water provinces.	For Paleontology II Students will be able to identify all morphological features of the particular groups of fauna and flora. He/She will be able to find about palaeoenvironment, stratigraphic position, age and correlation with other organism. For Phanerozoic Stratigraphy With respect to outcome it is expected that student should bear the knowledge of Phanerozoic lithostratigraphic units in Indian subcontinent, palaeogeographic linkages with the surrounding landmasses and position of India within the various Supercontinents.
M3GEO05-CP05	Practical – V : Economic Geology & Igneous Petrology	For Economic Geology This practical course has following objectives: • To study ore minerals in hand specimen with special focus to its physical properties for identification • To study polished sections of ore specimens under reflected light. • To study the distribution of various important ore minerals across world and India For Igenous Petrology • To impart knowledge about the magmatic systems • To train the students to identify different igneous rocks in hand specimen and further by thin section through optical properties of different minerals.	For Economic Geology The students upon successful completion of this course will be well versed with: • Identification of ore minerals in hand specimen • Identify, describe and understand texture and structures in polished section of ore minerals and appreciate ore genesis. • Distribution of ore important ore minerals in India and World For Igneous Petrology Upon successful completion of course the students would be able to • Identify the common rock forming minerals of igneous rocks in both hand specimen and thin-section. • Identify key textural/micro structural features of igneous rocks appreciate the significance of such features with regard to geological processes that have operated.

		• To train student to classified rocks based on the modal mineralogy.	• Assign a name to igneous rocks on the basis of its mineralogical and textural characteristics, and appreciate the environment(s) of formation. • Ability to interpret phase diagrams relevant to igneous systems. • Ability to make detailed and annotated petrographic sketches from thin-section observation and to summarise the salient features and relate the chemistry of the system and environment of formation.
M4GEO05-CP06	Practical – VI : Metamorphic Petrology & Mineral Exploration and Mining Geology	For Metamorphic Petrology • To impart knowledge about metamorphic processes. • To train the students to identify different metamorphic rocks in hand specimen and further by thin section through optical properties of different minerals • To train the students to understand the different processes of formations of metamorphic rocks and their significance in the geodynamic evolution. For Exploration and Mining Geology • To understand the importance of surveying and Levelling in the field of Geology. • To study the basics of linear/angular measurement methods like, compass and Plane table surveying. • To study the significance of plane table surveying in plan making. • To know the basics of levelling and	For Metamorphic Petrology Upon successful completion of course the students would be able to 1. Identify the common rock forming minerals of metamorphic rocks in hand specimen and thin-section. 2. Identify key textural/micro structural features of metamorphic rocks and appreciate the significance of such features with regard to geological processes that have operated. 3. Assign a name to metamorphic rock on the basis of its mineralogical and textural characteristics, and appreciate the environment(s) of formation. 4. Ability to interpret phase diagrams relevant petrogenic grids relevant to metamorphic systems on the basis of mineral assemblages recorded in the rock. For Exploration and Mining Geology Upon successful completion of course the students would be able to:- • Calculate angles, distances and levels by Theodolite. • Identify data collection methods and prepare

		theodolite survey in elevation and angular measurements. • To understand measurement of horizontal, vertical angles and linear distance from Theodolite. • To Understand how to use and levelling of Theodolite in the field. • To understand process of core logging and its importance in exploration. • To understand applications of GPS and its use in field. • To know the methods of ore reserve estimation and how to calculate ore reserves of a stope and mine.	field notes. • Understand the working principles of survey instruments. • Estimate measurement errors and apply corrections. • Interpret survey data and compute areas and volumes. • Understand the procedures of plane table and compass survey. • Understand how to work Theodolite in field and its use in surveying and levelling. • Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. • Understand contouring and its importance. • Understand techniques and applications of GPS and its uses in field in mapping. • Understand how to do core logging and take visuals of grade from the core. • Understand the methods of ore reserve estimation of a ore body.

Discipline Specific Electives

Course /Paper Code	Course /Paper Name	Objective of Course	Outcome of Course
M3GEO03-ET01	Ground Water Geology	To teach students • The importance of groundwater, its occurrence, distribution and quality • Various hydrological concepts, groundwater flow theories and their applications. • Basic groundwater problems related to different engineering structures.	After completing course, students will be able to • Define the significance of groundwater as an Earth resource • Understand the porous medium properties that control groundwater flow and transport, including porosity, hydraulic conductivity, and compressibility. • Apply groundwater flow equations to confined and unconfined aquifers.
M3GEO04-ET02	Photo geology and Remote Sensing	The objective of the present syllabus of Photo Geology and Remote Sensing is as follows: • To introduce students to concepts and geological applications in remote sensing with an emphasis on aerial photography although other airborne and satellite imagery are also included. • To familiarize students with the fundamentals of both the photo geological interpretation of air-photo stereo pairs and satellite imagery through laboratory practice. • To encourage the use of large-scale air-photo stereo pairs and satellite imagery in field surveying and site investigations	The outcome of the syllabus will be helpful for students in the following way: • The students will be able to understand the concepts, methodologies and applications of Remote Sensing Technology. • They will acquire skills in handling instruments, tools, techniques while using Remote Sensing Technology. • It empowers the students with confidence and leadership qualities.
M4GEO03-ET03	Environmental Geology & Disaster Management	• To impart knowledge of environmental geology, natural hazards and their management. • To understand the Earth's ecosystem and interrelations of various components of the Earth.	Upon successful completion of course the students would be able to:- • Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment.

		To understand geological aspects of various natural hazards and geo-engineering projects	Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.
M4GEO04-ET04	Geochemistry	The objective of the syllabus helps the students to understand the chemical principles which are used to explain the mechanisms that control the large geological systems. The course also helps to understand the distribution of elements in different Earth's spheres and evaluate different processes of element migration.	By attending the courses, the students able to understand the evolution of the early earth and its differentiation to the present-day state. The students also have an idea of the chemical composition of the geochemical reservoirs. The knowledge of the radiogenic isotope's signature helps to trace the source of mineral and rock separation from the magma.
M3GEO06-EP01	Elective Practical - I : Groundwater Geology & Photo-geology and Remote Sensing	For Groundwater geology To give students hands-on practical classes aimed at giving exercises on various topics covered in theory classes of the subject like water quality, groundwater exploration, yield etc. For Photo-Geology and remote sensing To introduce students with the interpretation of aerial photographs with the help of stereo pairs and satellite imageries through laboratory practice. To introduce students with the visual interpretation of satellite imageries. To introduce students with the various application of GIS software in different field of Earth Sciences viz. geomorphology, structural geology, lithological mapping,	For Groundwater geology After completion, students will be able to apply theoretical knowledge and concepts learned during lecture classes by using the data gathered in the field or other source(s). For Photo-Geology and remote sensing The students will be able to interpret aerial photographs and satellite imageries. The students will also be able to apply GIS software in various fields of Earth Sciences geomorphology, structural geology, lithological mapping, environmental geology, hydrogeology etc.

		environmental geology, hydrogeology etc.	
M4GEO06-EP02	Elective Practical – II : Environmental Geology and Disaster Management & Geochemistry	For Environmental Geology and Disaster Management These are the objectives of this course. 1. To analysis of different parameters of air, water and noise. 2. To interpretation of air, water and noise data. 3. To prepare iso-concentration maps of water quality parameters according to WHO data and their limits. 4. To identify the seismic zones and plot them in maps of World, India and Rajasthan. 5. To know how to occur slope failure and landslide in landslide prone zones. For Geochemistry The students will learn how to present analytical data of geochemistry through various graphical diagrams viz. Multi-Elements spider diagrams and introduction to Geochemical Modelling for interpretation of the petrological processes.	For Environmental Geology and Disaster Management Upon successful completion of course the students would be able to:- 1. Understand the different parameters of air, water and noise. 2. Understand how to interpretation the air, water and noise data. 3. Understand to prepare iso concentration maps of water quality. 4. Understand the seismic zones of India, world and Rajasthan. 5. Understand some exercises of slope failure on sterionet and their field relation. For Geochemistry At the completion of the course, the student will, • learn to calculate mineral formulae based on mineral chemistry. • be able to do Bi-variate analysis of data (Regression & Correlation). • learn to present the geochemical data via different multi-elements spider diagrams for the interpretation of various petrological processes.

Skill Papers

Course /Paper Code	Course /Paper Name	Objective of Course	Outcome of Course
M2GEO07-SE01	Application of GIS	The main objective of teaching skill course in M.Sc. is to gain a basic, practical understanding of GIS concepts, techniques and real world applications Class discussions, reading assignments, and class lectures prepare students to develop a mapping project based on the assumptions and interpretations of data selected by the student.	At the completion of the course, students will: • Have a basic, practical understanding of GIS concepts, techniques and real world applications. • Have an understanding of the technical language of GIS. • Know how GIS is utilized in the larger context of business needs and IT strategies. Understand basic GIS data concepts. Have an ability to perform basic GIS analysis of concepts. • Have demonstrated a practical application of GIS. • Have practical experience using basic GIS tools. • Have an understanding of GIS and its relationship to mapping software development. • Have an appreciation of GIS career options and how to pursue them.
M4GEO07-SE02	Survey & Leveling	• To understand the importance of surveying and Levelling in the field of Geology. • To study the basics of linear/angular measurement methods like Tape, chain surveying, electronic distance, compass and Plane table surveying. • To study the significance of plane table surveying in plan making. • To know the basics of levelling and theodolite survey in elevation and angular measurements. • To understand measurement of horizontal,	Upon successful completion of course the students would be able to:- • Calculate angles, distances and levels from theodolite and other equipments. • Identify data collection methods and prepare field notes. • Understand the working principles of survey instruments. • Estimate measurement errors and apply corrections. • Interpret survey data and compute areas and volumes.

		vertical angles and linear distance from Theodolite. • To Understand how to use and levelling of Theodolite in the field. • To understand characterising and methods of contouring. • To understand applications of GPS and its use in field.	• Understand the procedures of plane table and compass survey. • Understand how to work Theodolite in field and its use in surveying and levelling. • Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. • Understand contouring and its importance. • Understand techniques and applications of GPS and its uses in field in mapping.

Outcome of M. Sc. Tech Applied Geology Programe

After getting M.Sc. degree students study advance geology in M.Sc.Tech (Applied Geology) course. M.Sc. Tech students get privilege in jobs of all geological organization and industry specially for exploration work. Central Government Department like Geological survey of India, Indian Beauro of Mines, Central Groundwater Board etc. Public enterprises and MNCs like ONGC, Oil India, Cairn Energy etc. They also get jobs in state Government Department like Department of Mines and Geology, Groundwater Department, state government enterprises like RSMM. All mineral, cement and building stone industries employ them as geologist. Also get opportunities in consultancy work.

Course/Paper Code	Course/Paper Name	Objective of Course	Outcome of Course

MT1GEO01-CT01	Structural Geology and Tectonics	Accurate geometric description of the structures observed in natural deformed rocks. Understanding deformation mechanisms at micro-meso- and macroscopic scales.	Students is supposed to learn the techniques of recording and analysing structural data and taught how to map rock sequences in the field and interrogate a region to determine how it formed and what has happened to the area since formation. To come out with the application of structural geology in oil and petroleum sectors.
MT1GEO02-CT02	Micropalaeontology	To know the process/Basics of the study of micropalaeontology. It is aimed to give knowledge about the microfossils role in hydrocarbon exploration and basin analysis.	To explain the role of micropalaeontology in biostratigraphy and hydrocarbon exploration geology. To explain the role of microfossils in palaeoenvironmental interpretation. To describe the morphology and biology of organisms commonly found as microfossils.
MT1GEO03-CT03	Mineral Exploration and Mining Geology	This course is designed to enable students to acquire understanding of the basic concept of mineral exploration, various exploration techniques including ground and aero geophysical surveys, geochemical exploration, etc., introduces the basic concepts of mining and gives knowledge of application of ore petrography.	The expected outcome of the course upon successful completion includes development of ability to apply knowledge based approach for mineral exploration and capacity to judge better use of specific tools for mineral targeting unique to the selected mineral under consideration.
MT1GEO04-CT04	Mineral Technology and	□ To acquire knowledge of	Upon successful completion of course the

	Mineral Economics	basic concept of mineral processing and economics of mineral resources. □ To be able to understand how and why different types of mineral deposits are formed. □ To understand various government mineral policies, rules and regulations for conservation of minerals.	students would be able to □ Understand the technology of the minerals processing and implication of the mineral resources in different industries □ Students gain the knowledge about different government policies and regulations of minerals. □ Students able to know how economy generated by various type of minerals
MT2GEO01-CT05	Advance Remote Sensing in Geosciences	The course is designed to fulfil the following objectives □ To provide exposure to students in gaining knowledge on concepts and applications leading to modelling of earth resources management using Remote Sensing □ To acquire skills in storing, managing digital data for planning and development. □ To acquire skills in advance techniques such as hyper spectral, thermal and microwave for mapping, modeling and monitoring. □ To inculcate practical skill for processing advance remote sensing datasets for various applications including natural resources management.	□ The students will be able to get understanding on various concepts and application of remote sensing in the modeling of earth resource management □ The student will be able to handle digital data for planning and development □ The students will be able to learn skill for processing advance remote sensing datasets such as hyper spectral, thermal and microwave for various applications including natural resources management.

MT2GEO02-CT06	Engineering and Groundwater Geology	The course aims at teaching the student □ Basic knowledge and understanding in the most central part of engineering geology, rock and soil. □ Detailed knowledge of groundwater and its exploration, exploitation, wells and salt-water intrusion.	After completion of course, the student □ Can give an account of engineering geological investigations, engineering, stability of slopes and protection of underground facilities □ Learn about hydrological properties of aquifers, their determination, groundwater occurrence in different rocks, water level fluctuations and their causative factors □ Can learn exploration methods, concept of well hydraulics as well as Hydrogeology of India and Rajasthan in detail.
MT2GEO03-CT07	Petroleum, Coal and Radioactive Minerals	The course is divided in three sections namely Petroleum, Coal and Radioactive Minerals which is spread over five units. In the Petroleum part, the course is designed to enable students to acquire understanding of the processes involved in formation of petroleum, its migration, maturation, its distribution, etc. In the second portion of course, the course enables students to learn details about formation of Coal, fundamental concept of coal	The students after completing this course are expected to have fundamental concepts of origin of energy minerals which includes petroleum, coal and radioactive minerals. The students will have knowledge based approach towards exploration and exploitation including background of their distribution across the globe with special focus in India

		petrography, its classification and distribution across globe. In the last part, the course deals with radioactive minerals where student is exposed to processes of formation of various radioactive minerals, their classification and distribution in detail.	
MT2GEO04-CT08	Oceanography and Climatology	This course aims at introducing oceanography and climatology concepts dealing with the physical process and chemical behaviour of ocean and climate as a coupled system. Also this course includes the application of the various proxies for paleoceanographic and paleoclimatic interpretation.	After successful completion of this course student will be able to understand the process responsible for various oceanographic and climatological phenomenon. Also through this course student will be able to interpret and correlate various paleoceanographic and paleoclimatic events.
MT1GEO05-CP01	Practical-I: Structural Geology and Tectonics. Micropalaeontology	For Structural Geology and Tectonics To learn the practice of theoretical knowledge for applying at ground observation in field and to learn essential observational and practical skills. For Micropaleontology To explore students knowledge particularly in micro fossils.	For Structural Geology and Tectonics To train the students for adaptation in field work environment in certain professional and scientific organizations.Students will have knowledge and imparted through field trip. Students are expected to learn different deformational structures. For Micropaleontology Students will be able to identify all morphological features of microfossils by the help of microscope and will learn applications of microfossils in hydrocarbon exploration and correlation with the strata.
MT1GEO06-CP02	Practical-II: Mineral Exploration and Mining Geology. Mineral Technology and Mineral	The practical paper has following objectives: 1. To understand beneficiation of various ore minerals and use of	Upon successful completion of course the students would be able to:- 1. Use flow sheet and appreciate ore beneficiation methods specific to various

	Economics	their flow sheets 2. To understand industrial specifications of various minerals specific to different industries 3. To describe and identify various hand specimen of important metallic and non-metallic minerals 4. To understand the importance of surveying and Levelling in the field of Geology. 5. To know the basics of levelling and theodolite survey in elevation and angular measurements. 6. To understand measurement of horizontal, vertical angles and linear distance from Theodolite. 7. To understand process of core logging and its importance in exploration. 8. To understand applications of GPS and its use in field. To understand the methods of ore reserve estimation and calculation of ore reserves	metals 2. Decide use of mineral specification data and categorise it according to various industry 3. Identify and describe various metallic and non-metallic minerals in hand specimen 4. Understand the working principles of survey instruments. 5. Calculate angles, distances and levels by Theodolite. 6. Estimate measurement errors and apply corrections. 7. Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. 8. Understand techniques and applications of GPS and its uses in field in mapping. Understand the methods of ore reserve estimation in a mineral deposit.
MT2GEO05-CP03	Practical-III: Advance Remote Sensing in Geosciences & Engineering and Groundwater Geology	For Advance Remote Sensing in Geosciences To introduce students with the more understanding of the remote sensing with the practical knowledge of the subject.	For Advance Remote Sensing in Geosciences The students will be able to do various analysis viz. geomorphic mapping on aerial photographs, geological and structural mapping using aerial photographs, lineament analysis on satellite imageries as well as

		To introduce students with the various analysis viz. geomorphic mapping on aerial photographs, geological and structural mapping using aerial photographs, lineament analysis on satellite imageries as well as Geological and Structural studies using satellite imageries. For Engineering and Groundwater Geology To give students hands-on practical classes aimed at 1. Giving numerical problems/exercises on various topics covered in theory classes of the subject like engineering properties of soil and rock 2. Making maps such as iso-hyetal and groundwater contouring as well as numerical problems on aquifer parameters and pumping tests.	Geological and Structural studies using satellite imageries by themselves. They will be able to use this practical knowledge in research purpose too. For Engineering and Groundwater Geology After completion, students will be able to understand and apply theoretical concepts of engineering and groundwater geology in practical aspects like deciding which soil or rock properties are essential for construction of various engineering structures and making maps and interpreting the conditions of an area using available data.
MT2GEO06-CP04	Practical-IV: Petroleum, coal and Radioactive Minerals. Oceanography and Climatology	For Petroleum Coal and Radioactive Minerals This practical course has following objectives: □ Study the distribution of Coal deposits in Rajasthan, India and World □ Study the distribution of Petroleum basins in Rajasthan, India and World □ Study the distribution of Radioactive Mineral deposits in Rajasthan, India and	For Petroleum Coal and Radioactive Minerals The students upon successful completion of this course will be well versed with: □ Distribution of Coal deposits in Rajasthan, India and World □ Distribution of Petroleum basins in Rajasthan, India and World □ Distribution of radioactive mineral deposits in Rajasthan, India and World □ Identify and describe coal and radioactive minerals in hand specimen. □ Calculate and able to solve problems in reservoir volume and yield calculations.

		World □ Identification of Coal and Radioactive minerals in hand specimen □ Numerical exercises on reservoir volume and yield calculation. □ To study coal samples under microscope (Coal Petrography) For Oceanography and Climatology □ To emphasize on different climate regimes □ To introduce different ocean current and their role on global and regional climate □ To introduce major wind patterns on world map □ To make them understand use of different proxies for establishing chronology □ To introduce different proxies used for paleoceanographic and paleoclimatic interpretation	□ To identify and describe various microlith types of the coal samples under microscope. For Oceanography and Climatology □ The students will be able to understand the role of ocean atmosphere coupling and their importance in global climate. □ The student will be able to solve numerical exercises related to proxy interpretation and proxy correlation □ The students will be able to establish chronology with the help of proxies.

Skill Papers

Course /Paper Code	Course /Paper Name	Outcome of Course
MT2GEO07-SE01	Geological and Mining Consultancy	Students learn about ore reserve estimation and planning of mine

18. PROGRAMME SPECIFIC OUTCOMES (PSO)

- M.Sc. Zoology is a 2 year postgraduate course run under the CBCS scheme. It relates with the study of animal kingdom starting from a single cell, their structure, function, biochemistry, physiology, cell and molecular biology, biotechnology, conservation biology, bioinformatics etc.
- The entire syllabus is divided into four semesters each having 4 theory papers and 2 practicals accounting to a total of 16 theory and 8 practicals for each student.
- Third semester offers 2 elective courses namely Entomology and Insect Toxicology and Wildlife Biology.
- Students are gain expertise and indepth theoretical and practical knowledge of all the basic and allied field s of Zoology.
- The programme is designed in such a way to provide both academic and professional training and proficiency in animal science.
- The course imbibes students with state of art knowledge of every aspect animal science and its allies.

PROGRAMME OUTCOMES (PO)

- To understand the existing and new avenues of the biological sciences with special reference to animal science and imbibe the knowledge from all different perspectives.
- To Gain knowledge and understand concepts in all the contemporary fields of Zoology.
- To provide students with a broad understanding of animals and their interactions with the environment and to explain how organisms function at the level of the gene, cell, tissue, organ, organ-system and physiology.
- To equip students with competent and significant research knowledge to engage in any biomedical or bioscience research.
- To enable the students for gaining competencies for various competitive examinations of private and Government sectors as teachers, lecturers, food inspector, environmental inspectors etc.

SEMESTER I

Paper I: Biosystematics, Structure and Function of Invertebrates (Course Code-MI ZOO 01CT-01)

Course Outcome:

- To study the fundamentals of taxonomy, nomenclature and classification of invertebrates.
- To study molecular cytotaxonomy and role of genetics in taxonomy.
- To know the functional aspects of different systems of invertebrates.
- To study the various physiological mechanisms of various organ systems like locomotory, integumentary, reproductive, digestive etc., in invertebrates.
- To make students aware about how life evolved from simple to complex organization by modification in various systems and thus enhancing efficiency in Invertebrates.
- To help explain and compare the functional morphology of invertebrates.

Paper II: Ethology and Evolution (Course Code- MI ZOO02CT-02)

Course Outcome:

- Students would be imparted knowledge about basic and important concepts of ethology
- To give an insight into the various methods of studying animal behavior.
- To study about social organization, animal societies and its importance.
- To get acquainted with different types of learning and biological rhythms.
- To know the history and concept of evolution.
- To understand the mechanisms and factors involving in evolution process.

- To know the evolutionary patterns of various animals at micro and macro level.

Paper III -Instrumentation and Techniques in Biology (Course Code-MI ZOO03 CT03)

Course Outcome:

- To study the principle, working mechanism and application of various types of microscopes like electron, phase contrast, atomic absorption etc., used in biological experiments.
- To study the principle, working mechanism and application of various types of instruments like pH meter, spectrophotometer, centrifuge etc., used in biological experiments.
- To know the different types of separation techniques of electrophoresis and chromatography.
- To understand the technique of histological slide preparation by knowing the concepts of fixation, staining techniques etc.,
- To get aware about section cutting using microtome, cryostat etc.,
- To know about techniques like decalcification, cryopreservation, freezing techniques etc.

Paper IV: Cell and Molecular Biology (Course code-MI ZOO 04 CT-04)

Course Outcome:

- To gain insight into how processes are integrated at the molecular level to create a functional eukaryotic cell.
- To provide knowledge about the biomembranes, transport across them.
- To know the principles of cell communication and adhesion and cell- cell signaling.
- To acquire advanced knowledge of molecular biology of cell cycle, its regulation and the checkpoints.
- To study the biology of aging, genetic mechanism of cell death in terms of necrosis and apoptosis.
- To have an insight into the intracellular transport mechanism, protein trafficking and their regulation.
- To know about chromation, karyotype, somatic cell genetics etc.,

Practical I: (Paper I and II) (Course code-MI ZOO 05 CP 01)

Course Outcome:

- This course involves the practical knowledge related to theory papers I and II.
- It acquaints the students with various types of invertebrates by studying museum specimens and slides of their internal parts etc.
- Students are imparted practical knowledge of preparing permanent slides of various materials available as well as by collection of material.
- Virtual dissection helps to have practical knowledge about the anatomy of different animals.
- Experiments related to animal behavior provide practical insight into hoe the behavior is performed and varies under different circumstances.
- Exercises on evolutionary biology give clear indication of how estimations of gene and genotype frequencies are made.

Practical II: (Paper –III and IV) (Course code-MI ZOO 06CP-02)

Course Outcome:

- This course involves the practical knowledge related to theory papers III and IV.
- To demonstrate the practical usage of various instruments.
- To prepare paraffin block, perform sectioning, and prepare double stained slide.
- To know and prepare different solutions, fixatives and stains.
- To prepare slides of mitosis and meiosis to demonstrate cell division.
- To study human karyotype and sex chromatin.

SEMESTER II

Paper I: Biodiversity and Conservation Biology (Course code-M2 ZOO 01CT-05)

Course Outcome:

- To learn the concepts of biodiversity and mega diversity of India.
- To study the different causes leading to habitat destruction, impacts of climate change, overexploitation and environmental impact assessment.
- To gain knowledge about Conservation biology and methods of conservation.
- To know about different conservation categories of animals and global as well as national conservation agencies.
- To study different plant and animal interaction in the context of population ecology and community ecology.
- To know about Restoration ecology, human conflicts with animals and species reintroduction programmes.

Paper II: Environmental Toxicology (Course Code-M2 ZOO 02 CT06)

Course Outcome:

- To have a wide knowledge about environmental toxicology.
- To understand the Environmental stress and its management strategies.
- To know the different types of pollution and their control.
- To have an insight into the general principles of toxicology, toxicokinetics and toxicodynamics.
- To know the bioindicators and biomarkers of environmental health.
- To study different toxicants, their mechanism of action and kinetics.
- To gain insight into the safety evaluation of toxicants, risk management, assessment and monitoring.

Paper III: Developmental Biology (Course code-M2ZOO03CT-07)

Course Outcome:

- To get knowledge about gametogenesis, fertilization and its mechanism.
- To know about the mechanism of cleavage, blastulation and gastrulation in different animals.
- To have an insight into mechanisms of induction, competence and differentiation.
- To know how animals achieve symmetry and axis.
- To study morphogenesis and organogenesis and their genetic mechanism.
- To know how evolution has changed the development process in the phylogeny.
- To gain knowledge about modern techniques of developmental biology and socio ethical issues.

Paper IV: Animal Physiology and Immunology (Course Code-M2ZOO 04CT08)

Course Outcome:

- To help the students in understanding how the body functions adapts with respect to its external and internal environment.
- To study about thermoregulation, osmotic balance, hormonal regulation in relation to the environment.
- To understand the all areas of immunology and study the innate and adaptive immunity, antigens and antibodies.
- To know about the immune deficiency diseases, hypersensitivity and vaccines.

Practical I: (Paper I and II) (Course Code-M2 ZOO05- CP03)

Course Outcome:

- This course involves the practical knowledge related to theory papers I and II.
- The students are given exposure to field by visits to natural habitats and protected areas and wetlands of Rajasthan for detailed study.
- Analysis of habitat characteristics and determination of various parameters of population and species.
- Practical demonstration and performance of bioassays of different pesticides and dose calculation are taught.
- Effect of heavy metal toxicity on various mammalian tissues is demonstrated.

Practical II: (Paper III and IV) (Course code-M2 ZOO6CP-04)

Course Outcome:

- This course involves the practical knowledge related to theory papers III and IV.
- It gives knowledge about the structure of reproductive organs.
- To acquire students with basic knowledge of experimental embryology that leads to understanding cleave, blastula and gastrula.
- To demonstrate the development of chick embryo.
- To help study the internal structure of various immune organs viz spleen, thymus, bone-marrow, kidney, lymph nodes etc.
- Demonstration of different experiments of blood related to clotting and bleeding time, formation of haematin crystals and differential staining.

SEMESTER III

Paper I: Vertebrates (Course code-M3ZOO01CT-09) (Core)

Course Outcome:

- To critically examine the origin and diversification history of vertebrates.

- To study the origin and classification of vertebrates.
- To have an insight into various concepts of origin and phylogenetic relationship of vertebrates starting from agnatha, gnathostomes, pisces, amphibians, reptiles, aves and mammals.
- Evolutionary significance of vertebrates is studied.

Paper II: Computational biology, Biostatistics and Bioinformatics (Course Code-M3 ZOO 02 CT-10)) (Core)

Course Outcome:

- To learn the strategies of data collection, analysis of data, measurement of central tendencies and different sampling techniques.
- To understand the proper interpretation of data generated in the biology using correlation, regression and significance tests.
- To have access to computer statistical programs – Prism, SPSS.
- To have knowledge about probability and different probability distribution.
- To understand theStatistical designing of experiments and importance of research designs.
- To give knowledge about computer and its applications for further research and to use of different scientific database.
- To introduce to bioinformatics and various tools like proteomics, genomics, microarray etc.

Elective I A: Entomology and Insect Toxicology

Paper I: SYSTEMATIC ENTOMOLOGY, INSECT ORGANIZATION AND ECOLOGY (Course Code-M3ZOO 03 ET-01A) (Elective)

Course Outcome:

- To give a detailed knowledge about Origin and Evolution of insects.
- To know taxonomical position, classification and use of identification keys for the largest inhabitants of the earth i.e., insects.
- To give knowledge about collection, identification and preservation aspects of insects.
- To study about different insect societies and their success rate.
- To provide information about the ecology, population dynamics, intra and interspecific relations along with human and insect interactions.

Elective I B: Wildlife Biology

Wildlife Biology I : Biodiversity and Wildlife Ecology (Course Code-M3ZOO-03 ET01B) (Elective)

Course Outcome:

- To understand the concepts, levels and values of biodiversity alongwith different types of species of biodiversity importance.
- To study the organization and characteristics of biotic community and population ecology
- To know about the Ecology of major habitats, patterns of habitat utilization and dispersion.
- To have idea about the Major vegetation types of India, phenology and distribution.
- To study the forest soils, conservation methods and forest menstruation.
- To provide insight into Silviculture.

Elective III B : Limnology and Fisheries

Limnology and Fisheries I: Limnology (Course Code-M3ZOO 04ET01C) (Elective)

Course Outcome:

- To have a detailed knowledge about the origin, classification and morphogenesis of lakes

- To study how different physical factors like temperature, density etc., affect the lake ecosystem
- To study the various chemical factors like pH, oxygen, salts etc. which influence the lake ecosystem
- To have an insight about various planktonic organisms in terms of their classification, distribution, significance and to study the productivity and energy flow in aquatic system.
- To know about eutrophication and its causes, control, water purification techniques, wetlands and their conservation.

Elective II A: Entomology and Insect Toxicology

Paper II: Insect Physiology and Toxicology (Course Code-M3ZOO04 ET02A) (Elective)

Course Outcome:

- To inculcate knowledge of morphology and physiology of insects.
- To study the integument, appendages and wing development.
- To have knowledge about various systems namely muscular, digestive, circulatory, excretory and respiratory systems of insects and to know their physiology and how they make insects the most successful organisms on the earth.
- To provide information about the morphology and physiology of neuro endocrine system.
- To impart knowledge about the reproductive, endocrine system, growth, development and metamorphosis in insects.

Elective II B : Wildlife Biology

Wildlife Biology II : Conservation Biology (Course Code-M3ZOO 04ET02B) (Elective)

Course Outcome:

- To gain knowledge about Conservation biology and biodiversity conservation
- To have an insight into *ex situ* and *in situ* methods of conservation
- To have an idea about international conservation bodies – IUCN, UNDP, FAO, WWF
- To have knowledge about national parks, wildlife sanctuaries and biosphere reserves of India
- To know about the formation and management of zoological parks and zoo sanitation
- To have an idea of Indian wildlife and endangered and threatened species
- To impart knowledge about wildlife forensics, conservation ethics and values

Elective III B: Limnology and Fisheries

Limnology and Fisheries II : Fresh water aquaculture and its management (Course Code-M3ZOO 04ET02C) (Elective)

Course Outcome:

- This paper gives insight about fresh water aquaculture and its management
- Gives an account of aquaculture in India
- Students gain knowledge about fishes of cold water and brackish water.
- Gives knowledge about fisheries of economically important fishes.
- Helps the student gain insight into how to develop, plan and construct a fish farm and hatcheries.
- Gives information about fish culture, fish preservation, conservation and fish behavior.

Practical- I (Core Paper I & II) (Course Code-M3ZOO05CP05)

Course Outcome:

- This course involves the practical knowledge related to core theory papers I and II.
- It acquaints the students with various types of vertebrates by studying museum specimens and slides of their internal parts etc.
- Students are imparted practical knowledge of preparing permanent slides of various materials available
- Virtual dissection helps to have practical knowledge about the anatomy of different vertebrate animals.

- Comparison of axial skeleton of pisces, amphibians, reptiles, aves and mammals gives an idea about the bones and their development
- Understand the application of statistical techniques in biological research.
- To know the statistical problems in biological science which are useful for the students for their research works.
- To work on computer statistical programs – Prism, SPSS
- To have practical knowledge about how to perform various statistical tests like significance tests, ANOVA, etc.
- To use various bioinformatics tools like proteomics, genomics, microarray etc.
- To calculate probability and different probability distribution.

Practical-II (Elective I A and II A: Entomology and Insect Toxicology) (Course Code -M3ZOO 05 EP01A)

Course Outcome:

- This course involves the practical knowledge related to elective IA and IIA theory papers.
- Students are exposed to field visits for identification and collection of insects of various orders.
- To inculcate practical knowledge and usage of various collection, identification and preservation methods of insects at various stages
- Dissections of insects from different orders gives an insight of the anatomy of various systems
- To demonstrate the different types of antennae, mouthparts, wings etc., which are an important parameter for identification
- Insect preservation boxes are made for future studies
- Microtomy of internal organs helps to analyze the detailed structure

Practical-II (Elective I B and II B: Wildlife Biology) (Course Code-M3ZOO05 EP01B) Biodiversity, Wildlife Ecology and Conservation Biology

Course Outcome:

- This course involves the practical knowledge related to elective IB and II B theory papers.
- The students are given exposure to field by visits to Zoological garden and a small report is submitted by them.
- Practical knowledge about identification of mammalian species using hair imprinting and scat analysis is given which is an important aspect for wildlife studies.
- Analysis of population density, species dominance, habitat characteristics etc., are done in field.
- Soil and water analysis in the field are demonstrated.

Practical-II (Elective I C and II C: Limnology and Fisheries) (Course Code-M3ZOO05 EP01C)

Course Outcome:

- This course involves the practical knowledge related to elective IC and II C theory papers
- This course gives practical training about various aspects related to limnology
- It helps students to know methods to measure the area, shoreline and shoreline index of lake.
- Helps to learn methods to measure the various physical factors like temperature, visibility and pH of water.
- Gives practical knowledge about measurement of chemical factors like alkalinity, salinity, dissolved oxygen etc.
- Acquaints students with the different types of aquactic insects, planktons, aquatic weeds and various fishing crafts and gears.

SEMESTER IV

Paper I: Applied Zoology (Course Code-M4ZOO01CT11) (Core)

Course Outcome:

- To study the concepts of applied zoology.
- To study various protozoans, helminthes and insects in relation to the human diseases they cause.
- To acquire information on beneficial insects, sericulture and apiculture.
- Students are introduced to vector biology and are imparted knowledge regarding different vector borne diseases especially in humans and their recent facts.
- To impart knowledge about agricultural pests.
- Brief idea of pisciculture, fish industry, pearl culture and pearl industry are given.
- To provide knowledge about Sustainable agriculture, organic farming and vermicomposting.

Paper II: Animal Biotechnology (Course Code-M4ZOO02CT-12) (Core)

Course Outcome:

- To give an insight into the various aspects of biotechnology, rDNA technology and genetic engineering.
- To provide knowledge about dealing with different procedures involving genes viz., isolation, sequencing, labeling, probing, cloning techniques etc.
- To study different hybridization techniques, DNA fingerprinting, blotting techniques etc.
- To study the mechanism of gene regulation, gene targetting, gene therapy and human genome project.
- To learn the application of biotechnology and genetic engineering in various fields.
- To study the Role of biotechnology in health care diagnosis.
- To learn the Intellectual Property Rights and patenting laws.
- To give knowledge about Ethical and social implications of gene technology.

Elective I A: Entomology and Insect Toxicology

Paper I: Economic, Medical, Forensic and Commercial Entomology (Course Code-M4ZOO03 ET -01A) (Elective)

Course outcomes:

- To impart knowledge about pests of economic importance and their management
- To study about synthetic insecticides, assessment of pest status and their chemical control
- To provide an insight into the biological control of insects and integrated pest management
- To acquaint with role of biotechnology and nanotechnology in insect control
- To give knowledge of medical entomology where life cycle, disease transmission and control measures of flies, fleas and ticks etc.,
- To have an insight of mosquito borne diseases, other vector borne diseases, disease outbreak and integrated vector management strategies
- To study commercial entomology by providing an insight into apiculture, sericulture and lac culture and their status in India

Elective I B: Wildlife Biology

Paper I B: Wildlife Biology: Indian Wildlife (Course code-M4ZOO 03ET -01B) (Elective)

Course outcomes:

- To study about various aspects of Indian wildlife.
- To study the various Zoogeographical regions of India and their fauna and special mention of fauna of Thar desert.
- To have an insight into the Status, distribution, physical characteristics and ethology of important endangered animals and plants of the country.
- To study about the different special wildlife programs likeProject Tiger, Project Elephant, Operation

Rhino, Project Crocodile running in the country.

- To gain knowledge about Wildlife Institutes in India and wildlife legislation including different acts and plans.
- To study the damages caused by wildlife- their identification and control.

Elective I C: Limnology and Fisheries

Paper I C: Limnology and Fisheries: Fish Taxonomy and Physiology (Course code-M4ZOO 03ET -01C) (Elective)

Course outcomes:

- To study the taxonomy and physiology of fishes.
- Gives an account of origin and classification of fishes.
- Provides knowledge about Ganga river system, coastal and deep sea fisheries.
- Gives knowledge about various physiological system of fishes like respiration, reproduction osmoregulation etc.
- Helps to gain knowledge about bacterial, fungal and worm diseases of fish and their prevention, fish spoilage, preservation and transport.
- Gives insight about fish biotechnology

Elective II A: Entomology and Insect Toxicology

Paper II: DISSERTATION (Course Code-M4ZOO04ET -02A) (Elective)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Elective II B: Wildlife Biology

Paper II: DISSERTATION (Course Code-M4ZOO 04ET -02B)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Elective II C: Limnology and Fisheries

Paper II C: DISSERTATION (Course code-M4ZOO 03ET -02C) (Elective)

Course outcomes:
Helps student to gain deep practical knowledge on a topic of interest and to develop research insight.

Practical- I (Core Paper I & II) (Course Code-M4ZOO06-CP06)

Course Outcome:

- This course involves the practical knowledge related to core theory papers I and II.
- Students are given practical knowledge of rearing and the life cycle study of any stored product pest, phytophagous pests or medically important insects.
- To study permanent slides of disease causing protozoans, helminthes and arthropods.
- Extraction and quantification of DNA is practically demonstrated.
- Practical knowledge and demonstration of Agarose gel electrophoresis for DNA, RNA and protein.

Practical-II (Elective I A: Entomology and Insect Toxicology)

Entomology and Insect Toxicology (Course Code-M4ZOO06-EP02A)

Course Outcome:

- Students are given practical knowledge about Collection, identification and rearing of phytophagous pests and different mosquitoes.
- Estimation of LD50 and LC 50 of insecticides using insects is demonstrated.
- Students are acquainted with techniques of appliances used for the application of insecticides.
- Analysis of Blood cells, meiotic and polytene chromosomes is being practically taught.
- Various rearing techniques, mechanisms and use of equipments is learnt by the student.

Practical-II (Elective I B : Wildlife Biology)

Indian Wildlife and Wildlife Management (Course Code-M4ZOO06-EP02B)

Course Outcome:

- Visit to natural habitats and wildlife sanctuaries, desert, mountain range, wetland and especially Rajasthan for the detail study.
- Visit to wetland for demonstration and field exposure of students.
- Students are acquainted with use of Taxonomic identification and preparation of taxonomic key of given animals.
- Practical knowledge of POP preparation of pugmarks and footprints, designing the animal housing, enclosures, Permanent preparation of barbs of different avian feathers and use of statistical parameters is imparted.

Students also have to submit a project report on the different field visits done.

Practical-II (Elective I C: Limnology and Fisheries) (Course Code-M4ZOO05 EP02C)

Course Outcome:

- Helps in identification of fishes using morphometric characters
- Identification of important cultivable fin fishes, shell fishes, predator and weed fishes.
- Identification of fish eggs, larva fry and fingerlings.
- Identification of commercially important indigenous fishes, exotic fishes, Prawns, fishing nets, boat models, hapas,
- Field trips to gain knowledge about various lakes, fish farms, landing centres and polluted streams for limnological and fisheries study
- Students also have to submit a project report on the different field visits done.

19. Maths & Statistics

Programme Specific Outcomes and Course Outcomes
Department of Mathematics and Statistics

Programme Specific Outcomes

PSOs of B.Sc. Mathematics

PSO1. Understand Group Theory, Ring Theory and Fields and apply in problems.

PSO2. Understand the basic concept of Differential Equations of various types and apply in various real life problems.

PSO3. Understand the Geometrical Interpretations of 2D and 3D shapes and evaluate their area and volume.

PSO4. Analyse real numbers and their applications by certain results and apply then in various pure problems.

PSO5. Analyse numerical problems and apply in various problems by different methods.

PSO6. Understand the basic definition of Graph Theory, Tree and Boolean Algebra and analyse their application.

PSOs of M.Sc. Mathematics

PSO1. Understand the concept of group theorems, ring theory and field theory and evaluate their applications also expansion of these concepts from the view point of Discrete Mathematics.

PSO2. Analyze and interpret real and complex functions with their applications.

PSO3. Study the analytic and numerical solutions of various differential equations, initial and boundary value problems by various approaches.

	PSO4. Apply various techniques in solving linear and non-linear programming problems and find their applications. PSO5. Understand the concept of hydrodynamics, equation of Continuity, rigid dynamics, moment of inertia and boundary surface with their applications. PSO6. Find applications of tensor analysis in electromagnetism and physics. PSO7. Discuss testing of hypothesis by various Mathematical distributions.
Course Outcomes	**COs** of the course **"Algebra" (B.Sc. I Year)** CO1 Understand concepts of matrices, system of linear equation and their consistency, using by rank. CO2 Understand different methods to find the solution of cubic equations. CO3 Understand basic concept of group subgroup, cyclic group, permutation group etc. and analyse their applications. CO4 Apply Lagrange's theorem and understand the concept of normal sub group, centre of group etc. CO5 Apply Cayley theorem of finite groups. **COs** of the course **"Calculus" (B.Sc. I Year)** CO1 Understand concepts of arc length and Geometrical interpretation of results obtained from it.

	CO2 Understand the concepts of Asymptotes points of inflexion and apply them in curve tracing. CO3 Apply Beta and Gamma function in quardature and rectification. CO4 Understand the concept of differential equation and their types and analyse their applications. **COs** of the course **"Geometry" (B.Sc. I Year)** CO1 Indentify the nature of conic of second and third degree. CO2 Geometrical properties of ellipse and hyperbola as well as 3-D shapes CO3 Interpret the relation between plane and straight line. CO4 Evaluation of principal plane and direction of conics. **COs** of the course **"Advanced Calculus" (B.Sc. II Year)** CO1 Understand basic concepts of continuity important theorems. CO2 Concepts of partial differentiation and its applications. CO3 Evaluate double and triple integrals and their applications. CO4 Understand vectors & scalars quantity, evaluate of gradient, divergence and curl. Some important vector identity. CO5 Understand Gauss's theorem, Stoke's theorem and Green's theorem and their applications. **COs** of the course **"Differential equations"(B.Sc. II Year)**

	CO1 Understand the concept of exact, simultaneous and total differential equation and analyse their applications. CO2 Evolution of solution of linear differential equation with variable coefficients by various approach. CO3 Classify the partial differential equation and evaluate their solution using different approaches. CO4 Analyze numerical solution of differential equation. **COs** of the course **"Mechanics" (B.Sc. II Year)** CO1 Finding resultant of coplanar forces and study equilibrium of bodies under three or more forces. CO2 Interpretation of virtual work by forces. CO3 Study the projective motion of various particles. CO4 Finding velocity and acceleration in various direction and study rectilinear motion. CO5 Study the motion of particle in resisting medium. **COs** of the course **"Real Analysis" (B.Sc. III Year)** CO1 Understand the concepts of real number and analyse their properties. CO2 Study sequence, series and their applications. CO3 Apply Riemann integrals in evaluation of some integrals.

	CO4 Understand the concept of uniform convergence and study their application. **COs** of the course **"Abstract Algebra" (B.Sc. III Year)** CO1 Understand the concept of ring theory and their applications. CO2 Study the concept of homomorphism and isomorphism of rings and their applications. CO3 Evolution of examples of vector spaces and related problems. CO4 Apply Sylvester law of nullity in linear transformations. **COs** of the course **"Discrete Mathematics" (B.Sc. III Year)** CO1 Understand the basic concept of sets and propositions, permutations and combinations. CO2 Understand the basic of relations and functions, Pigeon Hole principle graphs and related theorems. CO3 Understand the basic concept of trees and finite state machines. CO4 Understand the basic concept of Recussence relations solution by the method of generation functions. CO5 Basic concept of Boolean algebra Lattices, Duality, Digital network switching circuits.

COs of the course **"Numerical Analysis and Operation Research" (B.Sc. III Year)**

CO1 Study the interpolation methods of equi-distance and unequi distance intervals.

CO2 Discuses the numerical integration methods and their derivations.

CO3 Understand the concept of linear programming problems and methods of solving it.

CO4 Apply assignment and transportation problem in various physical problems.

COs of the course **"Mathematical Statistics" (B.Sc. III Year)**

CO1 Understand the basic concept of probability, independent events and related problems.

CO1 Understand the basic of Random variables, distribution functions, density functions.

CO1 Understand the basic concept of theoretical probability distribution and related theorems.

CO1 Understand the basic definition of Mathematical expectation, moments and related theorems.

	CO1 Understand the basic concept of curve fitting by the least square principle, fitting of straight line and parabola and regression. **COs** of the course **"Algebra-I" (Sem-I)** CO1 Understand types of direct product of subgroups. Cauchy's theorem for abelian and non abelian groups. CO2 Understand and apply Sylaw's three theorem. Composition series and Jordan Holder theorem. CO3 Understand solvable group and their properties fundamental theorem for finite abelian group. CO4 Understand Annihilators of subspace, invariant and projection. CO5 Understand types of Linear transformation and diagonalicatoin. **COs** of the course **"Real Analysis" (Sem-I)** CO1 Study the measure and their properties of subsets of Real numbers. CO2 Study the measurably of various functions discuss. CO3 Discuss the integral properties of measurable functions. CO4 Discuss the convergence of equation of measurable function and other applications.

	CO1 Establish the relations between the solutions of various differential equations. CO2 Application of special function to solve various problems. CO3 Study the various problems of special functions. CO4 Understand the concept of orthogonal polynomials and generating functions. **COs** of the course **"Differentional Equations and Calculus of Variation" (Sem-I)** CO1 Understand concept of partial differential equations, existence and uniqueness theorem and solution of second order PDE through Monge's method. CO2 Understand concepts of canonical forms and reduction of second order semi linear partial differential equations to canonical forms. classification of second order PDE having more than two independent variables, Cauchy's problem. CO3 Understand concept of BVP's of second order ordinary differential equations, Strum-Lowville BPS's Lagrange's identity and relevant theorems and properties based on study Eigen values and Eigen functions. CO4 Study solution of second order PDE's by the method of separation of variables, Green's functions and solution of second order homogeneous

	BPV's through Green's function. CO5 Understand concept of calculus of variations functional, Euler-Lagrange differential equation for externals and its alternative forms. Solution of variational problems using Ritz method. **COs** of the course **"Mechanics" (Sem-I)** CO1 Understand the concepts of hydrodynamics, equation of continuity and boundary surface. CO2 Derive Feeler's dynamical equations and Bernoulli's equation with applications and problems CO3 Understand the concept of central orbit and planetary motion with Kepler's laws. CO4 Understand the concept of special theory of relativity, Michelson-Marley experiment and Lorentz transformation. CO5 Describe applications of Lorentz transformations and concept of Minkowski's 4-dimensional continuum space, relativistic Hamiltonian and Lagrangian. **COs** of the course **"Differential Geometry-I" (Sem-I)** CO1 Understand the basic concept of plane section and circular section.

	CO2 Understand the concept of any section of a central conicoid. Generating lines Tangent plane. CO3 Understand the basic concept of projection of generators, Hyperbolic paraboloid. CO4 Understand the basic of confocal conioids elliptic coordinates, parameter of confocals. CO5 Understand the basic concept of conoids inflexional tangents and indicatrix. **COs** of the course **"Algebra-II" (Sem-II)** CO1 Understand prime fields, polynomial rings, integral domain, Euclidean domain, principal ideal domain and unique factorization domain and their related theorems. CO2 Understand concept of modules, sub module, Quotient modules with suitable examples. Fundamental theorem of homomorphism and isomorphism. CO3 Understand finitely generated modules with fundamental theorem, Noetherian and Artinian modules and related theorems. CO4 Understand field extension with examples types of extension. Perfect field and finite fields. CO5 Understand Automorphism, Galois theory of field extension and its

	theorem. Solution of polynomial equations. **COs** of the course **"Complex Analysis" (Sem-II)** CO1 Interpret complex numbers Geometrically and study the concept of analytic function and their applications. CO2 Understand the concept of conformal transformation and apply it in various problems. CO3 Discuses the concept of complex integrations and its application. CO4 Study of various types of singularities and zero and application of Cauchy's Residue's theorem. **COs** of the course **"Special Functions" (Sem-II)** CO1 Find solutions of various differential equations using series solution. CO2 Understand concept of various special functions and their relations. CO3 Study properties of various special functions. CO4 Discuss applications of special functions in various problems. CO5 Understand concept of generating functions and their applications. **COs** of the course **"Mechanics" (Sem-II)**

	CO1 Understand the concept of Rigid dynamics, moment of inertia, product of inertia, Momental ellipsoid and principal anes. CO2 Understand D' Alembert's principle and drive equations of motion. Study motion about a fixed axis CO3 Understand the motion in two dimensions under finite forces and impulsive forces. CO4 Understand principles of the conservation of momentum and conservation of energy. CO5 Derive Lagrange's equations in generalized coordinates under finite and impulsive forces. **COs** of the course **"Differential Geometry-II" (Sem-II)** CO1 Understand the concept of differential geometry. CO2 Understand the basic of surfaces. Ruled surface and developable surface and related theorems. CO3 Understand the concept of curvature of normal section principal radii. CO4 Understand the concept of an oblique section radius of curvature, lines of curvature of an ellipsoid. CO5 Understand the concept of umbilicus, curvature at point of a generator of a skew surface curve linear coordinates.

COs of the course **"Topology" (Sem-III)**

CO1 Understand the concept of metric space with properties and examples open set, closed set, sequence, compact space and related theorems.

CO2 Understand basic concepts of topology, bases, countable space and related theorems.

CO3 Understand the various types of topological space T_0 T_1 T_2 etc. and related theorems, compactness and their theorems.

CO4 Understand Connectedness and continuity related theorems.

CO5 Understand function algebra and some important theorems.

COs of the course **"Tensor Analysis" (Sem-III)**

CO1 Understand the concepts of tensors, its types end operations. Define Quotient law, fundamental tensor and associate tensors.

CO2 Understand the concepts of Christoffel symbols, transformation of Christoffel symbols and covariant differentiation of tensors.

CO3 Define Geodesics, null geodesics and applications, understand the concept of Riemannian, Normal Gaussian Coordinates and parallel propagation.

CO4 Define and understand Riemannian, Curvature tensor, its properties and

conformal curvature tensor.

CO5 Understand the concept of electromagnetism, Max well's equations, transformation of elective and magnetic intensities and energy momentum tensor for electromagnetic field.

COs of the course **"Numerical Analysis-I" (Sem-III)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Understand the basic concept of iteration theory, rate of convergence, acceleration of convergence, multiple and complex roots.

CO2 Understand the real and complex roots, Bisection method, secant method, Regula falsie method, Newton Raphson method.

CO3 Concept of synthetic division Birge vieta method, Graffes root squaring method.

CO4 Understand the solution of Gauss Jordan method, partition method, Jacobi method.

CO5 Understand the basic concept of Eigen value problem, power method complex Eigen values.

	COs of the course **"Computer Programming in-C" (Sem-III)** CO1 Understand basic concepts of computer and generations of computer. CO2 Understand concepts of computer languages, use of all PC software's, Algorithm, flow chart. CO3 Understand concepts and features of High level language C. CO4 Understand concepts of how to compile and run C Programs. CO5 Understand concepts of writing and run all programs on topics mentioned in syllabus. **COs** of the course **"Discrete Mathematics" (Sem-III)** CO1 Understanding fundamental concepts of mathematical logic and certain Algebra concepts from the view point of Discrete Mathematics. CO2 Expansion of the Algebra concepts from the view point of Discrete Mathematics. CO3 Introduction to the Mathematical structure of Lattices, Partially ordered sets and their various kinds of Lattices. CO4 Introduction to Boolean Algebra, its relation with Lattices and relevant concepts.

	CO5 Minimization of Boolean function, Various canonical forms and Karnaugh-Map. **COs** of the course **"Optimization Techniques-I" (Sem-III)** CO1 Explain linear programming problem (L.P.P.), parametric linear programming and method used to solve it. CO2 Analyse the discrete changes in the parameters of the problem and its effect on optimal solution. CO3 Enumerate fundamentals of integer programming techniques and apply different techniques to solve various optimization problems arising from different areas. CO4 Understanding of project scheduling by PERT and CPM. CO5 Understand how optimization can be used to solve industrial problems. **COs** of the course **"Mathematical Theory of Statistics-I" (M-III)** CO1 Understand concepts of probability, laws of probability, Baye's theorem and its applications. CO2 Understand basic concepts of Mathematical expectations, moments generating function, inversion theorem and its applications.

	CO3 Understand and apply Binomial, Poisson distribution etc. CO4 Understand Normal, Gamma and Beta distributions and its applications in real life problem. CO5 Understand basic concepts of curve fitting, Correlation and regression and their applications. **COs** of the course **"Integral Equation" (Sem-III)** CO1 Study the concept of linear integral equations and their classifications. CO2 Finding solution of linear integral equations. CO3 Study the various properties of Eigen values and Eigen functions. CO4 Apply Hilbert Schmidt theorem in solving freedholm integral equation of second kind. CO5 Discuses freedholm theorems and their applications. **COs** of the course **"Functional Analysis" (Sem-IV)** CO1 Know about normal linear and Banach space and their applications.

	CO2 Understand the various Important theorems. CO3 Know about inner product space and Hilbert space with various important law. CO4 Understand orthonormal basis and sets. CO5 Learn various operation and apply to solve problems. **COs** of the course **"Relativity and Cosmology" (Sem-IV)** CO1 Understand the principle of covariance equivalence, Mach's principle and Newton's potential derive Einstein field equations. CO2 Disuses Schwarzschild extensor solution singularise and related problems. Derive energy momentum tensor for perfect fluid. CO3 Discuss planetary orbit, Three crucial tests of general relativity, Radar echo delay and study Schwarzschild interior solution. CO4 Understand principle of cosmology, Einstein and De-sitter Universes and their derivations with properties and their comparison. CO5 Understand the concept of non-static cosmological models, Hubble's law derivation of Robertson-walker metric, its geometric feature and expressions for FRW model. **COs** of the course **"Numerical Analysis-II" (Sem-IV)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Understand the concept of curve fitting with least square principle.

CO2 Understand the numerical solution of ordinary differential equations by Taylors series method, Picard's method, Fuler's method and modified eulers method.

CO3 Understand the solution of Rungekutta method and stability analysis.

CO4 Understand the solution of linear boundary value problems of ordinary differential equations by finite difference methods.

CO5 Understand the solution of Non linear boundary value problems by finite difference scheme.

COs of the course **"Computer Programming of Numerical Methods" (Sem-IV)**

CO1 Understand concepts of Normalized floating numbers, perform operations of normalized floating number and to write & run C program on Normalized floating Number.

CO2 Understand concepts of write and run programs to find roots of Algebraic and Transcendental equations.

CO3 Understand concepts of write and run programs to solve numerical solutions of simultaneous linear equations.

CO4 Understand concepts of write and run programs of Differentiation and

integration.

CO5 Understand concepts of write and run Programs of numerical solutions of Differential equation.

COs of the course **"Discrete Mathematics" (Sem-IV)**

CO1 Understand basic concept of Graph Theory, introducing planar graphs.

CO2 Trees (an important class of graphs, planar graphs, Bipartite graphs, Spanning trees and their properties.

CO3 Discussion of Euler's Theorem related to Euler graphs, Directed graphs and certain other advanced concepts of trees.

CO4 Finite state machines and related concepts and their various kinds understanding.

CO5 Grammar, Languages and their construction derivations etc. with their various type and certain advanced concepts.

COs of the course **"Optimization Techniques-II" (M-I)**

CO1 Explain the fundamental knowledge of non linear programming and

	dynamic programming problems. CO2 Uses of classical optimization techniques. CO3 Describes the basics of different evolutionary algorithms. CO4 Analyse and appreciate variety of performance measure for various optimization problems. CO5 Understand the different methods of optimization and be able to suggest a technique for a specific problem. **COs** of the course **"Mathematical Theory of Statistics-II" (M-IV)** CO1 Describe Chi square and t distribution with properties and applications. CO2 Understand F distribution with properties and applications. CO3 Understand basic concepts of estimation, criterion of good estimators, consistency, efficiency, sufficiency and untiaseelness. CO4 Discuss the method of maximum Likelihood estimator and its properties and find M.L.E. for binomial, Poisson and Normal populations. CO5 Discuss testing of hypothesis, error Neyman Pearson Lemma and its applications.

	COs of the course **"Integral Transform" (Sem-IV)** CO1 Understand the concept of Laplace transform and study its applications in finding solution of differential equations. CO2 Study the concept of Fourier transform and its applications. CO3 Discuss the application of Mellin transform. CO4 Study the Henkel transform with elementary property and its applications.

ABST
Cri-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

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2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.Com(ABST) Semester		19	10	08	08	07	94	12	06	05	00	02
MFC		15	06	05	04	-	15	09	03	-	-	-
Certification Programmes		No Limit										

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)

(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Prof .ShurveerS.Bhanawat	ABRPB7202M	Professor	Accountancy and Business Statistics	Permanent	2012	26	Yes
Dr.ShilpaVardia	AGBPV5939Q	Assistant Professor	Accountancy and Business Statistics	Permanent	2012	9	Yes
Dr.ShilpaLodha	ACBPL1536B	Assistant Professor	Accountancy and Business Statistics	Permanent	2018	3	Yes
Dr.Asha Sharma	ARZPS3844A	Assistant Professor	Accountancy and Business Statistics	Permanent	2018	9+3	Yes
Dr.ParulDashora	AXVPD2064R	Assistant Professor	Accountancy and Business Statistics	Permanent	2018	3	Yes
Sh. PushprajMeena	BQUPM6866M	Assistant Professor	Accountancy and Business Statistics	Permanent	2018	3	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function

2.Commendation and medal at a University function

3. Certificate of honor

4.Announcement in the Newsletter / website

(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Prof. Shurveer S Bhanawat	2020	ABRPB7202M	Professor	ICAI International Research Award 2020	ICAI, New Delhi	Received Certificate Only	
Dr. ShilpaVardia	2020	AGBPV5939Q	Assistant Prof.	ICAI International Research Award 2020	ICAI		
`Dr. ShilpaLodha	2020	ACBPL1536B	Assistant Prof.	ICAI International Research Award 2020	ICAI		

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

M Com (ABST)

Specific outcome of this post graduate program is to enrich the students with advanced knowledge of contemporary theory of accounting, auditing and taxation. Besides, the program focuses on enriching the student with the knowledge and skill of research tools and techniques. In all, the envisaged outcome is to prepare a future academician and researcher in the subject.

MFC:

This post-graduate programme is intended to equip the student with practical knowledge of accounting, finance and quantitative analysis. Outcome envisaged is to prepare a finance professional to work at supervisory level..

ndergraduate vocational program is focused on giving practical exposure to the students of accounting skills related with financial cost and Management Accounting, auditing taxation and quantitative analysis related with business. This course specifically envisages employability of he students in respective areas

PGDIT

This is a part time postgraduate skill-based diploma programme which focuses on imparting knowledge and skills related with taxation. Specific outcome envisaged of this program is to prepare employable postgraduates in the arena of taxation profession.

Certification Courses

These are skill based programmes which have been launches specially for those who have knowledge and experience of particular subject but not specific degree. These programmes helps a candidate to get skilled practically in different areas of accounting, taxation and business tatistics. The basic outcome of these programmes is that it enables a candidate to start his or her business in such areas or one can work as tax consultant or accountant or office assistant through theses certificate courses.

Master of Vocation (Accounting, Taxation, Auditing):

Postgraduate vocational program is focused on giving practical exposure to the students of accounting skills related with Business Practical Accounting, Financial Statement Analysis, Business Analysis, SAP Accounting, Advanced MS Excel, Stock market trading and quantitative nalysis related with business. This course specifically envisages employability of the students in respective areas.

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency as defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other reas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the

BBE
C-2

BBE

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2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.com		19	10	8	6	7	47	23	10	8	4	2
MIB		22	8	4	6		19	15	2			2

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)

(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Prof. P.K. Singh	ADGPS3427E	Professor	Dept. of Banking and	Permanent	1991	30	Yes

HEAD
Dept. of Banking Business Economics
UCCMS, MLSU
Udaipur

			business economics				
Prof. Mukesh mathur	ADAPN3052H	Professor	Dept. of Banking and business economics	Permanent	1991	30	Yes
Dr. Shalendra singh rao	ALCPR5397Q	Assistant Professor	Dept. of Banking and business economics	Permanent	2018	3.5	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &3.4.2 The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website

(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Nil	Nil						

HEAD
Dept. of Banking Business Economics
UCCMS, MLSU
Udaipur

Programme Outcomes:

1. Outcome of M. Com: - To provide specialized knowledge of the banking and business economics to cater the need of banking and industry and prepare students for teaching positions in higher education institutions.

2. Outcome of MIB: - To equip students with the specialized skills of international business specifically focusing on export-import procedure and documentation to provide specialized teaching of world economic environment and opportunities of international trade.

3.Outcome of MBI: - To accompany students with the working knowledge of banking and insurance sector and equip them with the required skills to get employment in the sector.

HEAD
Dept. of Banking Business Economics
CCMS, MLSU
Udaipur

Dept. - Botany C-2

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2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.Sc. CBCS Botany		24	12	08	06	-	264	91	72	44	57	-

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)

(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Dr. G. S. Deora	ABKPD6955H	Associate Professor	Botany	Permanent	2018	25	Yes
Dr. Vineet Soni	BFAPS3974K	Associate Professor	Botany	Permanent	2018	14	Yes
Dr. Rohini Trivedi	AFOPT7286A	Assistant Professor	Botany	Permanent	2012	9	Yes
Dr. Jaya Arora	AMCPA0432E	Assistant Professor	Botany	Permanent	2012	12	Yes
Dr. Harish	ADPPH7245E	Assistant Professor	Botany	Permanent	2012	17	Yes
Dr. Kuldeep Sharma	BWNPS2504R	Assistant Professor	Botany	Permanent	2018	7	Yes
Dr. Amit Gupta	APHPG3933Q	Assistant Professor	Botany	Permanent	2018	7	Yes
Dr. Tripta Jain	AOPPJ7044E	Assistant Professor	Botany	Permanent	2018	10	Yes
Dr. Mukesh Meena	BQIPM9484M	Assistant Professor	Botany	Permanent	2018	3	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Dr. Vineet Soni National Level	2020	BFAPS3974K	Associate Professor	Outstanding Scientist Award	VDGOODS Professional Association, India	NIL	Photocopy attached
Dr. Vineet Soni National Level	2021	BFAPS3974K	Associate Professor	Fellow of Academy of Plant Sciences, India	Academy of Plant Sciences, India	NIL	Photocopy attached
Dr.Mukesh Meena National Level	2020	BQIPM9484M	Assistant Professor	Young Scientist Award	International Scientist Awards on Engineering, Science, and Medicine, Chennai, India in 2020.		
Dr.Mukesh Meena	2020	BQI	Assistant	InSc Research	Institute of		https://w

National Level		PM 948 4M	Professor	Excellence Award (REA)	Scholars, Department of Awards, Bengaluru, Karnataka, India in 2020		ww.insc.in/awards/singleinfo.php?tid=3268
Dr.Mukesh Meena **National Level**	2020	BQI PM 948 4M	Assistant Professor	InSc Young Researcher Award (YRA)	Institute of Scholars, Department of Awards, Bengaluru, Karnataka, India in 2020		https://www.insc.in/awards/singleinfo.php?tid=3268

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

PROGRAM OUTCOMES FOR M.Sc. BOTANY (CBCS)

Plant sciences is now an amalgamation of basic and applied science. Plants besides being the unique capability of plants to trap solar energy and provide food to all cannot be replicated by any system. Conventional studies like plant identification is now being supplemented with molecular techniques like DNA Barcoding. The courses have been designed to benefit all Botany students to study various aspects of plant science including its practical applications. Keeping in mind that these students can take up teaching at different levels, research work in research institutes and or industry, doctoral work, environment impact assessment, biodiversity studies, entrepreneurship, scientific writing relevant topics have been included in the curriculum. Students would be benefited with knowledge of core subjects like plant diversity, physiology and biochemistry, molecular cytogenetics and application of statistics etc. which are offered in these subjects modules on analytical techniques, plant tissue culture and phytochemistry would make them obtain skills in doing research. All the courses in the programme are carefully designed to equip the students for competitive exams like CSIR NET, SET etc. and to write research proposals for grants.

PO1	Understanding the classification of plants from cryptogams to Spermatophyte. Identification of the flora in field. Study of biodiversity in relation to habitat correlate with climate change, land and forest degradation. Application of Botany in agriculture through study of plant pathology. Palaeobotany to trace the evolution of plants.
PO2	Understand the ultrastructure and function of cell membranes, cell communications, signaling, genetics, anatomy, taxonomy, ecology and plant physiology and biochemistry.

PO3	Molecular and Physiological adaptations in plants in response to biotic and abiotic stress. Genes responsible for stress tolerance genetic engineering of plants
PO4	To understand the multi functionality of plant cells in production of fine chemicals. There wide spread industrial applications.

Overall development

After completion of this course, it will educate students about plant science and inculcate strong fundamentals on modern and classical aspects of Botany, build life skills in Edible mushroom cultivation, Biofertilizer production, Greenhouse maintenance and Seed technology through value-added courses and create platform for higher studies in Botany and facilitate students to take-up successful career in Botany.Maintain a high level of scientific excellence in botanical research with specific emphasis on the role of plants. Create, select and apply appropriate techniques, resources and modern technology in multidisciplinary way. Practice of subject with knowledge to design experiments, analyse and interpret data to reach to an effective conclusion.

They would identify, formulate and analyse the complex problems with reaching a substantiated conclusion. Logical thinking with application of biological, physical and chemical sciences. Learning that develops analytical and integrative problem-solving approaches. Best problem-solving skills in students would encourage them to carry out innovative research projects thereby making them to use knowledge creation in depth.

M1BOT01-CT01	BIOLOGY AND DIVERSITY OF ALGAE AND BRYOPHYTES

Course Outcomes
After completion of this course, students will be able to
CO1: Learn criteria of classification, diversity, life form, reproduction, phylogeny, nutritional and economic importance of the plants.
CO2: Develop critical understanding on morphology, anatomy and reproduction.
CO3: Develop proficiency in the experimental technique and methods of appropriate analysis of plant of these groups.
CO4: Explore many unexplored plants for the economic benefits of human like medicine, biofertilizers and other uses because Rajasthan have diversified climatic condition.
CO5: Understand plant origin, evolution and their transition to land habitat because algae and bryophytes are one of the basics of botany.

M1BOT02-CT02	MICROBIOLOGY, MYCOLOGY AND PLANT PATHOLOGY

Course Outcomes
After completion of this course, students will be able to
CO1: Understand the general characteristic of archaebacteria and eubacteria
CO2: Develop a good knowledge of characteristics of different microorganisms and their significance.
CO3: Understand common characteristics of different classes of fungi with their economic and ecological importance.
CO4: Identify plant diseases ant their control measures.
CO5: Develop skill to perform basic experiments to grow and study vegetative and reproductive structure of microorganism in laboratory.

M1BOT03-CT03	CYTOGENETICS, GENETICS AND PLANT BREEDING

Course Outcomes
After completion of this course, students will be able to
CO1: To develop conceptual understanding of chromosomes, law of inheritance, genetic basis of loci, alleles and their linkage.
CO2: Comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders and study of chromosomal basis of inheritance.
CO3: Develop critical understanding of chemical basis of genes and their interactions at population and evolutionary level.
CO4: Develop conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool.
CO5: Learning the methods of crop improvement along with development of mapping population in plants, QTL mapping, and molecular marker assisted breeding.

M1BOT04-CT04	PLANT ECOLOGY, CONSERVATION AND EVOLUTION

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the concept of population ecology and population genetics.

CO2: Learn about community structure and interaction.

CO3: Have knowledge of ecosystem functioning and global pollution phenomenon.

CO4: Understand concept of biodiversity and conservation strategies.

CO5: Conceptualize the phenomenon of evolution and speciation.

M2BOT01-CT05	PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand about the evolution of stellar system and heterospory.

CO2: Gain knowledge about the general character and classification of pteridophytes.

CO3: Understand about the general character of gymnosperms.

CO4: Learn about evolutionary relationship of Cycadopsida, Coniferopsida, Gnetopsida, Coniferales

CO5: Understand about the basic principle of paleobotany and know about prominent scientist.

M2BOT02-CT06	PLANT DEVELOPMENTAL BIOLOGY AND RESOURCE UTILIZATION

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about the organization of meristem and vascular tissue differentiation

CO2: Understand about the anatomical structure of stem and roots and learn the genetic and molecular aspects of flower development.

CO3: Understand the structure of anther and pollen wall because ultrastructure of pollen grain plays an important role in taxonomy.Evaluate the special structures and types of male and female gametophyte and learn the reproductive process in angiospermic plants.

CO4: Understand the mechanism of pollination and fertilization and can relate between embryo, endosperm and seed.Comprehend the causes of polyembryony and apomixis with its classification.

CO5: Learn about the ethnobotanical practices and economic importance of plants. Increase an awareness and appreciation of plants and plant products encountered in everyday life of human use

M2BOT03-CT07	CELL AND MOLECULAR BIOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the structure and function of cell organelle at ultrastructure level

CO2: Explore molecular level regulation of cell cycle and cancer.

CO3: Understand the nucleic acid structure, replication and transcription mechanism

CO4: Develop the knowledge of functioning of protein synthesis machinery

CO5: Learn the gene regulation mechanism and basic techniques of genomics and proteomics

M2BOT04-CT08	PLANT GROWTH AND DEVELOPMENT

Course Outcomes

CO1: Students will be able to understand the plant-water relationship and various mechanisms of active and passive transportation of molecules across the living membranes.

CO2: Students will be able to understand the importance of micro and macro-nutrients on plant growth and development. They will also understand the various factors controlling seed development and germination.

CO3: Students will be skilled theoretically about the biosynthesis and physiological effects of various plant growth regulators.

CO4: Students will learn about the importance of photoperiods and role of various photoreceptprs in flowering.

CO5: Students will learn various mechanisms of signal transduction in plants.

M3BOT01-CT09	PLANT BIOCHEMISTRY AND PHYSIOLOGY

Course Outcomes

CO1: Students will be able to understand the principles of the thermodynamics. They will also learn about the classification, structure and functions of various biomolecules.

CO2: Students will understand the mode of action of enzymes in detail. They will also understand the mechanism of nitrogen fixation in detail.

CO3: Students will be skilled theoretically about the mechanism of photosynthesis in C3, C4 and CAM plants.

CO4: Students will understand the various pathways of respiration and the mechanism of ATP biosynthesis in mitochondria.

CO5: Students will study the plant responses to various biotic and abiotic stresses.

M3BOT02-CT10	PLANT SYSTEMATICS

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the theory and practices of describing, naming, classifying and preparing herbarium of plants because such work is essential for understanding of biodiversity and its conservation including nomenclature, principles and evolutionary trends in taxonomy.

CO2: Assess terms and concepts related to taxonomy of plants and systems of classification and generalize the characters of the families according to various proposed systems of classification.

CO3: Learn about the various terminology used for description of flower characteristics and plant species

CO4: Understand the diagnostic features of various angiosperm families

CO5: Gain knowledge about role of various discipline in serving as evidence for taxonomic purpose.

M4BOT01-CT11	PLANT TISSUE CULTURE AND GENETIC ENGINEERING

Course Outcomes

CO1: Students will be able to understand the hormonal regulation of morphogenesis *in vitro* in plants..

CO2: Students will understand the various techniques of protoplast isolation and somatic hybridization. They will also understand the development of variations in somatic cells during *in vitro* conditions.

CO3: Students will learn modern tools and techniques of plant genetic engineering.

CO4: Students will able to understand the various methods of plant transformation. They will also study the importance of genetic modified plants in detail.

CO5: Students will learn various applications of plant genetic engineering. They will also learn various issues and processes of patenting in plant biotechnology.

M4BOT02-CT12	TOOLS AND TECHNIQUES IN PLANT SCIENCES

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the basic principle of microscopy, centrifugation and electrophoresis

CO2: Explore chromatography and spectrophotometry techniques.

CO3: Understand the basic principle of bioinformatics

CO4: Develop the knowledge of central tendency and dispersion

CO5: Learn the application of correlation, regression and analysis of variance

M3BOT03-ET01-A	BIOSYSTEMATICS–I

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the basic principle of taxonomic classification.
CO2: Develop the knowledge of rules related with nomenclature.
CO3: Understand the basic principles of botanical nomenclature.
CO4: Gain the knowledge related with pioneer classification of plants.
CO5: Learn about the evolutionary history of angiosperms.

M4BOT03-ET03-A	BIOSYSTEMATICS–II

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the method of plant collection and preservation of samples.
CO2: Learn about the documentation of taxonomic literature.
CO3: Assess the concept of evolution of characters and their application in taxonomy
CO4: Gain the knowledge of current advancement in plant taxonomy
CO5: Explore evolutionary history of angiosperm

M3BOT03-ET01-B	PRINCIPLES OF PATHOLOGY AND PLANT DISEASES

Course Outcomes

After completion of this course, students will be able to

CO1: Apply the conceptual and the practical training to differentiate between a healthy and disease plant in field.
CO2: Isolation and Identification of plant pathogen.
CO3: To ascertain the cause of the disease by Koch's Postulates.
CO4: To Know the source, symptoms and etiology of diseases of major concern.
CO5: To know about Disease forecasting

M4BOT03-ET03-B	MOLECULAR PLANT PATHOLOGY AND DISEASE MANAGEMENT

Course Outcomes

After completion of this course, students will be able to

CO1: Plant disease diagnosis by serological and molecular methods.

CO2: To learn the application of information technology and bioinformatics in plant pathology.

CO3: To have a brief idea about GIS and Remote sensing techniques in plant pathology.

CO4: To know about institute of repute of plant pathology in India and Abroad.

CO5: Learn about integrated pest management to reduce the risk of use of chemical agents for control

M3BOT03-ET01-C	BIOLOGY AND EVOLUTION IN BRYOPHYTES-I

Course Outcomes

After completion of this course, students will be able to

CO1: Develop critical understanding on characterization, reproduction, evolution of gametophytes and sporophytes of bryophytes.

CO2: Understand the comparative knowledge of Hepaticopsida, Anthocerotopsida, Bryopsida.

CO3: Recall and recognize the contributions of legends of bryology such as S.R. Kashyap, P.N. Mehra, S.K. Pande and Ram Udar along with the understanding of morphology and germination of spores.

CO4: Understand the mechanism of protonemal differentiation and bud formation and can relate the factors affecting physiology of reproduction.

CO5: Explore micro techniques used in bryological study and understand the economic importance of this ignored group of plants.

M4BOT03-ET03-C	BIOLOGY AND EVOLUTION IN BRYOPHYTES-II

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about the various life cycle pathway of bryophytes.

CO2: Gain knowledge about photomorphogenesis of liverworts and mosses.

CO3: Understandrole of bryophytes as indicator species.

CO4: Explore the conduction mechanism in the bryophytes.

CO5: Study the importance of model bryophytes for scientific research.

M3BOT03-ET01-D	RESTORATION ECOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand about role of habitat in species conservation.

CO2: Gain knowledge about the ecosystem functioning in disturbed ecosystem.

CO3: Develop basic understanding of restoration ecology

CO4: Learn about the case studies of restoration of degraded ecosystem.

CO5: Understand about role of biotechnology in solving the environmental problems.

M4BOT03-ET03-D	CONSERVATION BIOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand the population dynamics for conservation purpose

CO2: Learn about the life history pattern

CO3: Basic principles of conservation genetics

CO4: Gain knowledge about genetic differentiation, geneflow and molecular variance

CO5: Skilled about conservation genetics using study of some case studies

M3BOT04-ET02-A	PLANT BIOENERGETICS AND APPLIED BIOCHEMISTRY

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about the bioenergetics of photosynthesis

CO2: Gain knowledge about various fluorescence parameters

CO3: Understand metabolism related with carbohydrate and fatty acid

CO4: Understand biosynthetic pathway of amino acids

CO5: Learn about concept of stress physiology

M4BOT04-ET04-A	SECONDARY METABOLITES AND BIOPROCESS ENGINEERING

Course Outcomes

After completion of this course, students will be able to

CO1: Understand different types of secondary metabolites and Knowledge generation of medicinal plants and various bioactive molecules

CO2: Study basic pathway for production of secondary metabolites and Standardization of isolation and extraction protocols of Secondary metabolites

CO3: Learn about different types of bioreactors and concept of bioprocess engineering and Scale up production of Secondary metabolites

CO4: Understand role of culture system in production of important drugs. Drug discoveries from medicinal plants.

CO5: Learning of genetic engineering tools for heterologous expression of genes to enhance secondary metabolite production, concept generation of functional foods and Nutraceuticals

M3BOT04-ET02-B	PRINCIPLES OF MICROBIAL TECHNOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about principles of fermentation technology, types of bioreactors and bioprocess parameters

CO2: Understand the overall fermentation process

CO3: Learn about strain selection and their improvement from the point of industry

CO4: Gain knowledge about the downstream processing

CO5: Develop the understanding of aerobic and anaerobic fermentation technology

M4BOT04-ET04-B	APPLICATIONS OF MICROBIAL TECHNOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand role of microorganism in agriculture.

CO2: Gain knowledge about the application of microbes in environmental studies

CO3: Learn about microbial degradation of pesticides and toxic chemicals

CO4: Understand the role of micro-organisms in food industry

CO5: Assess the role of microbes in preservation technology

M3BOT04-ET02-C	ADVANCED PHYCOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about the different types of culture media used for algal culture

CO2: Gain knowledge about the molecular systematics of algae

CO3: Understand molecular mechanisms of photodamage and photoprotection

CO4: Learn about pigments of algae for photosynthesis

CO5: Understand the role of toxins in algal blooms and their ecological implications

M4BOT04-ET04-C	APPLIED PHYCOLOGY

Course Outcomes

After completion of this course, students will be able to

CO1: Understand application of algae for biodiesel production

CO2: Learn about the high value by-products of bioprocess engineering

CO3: Understand the role of algae in nanoparticle synthesis and nanoecotoxicology

CO4: Gain knowledge about role of algae in bioremediation

CO5: Understand the genetic engineering of algae

M3BOT04-ET02-D	APPLIED PLANT SCIENCES

Course Outcomes

Overall, the paper has been designed to inculcate the basic and applied knowledge and skill enhancement with a view of entrepreneurship, self-employment and livelihood security among PG students of plant sciences.After completion of this course, students will be able to

CO1: To make the students aware about organic farming, biofertilizers and sustainable agriculture package and practices for productivity enhancement.

CO2: To learn different nursery and gardening techniques.

CO3: To get the knowledge and scope of landscape gardening and cultivation of flowers of commerce.

CO4: To make them aware about the pest and pathogens of plants of ornamental and floriculture value.

CO5: To get them aware about the Intellectual Property Rights, Copyrights and how to draw a patent for biological specimens/ processes, etc.

M4BOT04-ET04-D	COMMERCIALIZATION OF MICROPROPAGATION TECHNOLOGIES

Course Outcomes

After completion of this course, students will be able to

CO1: Learn about the micropropagation technology

CO2: Commercialization of micropropagation technique

CO3: Understand about greenhouse technology

CO4: Understand application of micropropagation technology for commercialization of important groups of plants

CO5: Understand the industrial scale setup based on micropropagation

Bus. Ad.
C-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

Dept. of Business Administration, UCCMS

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.COM		19	10	8	6	7		26	10	2	0	1
MHRM		11	7	5	4	3	34	15	10	1	0	1

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)
(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Pro. Rajeshwari Narendran	ABCPN9966B	Professor	Busiadm.	Permanent	1997	25 years	Yes

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Udaipur (Rajasthan), India

Pro. Manju Baghmar	ACKPB7721M	Professor	Busiadm.	Permanent	1997	25 Years	Yes
Pro. B.L Verma	AA5PV8378A	Professor	Busiadm.	Permanent	1997	25 years	Yes
Dr. Devendra Shrimali	BQHPS7092E	Asst. Professor	Busiadm.	Permanent	2018	4 years	Yes
Dr. Sachin Gupta	AUBPG5693E	Asst. Professor	Busiadm.	Permanent	2018	4 years	Yes
Dr. Renu Sharma	CPFP55918M	Asst. Professor	Busiadm.	Permanent	2018	4 years	Yes
Dr. Vinod Kumar Meena	BBHPM9739B	Asst. Professor	Busiadm.	Permanent	2018	4 Years	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &3.4.2 The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website

(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents

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Not Applicable

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

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Program	**M.COM (Business Admn.)**
Credits	
ISO Certification	NA
Programme Outcomes	M.Com is two year full time post-graduate degree programme. To keep conformity with the requirements of Choice Based Credit System, provisions have been made for Core Courses, Skill Enhancement Courses and Discipline Specific Elective Courses; this is based on a cafeteria approach to choosing dual specialization The sixteen core courses have been enumerated to be offered in Semester I and Semester II; i.e., eight core courses are to be taught in each semester. The students will also have four skill enhancement courses in the 3rd and 4th Semesters. They will have the opportunity of selecting 10 subject specific elective courses to pursue dual specialization for their future career Program Outcome 1. Fundamental knowledge in different functional

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areas of management, managerial principles, economic theory and quantitative techniques of decision-making like Statistics and Operations Research are imbibed by the students. Program Outcome 2. Managerial skill of the students are developed by adopting practical approaches such as case study, business games, assignment writing and application of digital technology Program Outcome 3. Students get adequate exposure to operational procedures in Finance, Marketing, HRD, Banking, Insurance, Accounting, Taxation, International Business and Operations Management. Program Outcome 4. Students are equipped with dual specialization such a combination of Finance and Marketing or Finance and Human Resource Development or Marketing and HRD so as to make them useful human resources to cater to multiple tasking demands in industry . Program Outcome 5. Students interested in pursuing academic

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careers acquire the ability to bond with their specializations and come up with primary ideas of research to be carried in their respective fields. Programme Specific Outcomes

PSO-1 - Students develop the ability to comprehend and imbibe core and functional management concepts, business environment and domain specific knowledge. 2

PSO-2 - Equip the students with requisite knowledge, skills and right attitude necessary to provide effective leadership in a global environment.

PSO-3 - Develop competent management professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Indian Economy and Society, aligned with the national priorities.

PSO-4 - Develop skills for analysing of the business data, application of relevant analysis, and problem solving in other functional areas such as marketing, finance, business strategy

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and human resources etc.

PSO-5 - Develop attributes for research in academics and applied research for industry .

Program	MHRM
Credits	
ISO	NA
Program Outcomes	PO1 :- To understand human resource issues and management trends in a competitive global economy as well as a broad spectrum of state and federal employment legislation. PO2:- To equip students with the tools necessary to effectively meet the challenges of an ever-changing business climate. PO3:- To inculcate specialized knowledge and skills required by managers who are responsible primarily of managing human resources and improving industrial relations PO4 :- To develop a sound theoretical base in the domain of Human Resource Management. PO5:- To develop communication, interpersonal skills and leadership qualities to work in and with teams in organizations.
Program Specific Outcomes	PSO1:- Understand the basic concepts of Human resources management and its applications in the individual, team and

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organizational levels

PSO2 :- Theoretical Knowledge in Enterprise Resource Planning, Innovation and Change Management, Organisational Behavior, Labour Laws, Knowlegde and Talent Management, Marketing Management, MIS etc.

PSO3:- Practical knowledge and training in various areas of HR such a recruitment, selection, induction, communication, peformance appraisal, stress etc

PSO4 :- Practical exposure to the real life organizational situations and opportunities of Human resources management through the two practical project studies Internship and a Problem centered study

criteria 2.
Comp. Sc.

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
2 year MCA degree programme	MCA(CBCS)	36	9	7	6	2		28	22	04	02	3
BCA	BCA(CBCS)							101	52	8	2	6
MSc.IT	MSc.IT(CBCS)	12	7	6	4	6		9	4	2	1	1

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)
(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution

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UDAIPUR (Raj.)

Prof. Manoj Kumar Jain	ABJPJ2518A	Professor	Computer Science	Permanent	1993	28Yrs	Yes
Dr. Avinash Panwar	AIYPP3047J	Associate Professor	Computer Science	Permanent	2018	3 yrs	Yes
Mrs. Deepti Shrimal	BAWPS7998J	Assistant Professor	Computer Science	Permanent	2018	3 yrs	Yes
Mr. Mohit Gokhroo	AZMPG2970L	Assistant Professor	Computer Science	Permanent	2018	3 yrs	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
—							

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Department of Computer Science
M.L. Sukhadia University
UDAIPUR (Raj.)

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

Annexure 2.6.1 → Annexure 1, 2, 3

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

Sample for

Credits	1 Theory period of one hour per week over a semester
	1 Tutorial period of one hour per week over a semester
	1 Practical period of two hour per week over a semester
ISO Certification	ISO 9001:2015 implementations help to manage the resources effectively, as you will be able to utilise all your resources to its

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2.6.1. Annexure I

BCA (PSO)

BACHELOR OF COMPUTER APPLICATION (CBCS based BCA semester)

PROGRAMME SPECIFIC OUTCOMES:

BCA programme has been designed to prepare graduates for attaining the following specific outcomes

PSO1: An ability to apply knowledge of mathematics, computer science and management in practice

PSO2: An ability to enhance not only comprehensive understanding of the theory but its application use in diverse field

PSO3: The program prepares the students for a range of computer applications, computer organization, computer networking, software engineering, Web Designing etc.

PSO4: An ability to design a computing system to meet desired needs within realistic constraints with positive attitude

PSO5: Effective communication and presentation skill

PSO6: To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications.

PSO7: Analyze and synthesis computing systems through quantitative and qualitative techniques.

PSO8: Accept cross cultural, social, professional, legal and ethical issues prevailing in local and global industry.

PSO9: Prepare the learners to get placed in reputed organizations.

BCA Semester – I

Paper-I (BCA-S101)

Introduction to Information Technology & PC Packages

COURSE OUTCOMES

1. Operating Computer using GUI Based Operating System
2. Basic understanding of computer hardware, software and computer languages
3. Understanding of Memory hierarchy

4. Understanding Word Processing, Spread Sheet, Data base package
5. Introduction to latest technologies and terms related to Internet, WWW and web browsers
6. Making small presentation for business needs
7. Financial Literacy for banking Applications

Paper-II (BCA-S102)

Business Communication

COURSE OUTCOMES

1. To provide an overview of Prerequisites to Business Communication
2. Imparting the correct practices of the strategies of Effective Business writing.
3. To understand and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation
4. To understand the importance of specifying audience and purpose and to select appropriate communication choices
5. To understand and appropriately apply modes of expression
6. To participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding

Paper-III (BCA-S103)

Problem solving through C

COURSE OUTCOMES

1. Learn a logic which helps in solving common types of computing problems
2. Learn data types and control structures of C
3. Learn to write good portable C programs
4. Analyze a given problem and develop an algorithm to solve the problem
5. Learn different types of programming approach like top down and bottom up

Paper-IV (BCA-S104)

Computer Organization

COURSE OUTCOMES

1. Ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
2. Understanding the functions of various hardware components and their building blocks
3. An ability to understand and appreciate Boolean algebraic expressions to digital design
4. In depth understanding of sequential/ Combinational circuits, sequential circuits etc.
5. Ability to understand memory hierarchy and design of primary memory

Paper-V (BCA-S105)

Practical-I: C Programming Lab

COURSE OUTCOMES

1. Read, understand and trace the execution of programs written in C language
2. Declaration of variables and constants
3. Understand operators, expressions and preprocessors
4. Understand array and it's declaration and uses.
5. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor
6. Write programs that perform operations using derived data types.

Paper-VI (BCA-S106)

Practical-II ICT & PC Software Lab

Paper-VI (BCA-S107) Language Lab

BCA Semester – II

Paper-I (BCA-S201)

Computer Architecture

COURSE OUTCOMES

1. Explain the organization of basic computer, its design and the design of control unit
2. Demonstrate the working of central processing unit and RISC and CISC Architecture
3. Describe the operations and language f the register transfer, micro operations and input-output organization
4. Understand the organization of memory and memory management hardware
5. Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization

Paper-II (BCA-S202)

Basic Physics

1. Importance of Mathematics and Physics in ICT
2. Brief understanding of telescope, microscope and eye pieces.
3. Concept of Potential and field due to a charge, Gauss's law, energy stored in condenser, series and parallel combination of capacitances, types of capacitances used in electronic circuits.
4. Learn the concept of Electric current, Ohm's law, and types of resistances
5. Able to understand thermoelectric effect and thermocouples
6. Learn about AC Circuits, semiconductor, transistors
7. Brief idea of working and uses of Cathode ray Oscilloscope. Working principle of LCD

Paper-III (BCA-S203)

Basic Mathematics-II

1. Understand the basic principles of sets and operations in sets
2. Prove basic set equalities
3. Apply counting principles to determine probabilities

4. Demonstrate an understanding of relations and functions and be able to determine their properties.

5. Use of truth tables for expressions involving the following logical connectives: negation, conjunction, disjunction, conditional.

6. Define and use the terms: proposition (statement), converse, inverse, contra positive, tautology, and contradiction.

Paper-IV (BCA-S204)

Object oriented programming using C++

COURSE OUTCOMES

1. Understand the concepts of objects and classes in real world.
2. Able to create program to demonstrate the implementation of constructors, destructors and operator overloading.
3. Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
4. Understand templates, file handling etc.

Paper-V (BCA-S205)

Object oriented Programming Lab

COURSE OUTCOMES

1. Apply object oriented programming concepts in designing programs.
2. Analyze different dimensions of a problem and provide solutions.
3. Apply the advance features of Oops language such as exception handling, file handling etc to build small window based projects.

Paper-VI (BCA-S206)

Microprocessor Lab

COURSE OUTCOMES

1. Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors.
2. Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.
3. Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and 8255.
4. Demonstrate programming using the various addressing modes and instruction set of 8085 microprocessor.
5. Design structured, well commented, understandable assembly language programs to provide solutions to real world control problems.

Paper-VII (BCA-S207)

Communication Skill Lab

1. Understand the role of communication.
2. Awareness of appropriate communication strategies.
3. Prepare and present messages with a specific intent.
4. Able to enhance communication skills.

BCA Semester – III

Paper-I (BCAS301)

Database Management

COURSE OUTCOMES

1. Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
2. Identify basic database storage structures and access techniques such as file organizations, indexing methods including B+tree, and hashing.
3. Learn and apply structured query language (SQL) for database definition and database manipulation.
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5. Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.

Paper-II (BCA-S302)

Data Structure

COURSE OUTCOMES

1. Know what is data structure and basic algorithmic notations.
2. Analyze the time and space requirement of any algorithm.
3. Understand different linear data structures for conversion of mathematical expressions and polynomial representations.
4. Know the file structures.

Paper-III (BCA-S303)

Computer Communication and Networks

COURSE OUTCOMES

1. Understand computer network basics, network architecture, TCP/IP and OSI reference models.
2. Identify and understand various techniques and modes of transmission.
3. Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN.
4. Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme.
5. Discuss the elements and protocols of transport layer.
6. Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS.

Paper-IV (BCA-S304A or BCA -S304B)

A. Business organization and Management

COURSE OUTCOMES

1. Understand the concepts related to Business.
2. Demonstrate the roles, skills and functions of management.
3. Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
4. Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.

B. Numerical & Statistical Computing

COURSE OUTCOMES

1. Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis.
2. Critically evaluate the underlying assumptions of analysis tools.
3. Understand and critically discuss the issues surrounding sampling and significance.
4. Discuss critically the uses and limitations of statistical analysis.

5. Solve a range of problems using the techniques covered.

6. Conduct basic statistical analysis of data.

Paper-V (BCA-S305)

Data Structure Lab

COURSE OUTCOMES

1. Demonstrate familiarity with major algorithms and data structures.

2. Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.

3. Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.

4. Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.

5. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

Paper-VI (BCA-S306)

DBMS Lab

COURSE OUTCOMES

1. Implement Basic DDL, DML and DCL commands
2. Understand Data selection and operators used in queries and restrict data retrieval and control the display order
3. Write sub queries and understand their purpose
4. Use Aggregate and group functions to summarize data
5. Join multiple tables using different types of joins
6. Understand the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc

Paper-VII (BCA -S307A or BCA -S307B)

A. Web Design

COURSE OUTCOMES

1. Discuss the insights of internet programming and implement complete application over the web
2. Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet
3. Utilize the concepts of JavaScript and Java
4. Use web application development software tools i.e. Apex, PHP and XML etc. and identify the environments currently available on the market to design web sites

B. Desk Top Publishing

COURSE OUTCOMES

1. Use Adobe in Design to create personal and/or business publications following current professional and/or industry standards
2. Use critical thinking skills to independently design and create publications
3. Create supporting pages for multi-page documents, such as index or table of contents
4. Use color appropriately and effectively
5. Create and use template documents
6. Prepare & package documents for professional printing or exporting

BCA Semester – IV

Paper-I (BCA-S401)

System Analysis & Design

COURSE OUTCOMES

1. Describe principles, concepts and practice of System Analysis and Design process
2. Explain the processes of constructing the different types of information systems
3. Apply object oriented concepts to capture a business requirements
4. Design and Develop of Information Systems in real world business environment

Paper-II (BCA-S402)

Fundamentals of operating System

COURSE OUTCOMES

1. Know about functions and services of operating system.
2. Aware about different CPU scheduling algorithms.
3. Get familiar with different memory management techniques.
4. Understand different disk and drum scheduling algorithms as well as deadlock concepts.
5. Get introductory knowledge about android operating system.

Paper-III (BCA-S403)

Java Programming

COURSE OUTCOMES

1. Explore polymorphism using Function and Operator Overloading, overriding.
2. Understand the different aspects of hierarchy of classes and their extensibility.
3. Understand the concepts of streams and files.
4. Write programs for handling runtime errors using exception.
5. Program using graphical user interface with Swing classes.
6. Handle different kinds of events generated while handling windows.
7. Create programs using menus, applets and dialog boxes.

Paper-IV (BCA- S404A / S404B)

A. Information Systems

COURSE OUTCOMES

1. Skills and competencies in information systems and operations management to contribute to an organization upon entry.
2. Command of the conceptual frameworks of information systems and operations management.
3. Knowledge of the processes of organizations and the key role that information systems play.

4. Capability and initiative to lead organizations through technological changes. Discernment of, and responsible approaches to, ethical issues in technology use by society, organizations and individuals.

B. Business Accounting

COURSE OUTCOMES

1. Enabling the students to understand the features of Shares and Debentures.
2. Develop an understanding about redemption of Shares and Debenture and its types.
3. To give an exposure to the company final accounts.
4. To provide knowledge on Goodwill.
5. Students can get an idea about internal reconstruction.

Paper-V (BCA-S405)

Java programming Lab

COURSE OUTCOMES

1. Write, compile, and execute Java programs that may include basic data types and control flow constructs using J2SE or other Integrated Development Environments (IDEs) such as Eclipse, Net Beans, and JDeveloper.
2. Write, compile and execute Java programs using object oriented class structures with parameters, constructors, and utility and calculations methods, including inheritance, test classes and exception handling.
3. Write, compile, and execute Java programs using arrays and recursion.
4. Write, compile, and execute Java programs manipulating Strings and text documents.
5. Write, compile, and execute Java programs that include GUIs and event driven programming.

Paper-VI (BCA-S406)

Operating systems Lab

COURSE OUTCOMES

1. Familiarize students with the architecture of Unix OS.
2. To provide necessary skills for developing and debugging programs in UNIX environment.

3. Appreciate the advantages of Unix OS
4. Develop and debug, C programs created on UNIX platforms
5. Use and if necessary install standard libraries.

Paper-VII (BCA-S407A / S407B) Practical Elective

A. Accounting Software Lab

1. Understand the basics of accounts and use of Tally software
2. Maintaining accounts in Tally
3. Calculation of Tax Deduction
4. Able to create Payroll Entry
5. Able to make Voucher entry

B. Networking Lab

COURSE OUTCOMES

1. Awareness about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories
2. To understand the working difference between straight cable and cross over cable
3. To use the packet tracer to simulate various networks
4. Understanding of IP address and sub netting
5. Understanding the working of different types of server like mail server, web server etc

BCA Semester – V

Paper-I (BCA-S501)

Software Engineering

COURSE OUTCOMES

1. Select and implement different software development process models
2. Extract and analyze software requirements specifications for different projects
3. Develop some basic level of software architecture/design
4. Apply standard coding practices

5. Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress
6. Identify and implement of the software metrics
7. Apply different testing and debugging techniques and analyzing their effectiveness

Paper-II (BCA-S502)

Data mining

COURSE OUTCOMES

1. Understand the data extraction and transformation techniques
2. List the association rule mining techniques and understand association mining to correlation analysis, constraint based association mining
3. Understand operational database, warehousing and multidimensional need of data base to meet industrial needs
4. Understand the components of warehousing, classification methods and clustering analysis
5. Identify and understand the Business analysis, query tools and application. Of AP etc

Paper-III BCA-S503

Web Technology

COURSE OUTCOMES

1. Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, JavaScript, VBScript, ASP, PHP and protocols in the workings of the web and web applications
2. Analyze a web project and identify its elements and attributes in comparison to traditional projects
3. Understand, analyze and create web pages using HTML, DHTML and Cascading Styles sheets
4. Understand, analyze and build dynamic web pages using JavaScript and VBScript (client side programming)
5. Understand, analyze and build web applications using PHP
6. Understand, analyze and create XML documents and XML Schema

Paper-IV BCA- S504A/ S504B

A. Network management & Security

COURSE OUTCOMES

1. Understand applications of network, network structures and protocol hierarchy
2. Aware about details of physical, data link, network and transport layer of TCP/IP network model
3. Understand about different aspects of network security like firewalls, IP security and VPNS
4. Aware about attacks and confidentiality used in cryptography
5. Understand concepts and terminology associated with SNMP and FTP
6. Appreciate network management as a typical distributed application

B. Client Server Computing

COURSE OUTCOMES

1. Understand virtualization of real environment
2. Understand and discuss the use of data base management system and data hierarchy in an organization
3. Understand, and identify software and hardware development environment as client and server respectively
4. Understand, and determine database communication in client-server environment
5. Find, learn and use client-server based software development tools
6. Understand, and determine distributed file system architecture

Paper-V (BCA-S505)

Practical-I: Data mining Lab

COURSE OUTCOMES

1. Synthesize the data mining fundamental concepts and techniques from multiple perspectives.
2. Develop skills and apply data mining tools for solving practical problems
3. Advance relevant programming skills
4. Gain experience and develop research skills by reading the data mining literature

5. Study of WEKA tool and applying data mining techniques on following data sets in ARFF file Format i e customer's data, weather forecasting data, agricultural data etc.
6. Implementation / Usage of WEKA for classification of above mentioned data set
7. Implementation of various classification algorithms like decision tree, neural networks
8. Comparison of various databases such as Oracle, Sybase
9. Comparison of various data mining tools.

Paper-VI (BCA-S506)

Practical-II Minor Project Based on Web technology

1. Identify the requirements for the real world problems.
2. Conduct a survey of several available literatures and prepare software requirement specification.
3. Study and enhance software /hardware skills.
4. Demonstrate and build the project using appropriate process model, hardware requirements, coding, emulating and testing.
5. To report and present the findings of the study conducted in the preferred domain.
6. Demonstrate an ability to work in teams and manage the conduct of the research study.

Paper-VII (BCA- S507A/ S507B)

A. Web Development Lab

COURSE OUTCOMES

1. Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, JavaScript, VBScript, ASP, PHP and protocols in the workings of the web and web applications
2. Analyze a web page and identify its elements and attributes
3. Create web pages using HTML, DHTML and Cascading Styles sheets.
4. Create dynamic web pages using JavaScript and VBScript.
5. Create interactive web applications using ASP.NET
6. Build web applications using PHP
7. Create XML documents and XML Schema.
8. Build and consume web services

B. Advanced Web Tools

1. Able to develop a dynamic webpage by the use of java script and DHTML.
2. Able to write a well formed / valid XML document.
3. Able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
4. Able to write Servlet to catch form data sent from client, process it and stores it on database.
5. Able to JSP to catch form data sent from client and store it on database.

BCA Semester – VI

Paper-I (BCA-S601)

Project

COURSE OUTCOMES

1. Demonstrate a sound technical knowledge of their selected project topic.
2. Undertake problem identification, formulation and solution.
3. Design solutions to complex problems utilizing a systems approach.
4. Communicate with team members and the community at large in written an oral forms.
5. Demonstrate the knowledge, skills and attitudes of as a professional developer.

2.6.1 Annexure 2 MCA-2 Years (PSO)

M.C.A 2-year Degree Programme

Programme Specific Objective

PSO1 Develop an ability to apply knowledge in computing discipline

PSO2 Develop ability to demonstrate team work with the ability of leadership

PSO3 Develop ability to use current technologies, skill and models for computing practices

PSO4 Develop ability to communicate ideas effectively

PSO5 Produce entrepreneurs who can develop customized solution for small to large Enterprises

PSO6 To develop students to become globally competent

PSO7 To inculcate Entrepreneurial skill among students

M.C.A. SEMESTER – I

MCA-T101 Principle of Programming Languages

Sr. No	Outcomes
CO1	To understand basic structure of Computer and perform computer arithmetic operations and understand various number system concepts
CO2	To get insight into various types of software s and types of operating systems currently available for the computer systems
CO3	To learn about basic computer networking terms with a focus on signal transmission and various types of topologies of computer networks.
CO4	Able to design a document and its processing, working with spreadsheet and creating the power point presentation with graphics. Also, able to understand basics of database management system.

MCA-T102 Operating System

Sr. No.	Outcomes
CO1	Learn about various types of OS, their design issues, feature migration and computing Environments. Multithreading models. Different
CO2	Able to identify Process and Threads concept
CO3	Able to learn CPU Scheduling, Process Synchronization, Deadlocks
CO4	Learn the concepts of Storage and Memory Management. Virtual Memory and File System
CO5	Learn the concepts of Protection, Security

MCA-T103 Database Management system

Sr. No	Outcomes
CO1	Understand basic database concepts, including the structure and Operation of the relational data model, logical database design Principles, including E-R diagrams
CO2	Impart the knowledge about relationship algebra and calculus Construct simple and advanced database queries using Structured Query Language
CO3	Able to understand different types of indexing, query execution and optimization and hashing techniques
CO4	Learn transaction concepts, serializability concurrency and locking and recovery mechanisms
CO5	Understand object oriented database concepts

MCA-T104 MIS and E-Commerce

Sr. No	Outcomes
CO1	Learn about various Need, Purpose and Objectives of Management Information Systems
CO2	Able to identify Information, Management and Decision Making & Support Systems
CO3	Able to learn about e-commerce and use of internet for it. Learn Business models for e-commerce
CO4	Identify the various Enabling technologies for e commerce and E-payment systems
CO5	Learn about E-marketing and E-security mechanisms

MCA-T105 Python programming

Sr. No	Objectives
CO1	Master the fundamentals of writing Python scripts.
CO2	Learn core Python scripting elements such as variables and flow control structures.
CO3	Discover how to work with lists and sequence data.
CO4	Write Python functions to facilitate code reuse.
CO5	Use Python to read and write files

MCA-P101 DBMS and OS lab

Sr. No	Objectives
CO1	Construct the various models in DBMS.
CO2	Able to develop E-R diagrams for any given problem domain
CO3	Construct simple and advanced database queries using Structured Query Language (SQL)
CO4	Understand need for Schema Refinement and database normalization

MCA-P102 Python programming lab

Sr. No	Outcomes
CO1	Perform the STRING operations in python.
CO2	Implementation of CLASSES and their operations in python.
CO3	Perform the FILE handling in python.
CO4	Perform the XML, Serialization and Web Services operations.

MCA-P103 Skill Course

Sr. No	Outcomes
CO1	Able to learn soft skills.
CO2	Able to participate in the group discussion and develop oratorical skills
CO3	Able to write letter and business communication skills
CO4	Resume writing and participate in extempore
CO5	Able to make presentation effective.

MCA-B101 Data Structure

Sr. No	Outcomes
CO1	Understand the concepts of algorithms and their Rate of growth, analyze its time and space complexities. Understand the concepts of linear data structures like Arrays, and Linked lists
CO2	Understand the concepts of Stack, Queues and Storage Management.
CO3	Evaluate the different forms of Trees and their Applications
CO4	Understand the concepts of non-linear data structures like graphs and Strings with their features.
CO5	Apply the concepts of different types of searching and sorting algorithms with their applications.

MCA-B102 Basic Mathematic

Sr. No.	Objectives
CO1	Be able to apply problem-solving and logical skills.
CO2	Have a deeper understanding of mathematical theory.
CO3	Have a solid knowledge of elementary statistics.
CO4	Be able to communicate mathematical/logical ideas in writing.

M.C.A. SEMESTER II

MCA-T201 DAA

Sr. No.	Objectives
CO1	Able to define algorithms complexity, order notations.
CO2	Learn different algorithm design techniques with their applications such as Divide and conquer greedy methods.
CO3	Design algorithms using dynamic programming, Backtracking, branch and bound approaches and their solution based on real time data sets and
CO4	Able to demonstrate various Matrix multiplication algorithms, Data structures for set manipulation problems
CO5	Able to classify various real time problems in different categories like P, NP, NP Complete, and NP Hard based on their execution complexity

MCA-T202 Java Programming

Sr. No.	Outcomes
CO1	Understand the Different paradigms for problem solving and overview of OOPS principles. Describe the procedural and object oriented paradigm with concepts of memory allocation and deallocation
CO2	Understand the concepts of Classes and data abstraction and Overloading using java language
CO3	Understand Garbage Collection, Exceptions Handling, and Templates, File handling
CO4	Apply the concept of Standard template library (STL), AWT and Swings.
CO5	Learning the JDBC Database Connectivity

MCA-T203 Software engineering

Sr. No.	Outcomes
CO1	Understanding the Software Engineering Fundamentals, Software development Process with different types of models, Project management Concepts
CO2	Understand the Software Quality Assurance concepts, Software Configuration Management.
CO3	Understand the Software Quality Assurance concepts, Software Configuration Management, Analysis Concepts and Principles
CO4	Get acquainted with Design Concepts and Principles, Software Testing
CO5	Understand the purpose of Reengineering with some CASE Tools

MCA- T204 Computer Networks

Sr. No.	Outcomes
CO1	Know network terminology and concepts, design issues , Protocol Architecture, various service primitives with understanding of Data Communications techniques
CO2	Understand various type of encoding techniques and data link control protocols
CO3	Understand various routing, Switching concepts techniques and signalling protocols
CO4	A brief study of various network topologies and devices used in in layered structure of OSI model
CO5	Get acquainted with various application layer, transport and network layer protocols

MCA-T205 Computer Architecture

Sr. No.	Objectives
CO1	To understand the structure, function and characteristics of computer systems
CO2	understand the design of the various functional units and components of computers
CO3	To identify the elements of modern instructions sets and their impact on processor design
CO4	Understand concepts of register transfer logic and arithmetic

MCA-P201 Design and Analysis of Algorithm Lab

Sr. No.	Outcomes
CO1	Perform the experiments for time and space complexities calculation. Plot graphs for Rate of growth.
CO2	Perform the operations to understand the concepts of Stack, Queues, link lists and Storage Management.
CO3	Perform the operations to understand the different forms of Trees and their Applications
CO4	Perform the operations to understand the concepts of non-linear data structures like graphs and Strings with their features.
CO5	Apply the concepts of different types of searching and sorting algorithms with tables and their applications

MCA-P202 Java Programming Lab

Sr. No.	Objectives
CO1	Design program and code for understanding the OOPS principles, procedural and object oriented paradigm with concepts of memory allocation and deallocation.
CO2	Design program and code for Classes and data abstraction and Overloading
CO3	Design program and code for Garbage Collection, Exceptions Handling Templates, File handling.
CO4	Design program and code for using and designing the Standard template library (STL), AWT and Swings.
CO5	Working with different type of Database Connectivity and crud operations

MCA-P203 Industrial Training

Sr. No.	Outcomes
CO1	To provide students the opportunity to test their interest in a particular career before permanent commitments are made
CO2	To develop skills in the application of theory to practical work situations
CO3	To enhance the ability to improve students creativity skills and sharing ideas.
CO4	To produce post graduates who are credible, creative and proficient.
CO5	To cultivates the leadership ability of the students and gives them the responsibility to execute and perform the given task.

M.C.A. SEMESTER III

MCA-T301 Artificial Intelligence and Machine Learning

Sr. No.	Outcomes
CO1	Understand basics of AI, Control strategies- forward and backward chaining, Heuristic search techniques
CO2	Learn Neural Architecture and Expert System, learning rule, Back propagation
CO3	Learn Machine Learning and linear model
CO4	Learn Tree and Probabilistic Models
CO5	Understand the concept of Dimensionality Reduction and Evolutionary Models, Graphical Models

MCA-T302 Digital Marketing

Sr. No.	Outcomes
CO1	developing an overall understanding of digital marketing / online marketing platforms
CO2	Idea of web analytics, social media tools, marketing through search engines, search engine optimisation
CO3	Idea of mobile marketing, email marketing, Pay per click, digital display marketing, content marketing and Strategizing marketing
CO4	Understand the search engine as a default entry point to the internet. Learn how to get a website listed among top search engine results.
CO5	Learn to use white paper, brochure, case studies for unique interaction

MCA-T303 Embedded Systems

Sr. No.	Outcomes
CO1	Become aware about General Purpose Processor and IC technologies
CO2	To acquire knowledge of different types of Custom processors
CO3	Able to understand ASIP and its relevant methodologies
CO4	Effectively understand the Memory and Interfacing performances
CO5	Case study of embedded system (Digital Camera)

MCA-T304 Cloud Computing

Sr. No	Outcomes
CO1	Learning the basic Concepts of cloud computing: Architecture and virtualization
CO2	Know about various major cloud Platforms in Industry and applications in cloud
CO3	Understand SLA and risk approaches and Energy efficiency in data centers
CO4	Learn about various storage concepts and the Storage Network Design in cloud environment
CO5	Understand the advance topics in Consensus in Cloud Computing and Byzantine failure with their solutions

MCA-T305 Compiler Design

Sr. No	Outcomes
CO1	Provide an understanding of the fundamental principles in compiler design
CO2	Provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science
CO3	Learn the process of translating a modern high-level language to executable code required for compiler construction.
CO4	Provide an understanding of the fundamental principles in compiler design
CO5	Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations

MCA-P301 Embedded Systems Lab

Sr. No	Outcomes
CO1	To make students familiar with the basic concepts and terminology of the target area, the embedded systems design flow
CO2	To give students an understanding of the embedded system architecture
CO3	To acquaint students with methods of executive device control and to give them opportunity to apply and test those methods in practice
CO4	To teach students to make measurements with the specified accuracy
CO5	develop hardware-software complex with the use of the National Instruments products

MCA-P302 Artificial Intelligence and Machine learning lab

Sr. No	Outcomes
CO1	To acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level
CO2	To learn and grow after they are introduced to scenarios in the form of data
CO3	To introduce students to the basic concepts and techniques of Machine Learning
CO4	To develop skills of using recent machine learning software for solving practical problems
CO5	To gain experience of doing independent study and research

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M.C.A. SEMESTER – IV

MCA-T401 Cryptography & Network Security

Sr. No	Outcomes
CO1	To understand basics of Cryptography and Network Security
CO2	To be able understand the key exchange mechanisms, Digital envelope and Digital signatures
CO3	Learn about how to secure and manage Network and use of Virtual private Networks
CO4	To understand various network security protocols to protect against the threats in the networks
CO5	Be able to learn and configure simple firewall architectures

MCA-T402 Modeling and Simulation

Sr. No	Outcomes
CO1	Learn different types of simulation techniques
CO2	overview of the modeling and simulation approaches with emphasis on applications
CO3	use of models (e.g., physical, mathematical, or logical representation of a system, entity, phenomenon, or process) as a basis for simulations
CO4	To develop data utilized for managerial or technical decision making.
CO5	To simulate a state-space model on a computer

MCA-T403 Departmental Elective – I

MCA-E403-1 Software testing

Sr. No	Outcomes
CO1	To study fundamental concepts in software testing, including software testing objectives, process
CO2	To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report
CO3	define and develop a test tool to support test automation and Defects Testing
CO4	Able to do Business Intelligence Testing by white and black box testing
CO5	Analyze performance related issues and tackle device plans

MCA-E403-2 Real Time Systems

Sr. No	Objectives
CO1	Basic concepts of Real time systems, application and importance of RTS in real-life
CO2	Learning scheduling real-time tasks and their Schedulability tests.
CO3	Schedulability analysis and time driven task scheduling
CO4	Event based task scheduling and priority handling in real time scheduling
CO5	Resource Access control problems and solutions in multiprocessor system. Faults and their handling in real time systems.

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MCA-E403-3 Business Intelligence in ERP System

Sr. No	Outcomes
CO1	Purpose of business intelligence is to support better business decision making
CO2	Provides an overview of the technology of BI and the application of BI to an organization's strategies and goals
CO3	Objective of improving strategic decision-making and providing a competitive advantage
CO4	An overview of Business Intelligence (BI) and analytics in the ERP

MCA-E403-4 Mobile Computing

Sr. No	Outcomes
CO1	Basics of mobile technology, wireless communication, mobile device classification and wireless networks
CO2	Implementation of cellular system and power control. Understanding of concept of AMPS system, TACS system, NMT system, NTT system
CO3	Basic understanding of GSM as standardization and evolutionary directions
CO4	Transmission of data in cellular networks with various schemes of transmission as well as its evolution
CO5	Learning the basics of Android and design its applications

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MCA-E403-5 Image Processing

Sr. No.	Outcomes
CO1	To study the image fundamentals and mathematical transformations necessary for image processing
CO2	To study the image enhancement techniques
CO3	To study image restoration procedures
CO4	To study the image compression procedures
CO5	To study the image segmentation procedures

MCA-E403-6 Robotics

Sr. No.	Outcomes
CO1	To learn about robotics essentials
CO2	Learn End Effectors and Robot Controls
CO3	Understand the Robot transformations and different range of sensors
CO4	Learn Robot work cell design and control-Sequence control
CO5	Understand the concept of Micro/Nano Robotics System

MCA-E403-7 Internet of Things

Sr. No.	Outcomes
CO1	Learn about basics of IoT and understand the Deployment templates with NETCONF-YANG platform design Methodology.
CO2	Understand the IoT Architecture
CO3	Understand the IoT Protocols
CO4	Know about working on IoT with Raspberry Pi & Arduino
CO5	Undertake case Studies and Real-World Applications

MCA-T404 Departmental Elective – II

MCA-E404-1 Information Systems & Cyber Security

Sr. No.	Outcomes
CO1	Understand the elements of information security and techniques of network security
CO2	Define and describe the nature and scope of cybercrime
CO3	To Enable Learner To Understand, Explore, And Acquire A Critical Understanding Of Cyber Law
CO4	Identify the Information Technology Act, 2000 Various records and certification authorities
CO5	Understanding Intellectual Property Rights

MCA-E404-2 Ethical Hacking and Digital Forensics

Sr. No.	Outcomes
CO1	To provide an understanding Computer network and forensics fundamentals
CO2	Learn network security controls
CO3	Able to understand ethical hacking and its type
CO4	To understand the role of computer forensics in real world
CO5	Able to understand mobile OS architecture and legal issue

MCA-E404-3 Bio-Informatics

Sr. No.	Outcomes
CO1	Understand Bioinformatics technologies, Bayesian networks, molecular modeling
CO2	Understand the Pattern Matching and Visualization
CO3	Modeling the Bioinformatics networks
CO4	Learn about Gene regulation, motif recognition, motif detection, strategies for motif detection
CO5	Familiar with the Microarray technology for genome expression study, image analysis for data extraction

MCA-E404-4 Data Mining and Data Warehousing

Sr. No.	Outcomes
CO1	Learn Database Management System Concepts and Architecture and data warehouse
CO2	Able to understand the Warehouse Implementation and OLAP Technology for Data Mining

CO3	Able to Understand Data Preprocessing
CO4	Learn Data Mining Methods
CO5	Able to understand Fuzzy Logic Clustering and Introduction to Fuzzy Logic

MCA-E404-5 Soft Computing

Sr. No.	Outcomes
CO1	Learn about Soft/hard computing
CO2	Understand Neural networks and learn about application of ANN
CO3	Learn about Neural network and recent applications of neural network
CO4	Understand the fuzzy logic, fuzzy systems, and fuzzy classification and defuzzification methods
CO5	Learn about the genetic algorithm and various operators

MCA-E404-6 Ad Hoc Networks

Sr. No.	Outcomes
CO1	Learn about basics of Wireless Communication Technology and understand about Ad Hoc and sensor networks
CO2	Understand the MAC Protocol and MAC-IEEE 802.11
CO3	Learn about Routing Protocols and Transport Layer in Ad Hoc Wireless Networks.
CO4	Understand the Routing Protocol
CO5	Understand the Wireless Sensor Networks (WSNS) and Mac Protocols

MCA-E404-7 Natural Language Processing

Sr. No.	Outcomes
CO1	Understand the basics of NLP-Language and Information Retrieval concepts
CO2	Learn about Word Level Analysis and Syntactic Analysis
CO3	Know about Semantic Analysis and Discourse Processing
CO4	Able to do gain understanding about Natural Language Generation and Machine Translation
CO5	Learn the Information Retrieval concepts and use Lexical Resources like Word Net etc

MCA-P401 Software Project

Sr. No.	Outcomes
CO1	Identify the requirements for the real world problems
CO2	Conduct a survey of several available literatures and prepare software requirement specification
CO3	Study and enhance software/ hardware skills.
CO4	Demonstrate and build the project using appropriate process model, hardware requirements, coding, emulating and testing.
CO5	To work on teams and prepare a report and present the findings of the study conducted in the preferred domain

2.6.1 Annexure 3

M.Sc(IT) (PSO)

Master in Information Technology CBCS based (M. Sc IT)

Program Specific Outcomes (PSO):

After successful completion of the M Sc (IT) program students will have:

PSO1: Essential technical and practical skills for solving real-world problems by applying Information Technology.

PSO2: Ability to demonstrate excellent programming, analytical, logical and problem solving skills in developments.

PSO3: Ability to use IT tools and platforms necessary for practical needs in industry and R&D organizations.

PSO4: Ability to acquire social and ethical attributes that enable them in applying their skills for societal needs.

PSO5: Initiate and lead projects within the scientific field and be responsible for the work of individuals and groups.

PSO6: Students will become successful professionals to gain Employment and/or to become eligible for Computer Science Ph.D. programme.

PSO7: Students will demonstrate the ability to communicate effectively and to work as a team.

Semester – I

M1MIT01-CT01 **Computer Architecture**

Course Outcomes

CO1: Understand the theory and architecture of central processing unit.

CO2: Learn the concepts of parallel processing, pipelining and interprocessor communication.

CO3: Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

CO4: Understand concepts of register transfer logic.

CO5: Explain different types of addressing modes.

CO6: Understand concepts of Hardwired control and micro programmed control.

CO7: Discuss different types of computer arithmetic operations.

M1MIT02-CT02 **Introduction to Programming**

Course Outcomes

CO1: Makes students gain a broad perspective about the uses of computers in engineering industry.

CO2: Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.

CO3: Develops the ability to analyze a problem, develop an algorithm to solve it.

CO4: Develops the use of the C programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.

CO5: Introduces the more advanced features of the C language.

M1MIT03-CT03 **Data Structure**

Course Outcomes

CO1: Be familiar with basic techniques of algorithm analysis and writing recursive methods.

CO2: Master the implementation of linear and non linear data structures like Stack, Queue, linked lists and binary trees.

CO3: Familiar with advanced data structures such as balanced search trees, hash tables, priority queues.

CO4: Able to understand sorting algorithms including Selection, bubble, quick sort, merge sort etc.

CO5: Working with graph algorithms such as traversals, shortest path and minimum spanning tree.

M1MIT04-CT04 **Discrete Mathematics**

Course Outcomes

CO1: Understand the basic principles of sets and operations in sets.

CO2: Learn and prove basic set equalities.

CO3: Apply counting principles to determine probabilities.

CO4. Demonstrate an understanding of relations and functions and be able to determine their properties.

CO5. Use of truth tables for expressions involving the following logical connectives: negation, conjunction, disjunction, conditional.

CO6. Define and use the terms: proposition (statement), converse, inverse, contrapositive, tautology, and contradiction.

M1MIT05-CP01 **Practical-I Data Structure Programming**

Course Outcomes

CO1. To design and implement various data structure algorithms.

CO2. To introduce various techniques for representation of the data in the real world.

CO3. To develop application using data structure algorithms.

CO4. Determine and analyze the complexity of various algorithms.

M1MIT06-CP02 **Practical-II Web Development Using HTML & CSS**

Course Outcomes

CO1. Choose, understand, and analyze any suitable real time web application.

CO2. Integrate client and server side scripting languages to develop dynamic web applications.

CO3. To develop and deploy real time web applications in web servers and in the cloud.

CO4. Extend this knowledge to new technologies and platforms.

M1MIT07-SP01 **Communication & Presentation Skill**

Course Outcomes

CO1. Understand the role of communication.

CO2. Awareness of appropriate communication strategies.

CO3. Prepare and present messages with a specific intent.

CO4. Analyze speaking communication skills.

Semester – II

M2MIT01-CT05 **Database Systems**

Course Outcomes

CO1. Write SQL programs for effective data definition and manipulation.

CO2. Develop ER diagrams for logical design of database systems.

CO3. Perform Normalization.

CO4. Able to design database, tables and relationships among them.

CO5. Implement a small scale database development using commercially available DBMS tools.

M2MIT02-CT06 **Operating System**

Course Outcomes

CO1. Interpret various OS functions.

CO2. Demonstrate the knowledge of functions of Operating Systems.

CO3. Formulate the Problem and develop the solution for same in terms of CPU time, disk access, virtual memory etc.

CO4. Compare and analyze the different implementation approach of operating system abstractions.

CO5. Programming with shell.

M2MIT03-CT07 **Algorithms**

Course Outcomes

CO1 Ability to analyze the performance of algorithms

CO2 Selection of appropriate algorithm design techniques for solving problems

CO3 Use of set of rules design methods including greedy approach, divide and conquer, dynamic programming, backtracking, branch and bound etc

CO4 To understand tractable and intractable problems

CO5 To introduce problem classes taxonomy

M2MIT04-CT08 **Object Oriented Programming using C++**

Course Outcomes

CO1 Knowledge of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism.

CO2 Design, implement, simple programs in an object-oriented programming language.

CO3 Understanding of encapsulation and information hiding.

CO4 Implementation of "is-a" relationships among objects using a class hierarchy and inheritance.

CO5 Compare and contrast overloading and overriding methods in an object-oriented language.

CO6 Defining Real world problems in terms of abstract classes.

M2MIT05-CP03 **Practical-I: Algorithm Implementations**

Course Outcomes

CO1 To find an algorithm to solve the problem and prove that the algorithm solves the problem correctly

CO2 To understand the mathematical criterion for deciding whether an algorithm is efficient or not

CO3 To understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy

CO4 To acquire knowledge in NP Hard and NP-Completeness problem

M2MIT06EP01X **Practical-II:**

Elective Lab-I: Web Application Development

A. Web Development using Dot NET

Course Outcomes

CO1 To get familiarize with Microsoft Net, C#, VB.NET and ASP.NET technologies.

CO2 Create user interactive web pages using ASP.Net

CO3 Create simple data binding applications using ADO.Net connectivity

CO4 Performing Database operations for Windows Form and web applications.

B. Web Development using PHP & MYSQL

Course Outcomes

CO1 Understand the usage of PHP and MySQL in dynamic web development

CO2 Able to setup and configure MySQL, PHP, Apache web server development environment.

CO3 Become a PHP/MySQL web developer to create small applications

CO4 Create a dynamic database centric website using PHP and MySQL

Semester III

M3MIT01CT09 **Computer Networks**

Course Outcomes

CO1: Understand different types of networks, topologies and applications of them in real world

CO2: Understand types of addresses, data communication used over Internet

CO3: Understand the concept of networking models, protocols

CO4: Learn basic networking hardware and tools like Cisco router, packet tracer etc

CO5: Recognize the trends of Computer Networking

CO6: Evaluate the challenges in building networks and solutions to those

M3MIT02CT10 **Java Programming**

Course Outcomes

CO1: Build software development skills using java programming for real world applications

CO2: Implement frontend and backend of an application

CO3: Implement classical problems using java programming

CO4: Use Java in a variety of technologies and on different platforms

CO5: Use an integrated development environment like netbeans, websphere to write, compile, run, and test simple object-oriented Java programs.

CO6: Document a Java program using Javadoc

CO7: Understand the concept of Applet, swings and JDBC

M3MIT03ET01X **Elective -I A. Introduction to Data Science**

Course Outcomes

CO1: Insight into role of Scientists

CO2: Analyzing of big Data

CO3: Learn Techniques and Tools for Transformation of Data

CO4: Understand Data Mining

CO5: Different formats of data storage and processing

B. Computer Graphics

Course Outcomes

CO1: Basic Mathematical concepts related to matrices and geometry

CO2: Understanding of different types of projections

CO3: 2 dimensional and 3 dimensional Transformation and their applications

CO4: Working with pixel, resolution and colors models

CO5: Knowledge of half toning and visible surface detection

M3MIT04ET02X **A. Software Engineering**

Course Outcomes

CO1: Aim to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

CO2: Apply engineering design to produce solutions that meet specified needs

CO3: Recognize professional responsibilities in engineering situations and make informed judgments

CO4: Ability to function effectively on a team whose members together provide leadership

CO5: Ability to use the techniques, skills, and modern engineering tools and processes necessary for software engineering practice

CO6: Apply software engineering perspective through software design and construction, requirements analysis, verification, and validation, to develop solutions to modern problems

B. Image Processing

Course Outcomes

CO1: Understand the need for image transforms different types of image transforms and their properties

CO2: Analyze images in the frequency domain using various transforms.
CO3: Evaluate the techniques for image enhancement and image restoration.
CO4: Categorize various compression techniques.
CO5: Learn different techniques employed for the enhancement of images.
CO6: Learn different causes for image degradation and overview of image restoration techniques.
CO7: Develop image processing application.

M3MIT05EP03X **Practical-I: Elective Lab-II A. Android Programming**

Course Outcomes

CO1: Install and configure Android application development tools.
CO2: Design and develop user Interfaces for the Android platform.
CO3: Save state information across important operating system events.
CO4: Apply Java programming concepts to Android application development.
CO5: Design and implement Database Application and Content providers.
CO6: Use multimedia, camera and Location based services in Android App.
CO7: Able to handle security issues in Android platform.

B. Microprocessor & Micro-controller Programming

Course Outcomes

CO1: Design and implement programs on 8085.
CO2: Design flip flop, gates and other logic circuits.
CO3: Understand the architecture and instruction set simulator.
CO4: Acquainted with different types of registers.

M3MIT06EP04X **Practical-II: Elective Lab-III**

A. Big Data Analytics

Course Outcomes

CO1: Identify Big Data and its Business Implications.

CO2: Understanding the components of Hadoop and Hadoop Eco-System.
CO3: Access and Process Data on Distributed File System.
CO4: Develop Big Data Solutions.
CO5: Learn Machine Learning Techniques.

B. Cloud Computing

Course Outcomes

CO1: To learn what are Cloud Services and how to use them.
CO2: To understand the concept of Virtualization.
CO3: To study Task Scheduling algorithms.
CO4: Learn to apply Map-Reduce concept to applications.
CO5: Use and Examine different cloud computing services.
CO6: Analyze the components of open stack & Google Cloud platform.
CO7: Understand Mobile Cloud Computing as well as key components of Amazon web Service.

C. Web Application Project

Course Outcomes

CO1: Apply client/server communication techniques such as server, application, session variables, cookies and server behaviors.
CO2: Determine the needs for web database and connectivity.
CO3: Apply code reuse with templates, libraries, and snippets.
CO4: Evaluate several alternatives in the design of a web application.
CO5: Develop a functional web application.

M3MIT07EP05X **Practical-III: Minor Project**

Course Outcomes

CO1: Identify the requirements for the real world problems.

CO2: Conduct a survey of several available literatures and prepare software requirement specification.

CO3: Study and enhance software/ hardware skills.

CO4: Demonstrate and build the project using appropriate process model, hardware requirements, coding, emulating and testing.

CO5: To report and present the findings of the study conducted in the preferred domain.

CO6: Demonstrate an ability to work in teams and manage the conduct of the research study.

Semester IV

M4MIT01PW01 **Project Work**

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Undertake problem identification, formulation and solution.

CO3: Design solutions to complex problems utilizing a systems approach.

CO4: Communicate with team members and the community at large in written an oral forms.

CO5: Demonstrate the knowledge, skills and attitudes of as a professional developer.

Dean Commerce
C-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
B.Com I year		432	252	192	144	180	1863	682	348	101	26	10
B.Com Hons.		19	08	07	05	01	88	24	05	01	0	0
BBA		42	18	15	10	15	426	60	17	06	01	14

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NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

Programme Outcomes

PO1 - Enables learners to get theoretical and practical exposure in the commerce sector which includes Accounts, Commerce, Marketing, Management, Economics, Environment etc

PO2 - Develops communication skills and build confidence to face the challenges of the corporate world.

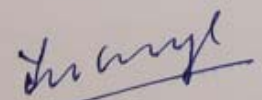
PO3 - Enhances the capability of decision making at personal and professional levels.

PO4 – Makes students industry ready and develop various managerial and accounting skills for better professional opportunities.

PO5 - Develops entrepreneurial skills amongst learners.

PO6 - Strengthens their capacities in varied areas of commerce and industry aiming towards holistic development of learners.

PO7 - Thus, after completing their graduation learners develop a thorough understanding of the fundamentals in Commerce and Finance.



Programme Specific Outcome B. Com

PSO1 - Learners venture into Managerial positions, Accounting areas, Banking Sectors, Auditing, Company Secretaryship, Teaching, Professor, Stock Agents, Government Employment etc.

PSO2 - Enables learners to prove themselves in different Professional examinations like CA, CS, CAT, GRE, CMA, MPSC, UPSC etc.

PSO3 - Learners further move towards research in the field of Commerce.

PSO4- Enables students to demonstrate Progressive learning of various tax issues and tax forms related to individuals and businessmen and setting up their own business start up.

PSO5 - The vast syllabi covers various fields of commerce and accountancy which helps students grasp practical and theoretical knowledge.

Program Specific Outcomes B. Com Hons.

PSO1 - Demonstrate Ability to Interpret and Analyze Financial Statements

PSO2- Understanding the Rules and Regulation Laid Down by Accounting Body

PSO3- Demonstrate Ability to Understand Compliance as per Various Enactment

PSO4- Acquiring Conceptual Clarity of Various Functions and Ability to Analyze

PSO5- Various Functional Issues

PSO6- Demonstrating Ability to Evolve Strategies for Business

PSO7- Demonstrate Effectively Oral and Written Communication

PSO8- Demonstrate Ability to work in Groups. Exhibit skills like Empathy, EQ,

PSO9- Managerial and Inter-Personnel Skills

PSO10- Demonstrate understanding of social cues and contexts in social interaction

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PSO11-Develop Ethical Practices and Imbibe Values for Better Corporate Governance.

PSO12-Understand Ethical Challenges and Choices in a Business Setting

PSO13-Demonstrate Understanding of Sustainability Related Concerns in Varied Areas

PSO14- Understand the Ecosystem of Start up in the Country

PSO15- Demonstrate the Ability to Create Business Plans

Program Specific Outcomes BBA

PSO 1 Ability to define, analyses the solutions for different business problems and using logical reasoning patterns for evaluating information, materials, and data for practical implementation.

PSO 2 Provides verbal, reasoning, Data Interpretation, Quantitative and communication skill to solve specific business problems and decision making.

PSO 3 Apply ethical principles and commitment towards professional ethics and responsibility.

PSO 4 Function effectively as a member, leader, individual or group in diverse environment.

PSO 5 Ability to conceptualize a complex issue into a coherent written statement and oral presentation and to communicate effectively on complex activities with technical community.

PSO 6 Providing an opportunity for the students to gain practical exposure towards the workplace and make them industry ready.

PSO 7 Promotes entrepreneurship by providing understanding of the fundamentals of creating and managing innovation, new business development, and high-growth potential entities.

PSO 8 Ability to demonstrate technical competence in domestic and global arena of business through the study of major disciplines within the fields of business.

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Course Outcome – B. Com. Honours

CO1 To help students to acquire conceptual knowledge of the financial accounting and to impart skills for recording various kinds of business transactions.

CO2 To impart basic knowledge of the important business legislation along with relevant case law.

CO3 To acquaint the students with the concepts of micro economics dealing with consumer behavior. The course also makes the student understand the supply side of the market through the production and cost behavior of firms.

CO4 To equip students of the B.Com (Hons.) course effectively to acquire skills in reading, writing, comprehension and communication, as also to use electronic media for business communication.

CO5 To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

CO6 To impart basic knowledge of the provisions of the Companies Act 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

CO7 The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

CO8 To acquaint students with the techniques and principles to manage human resource of an organisation.

CO9 To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961 and the relevant Rules.

CO10 To provide the student with an understanding of basic management concepts, principles and practices.

CO11 To familiarise students with the basic statistical tools used for managerial decision-making.

CO12 To enable the student t o become familiar with the mechanism for conducting business transactions through electronic means.

CO13 To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment and cost accounting book keeping systems.

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CO14 To familiarize the students with the basic mathematical tools, with an emphasis on applications to business and economic situations.

CO15 To provide computer skills and knowledge for commerce students and to enhance the student understands of usefulness of information technology tools for business operations.

CO16 To enable the student to grasp the major economic problems in India and their solution.

CO17 To orient the learner toward entrepreneurship as a career option and creative thinking and behavior.

CO18 To provide basic knowledge of concepts, principles, tools and techniques of marketing.

CO19 To familiarize the students with the principles and practices of financial management

CO20 To impart the students. knowledge about the use of financial, cost and other data for the purpose of managerial planning, control and decision making.

CO21 To provide Basic knowledge of corporate tax planning and its impact on decision making.

CO22 To familiarize the students with the basic concepts, tools and techniques of advertising used in marketing.

CO23 To impart knowledge about the basic principles of the banking and insurance.

CO24 To enhance the skills needed for computerized accounting system and to enable the students to develop simple accounting applications.

CO25 To provide the student a basic knowledge of financial markets and institutions and to familiarise them with major financial services in India.

CO26 To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility.

CO27 To provide basic knowledge and equip students with application of principles and provisions of Goods and Service Tax.

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CO28 To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

CO29 To familiarize the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints. and the role of different agencies in stablishing product and service standards

CO30 To provide basic knowledge of business tax procedures and management under different provisions of the Income tax.

CO31 To familiarise the students with the concepts, importance and dynamics of international business and India's involvement with global business. The course also seeks to provide theoretical foundations of international business to the extent these are relevant to the global business operations and developments.

CO32 To enable the students to learn the concepts of industrial relations including trade unions, collective bargaining, discipline and various labour enactments.

CO33 aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

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C-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.Sc. Mathematics I Semester (CBCS)		32	18	12	08	Nil	498	27	25	11	07	Nil
M.Sc. Statistics I Semester (CBCS)		13	05	04	03	Nil	47	10	08	02	01	Nil

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)
(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Dr. G. S. Rathore	AAZPR4241H	Professor	Mathematic and Statistics	Permanent	1988	33	Yes
Dr. Atul Tyagi	AAPPT5846G	Professor	Mathematic and Statistics	Permanent	1992	29	Yes
Dr. Rakeshwar Purohit	AJUPP1291P	Asstt. Professor	Mathematic and Statistics	Permanent	2012	9	Yes
Dr. S. K. Gandhi	ABTPG9048G	Asstt. Professor	Mathematic and Statistics	Permanent	2012	9	Yes
Dr. Auparajita Krishnaa	AOBPK2662P	Asstt. Professor	Mathematic and Statistics	Permanent	2012	9	Yes

Dr. Ajit Kumar Bhabor	AXIPA4312Q	Asstt. Professor	Mathematic and Statistics	Permanent	2012	9	Yes
Dr. Dhirendra Chhajed	ACUPC4124D	Asstt. Professor	Mathematic and Statistics	Permanent	2018	3.5	Yes
Dr. Kirti Khurdiya	ANYPM7202K	Asstt. Professor	Mathematic and Statistics	Permanent	2018	3.5	Yes
Dr. Mahesh Puri Goswami	ANNPG4100D	Asstt. Professor	Mathematic and Statistics	Permanent	2018	3.5	Yes
Mr. Bharat Kumar Yadav	ACYPY6189L	Asstt. Professor	Mathematic and Statistics	Permanent	2018	3.5	Yes
Dr. Anita Mehta	AICPM7543C	Asstt. Professor	Mathematic and Statistics	Permanent	2018	3.5	Yes
Dr. Pradeep Kumar Vishwakarma	ANEPV6944P	Asstt. Professor	Mathematic and Statistics	permanent	2018	3.5	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &3.4.2 The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

- Nil -

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

Programme Specific Outcomes and Course Outcomes
Department of Mathematics and Statistics

Programme Specific Outcomes

PSOs of B.Sc. Mathematics

PSO1. Understand Group Theory, Ring Theory and Fields and apply in problems.

PSO2. Understand the basic concept of Differential Equations of various types and apply in various real life problems.

PSO3. Understand the Geometrical Interpretations of 2D and 3D shapes and evaluate their area and volume.

PSO4. Analyse real numbers and their applications by certain results and apply then in various pure problems.

PSO5. Analyse numerical problems and apply in various problems by different methods.

PSO6. Understand the basic definition of Graph Theory, Tree and Boolean Algebra and analyse their application.

PSOs of M.Sc. Mathematics

PSO1. Understand the concept of group theorems, ring theory and field theory and evaluate their applications also expansion of these concepts from the view point of Discrete Mathematics.

PSO2. Analyze and interpret real and complex functions with their applications.

PSO3. Study the analytic and numerical solutions of various differential equations, initial and boundary value problems by various approaches.

PSO4. Apply various techniques in solving linear and non-linear programming problems and find their applications.

PSO5. Understand the concept of hydrodynamics, equation of Continuity, rigid dynamics, moment of inertia and boundary surface with their applications.

PSO6. Find applications of tensor analysis in electromagnetism and physics.

PSO7. Discuss testing of hypothesis by various Mathematical distributions.

Course Outcomes	**COs** of the course **"Algebra" (B.Sc. I Year)** CO1 Understand concepts of matrices, system of linear equation and their consistency, using by rank. CO2 Understand different methods to find the solution of cubic equations. CO3 Understand basic concept of group subgroup, cyclic group, permutation group etc. and analyse their applications. CO4 Apply Lagrange's theorem and understand the concept of normal sub group, centre of group etc. CO5 Apply Cayley theorem of finite groups. **COs** of the course **"Calculus" (B.Sc. I Year)** CO1 Understand concepts of arc length and Geometrical interpretation of results obtained from it. CO2 Understand the concepts of Asymptotes points of inflexion and apply them in curve tracing. CO3 Apply Beta and Gamma function in quardature and rectification. CO4 Understand the concept of differential equation and their types and analyse their applications. **COs** of the course **"Geometry" (B.Sc. I Year)** CO1 Indentify the nature of conic of second and third degree. CO2 Geometrical properties of ellipse and hyperbola as well as 3-D shapes CO3 Interpret the relation between plane and straight line. CO4 Evaluation of principal plane and direction of conics. **COs** of the course **"Advanced Calculus" (B.Sc. II Year)** CO1 Understand basic concepts of continuity important theorems. CO2 Concepts of partial differentiation and its applications. CO3 Evaluate double and triple integrals and their applications. CO4 Understand vectors & scalars quantity, evaluate of gradient, divergence

and curl. Some important vector identity.

CO5 Understand Gauss's theorem, Stoke's theorem and Green's theorem and their applications.

COs of the course **"Differential equations"(B.Sc. II Year)**

CO1 Understand the concept of exact, simultaneous and total differential equation and analyse their applications.

CO2 Evolution of solution of linear differential equation with variable coefficients by various approach.

CO3 Classify the partial differential equation and evaluate their solution using different approaches.

CO4 Analyze numerical solution of differential equation.

COs of the course **"Mechanics" (B.Sc. II Year)**

CO1 Finding resultant of coplanar forces and study equilibrium of bodies under three or more forces.

CO2 Interpretation of virtual work by forces.

CO3 Study the projective motion of various particles.

CO4 Finding velocity and acceleration in various direction and study rectilinear motion.

CO5 Study the motion of particle in resisting medium.

COs of the course **"Real Analysis" (B.Sc. III Year)**

CO1 Understand the concepts of real number and analyse their properties.

CO2 Study sequence, series and their applications.

CO3 Apply Riemann integrals in evaluation of some integrals.

CO4 Understand the concept of uniform convergence and study their application.

COs of the course **"Abstract Algebra" (B.Sc. III Year)**

CO1 Understand the concept of ring theory and their applications.

CO2 Study the concept of homomorphism and isomorphism of rings and their applications.

CO3 Evolution of examples of vector spaces and related problems.

CO4 Apply Sylvester law of nullity in linear transformations.

COs of the course "Discrete Mathematics" (B.Sc. III Year)

CO1 Understand the basic concept of sets and propositions, permutations and combinations.

CO2 Understand the basic of relations and functions, Pigeon Hole principle graphs and related theorems.

CO3 Understand the basic concept of trees and finite state machines.

CO4 Understand the basic concept of Recussence relations solution by the method of generation functions.

CO5 Basic concept of Boolean algebra Lattices, Duality, Digital network switching circuits.

COs of the course "Numerical Analysis and Operation Research" (B.Sc. III Year)

CO1 Study the interpolation methods of equi-distance and unequi distance intervals.

CO2 Discuses the numerical integration methods and their derivations.

CO3 Understand the concept of linear programming problems and methods of solving it.

CO4 Apply assignment and transportation problem in various physical problems.

COs of the course "Mathematical Statistics" (B.Sc. III Year)

CO1 Understand the basic concept of probability, independent events and related problems.

CO1 Understand the basic of Random variables, distribution functions, density functions.

CO1 Understand the basic concept of theoretical probability distribution and related theorems.

CO1 Understand the basic definition of Mathematical expectation, moments

and related theorems.

CO1 Understand the basic concept of curve fitting by the least square principle, fitting of straight line and parabola and regression.

COs of the course **"Algebra-I" (Sem-I)**

CO1 Understand types of direct product of subgroups. Cauchy's theorem for abelian and non abelian groups.

CO2 Understand and apply Sylaw's three theorem. Composition series and Jordan Holder theorem.

CO3 Understand solvable group and their properties fundamental theorem for finite abelian group.

CO4 Understand Annihilators of subspace, invariant and projection.

CO5 Understand types of Linear transformation and diagonalicatoin.

COs of the course **"Real Analysis" (Sem-I)**

CO1 Study the measure and their properties of subsets of Real numbers.

CO2 Study the measurably of various functions discuss.

CO3 Discuss the integral properties of measurable functions.

CO4 Discuss the convergence of equation of measurable function and other applications.

CO1 Establish the relations between the solutions of various differential equations.

CO2 Application of special function to solve various problems.

CO3 Study the various problems of special functions.

CO4 Understand the concept of orthogonal polynomials and generating functions.

COs of the course **"Differentional Equations and Calculus of Variation" (Sem-I)**

CO1 Understand concept of partial differential equations, existence and uniqueness theorem and solution of second order PDE through Monge's method.

CO2 Understand concepts of canonical forms and reduction of second order semi linear partial differential equations to canonical forms. classification of second order PDE having more than two independent variables, Cauchy's problem.

CO3 Understand concept of BVP's of second order ordinary differential equations, Strum-Lowville BPS's Lagrange's identity and relevant theorems and properties based on study Eigen values and Eigen functions.

CO4 Study solution of second order PDE's by the method of separation of variables, Green's functions and solution of second order homogeneous BPV's through Green's function.

CO5 Understand concept of calculus of variations functional, Euler-Lagrange differential equation for externals and its alternative forms. Solution of variational problems using Ritz method.

COs of the course **"Mechanics" (Sem-I)**

CO1 Understand the concepts of hydrodynamics, equation of continuity and boundary surface.

CO2 Derive Feeler's dynamical equations and Bernoulli's equation with applications and problems

CO3 Understand the concept of central orbit and planetary motion with Kepler's laws.

CO4 Understand the concept of special theory of relativity, Michelson-Marley experiment and Lorentz transformation.

CO5 Describe applications of Lorentz transformations and concept of Minkowski's 4-dimensional continuum space, relativistic Hamiltonian and Lagrangian.

COs of the course **"Differential Geometry-I" (Sem-I)**

CO1 Understand the basic concept of plane section and circular section.

CO2 Understand the concept of any section of a central conicoid. Generating lines Tangent plane.

CO3 Understand the basic concept of projection of generators, Hyperbolic paraboloid.

CO4 Understand the basic of confocal conioids elliptic coordinates, parameter of confocals.

CO5 Understand the basic concept of conoids inflexional tangents and indicatrix.

COs of the course **"Algebra-II" (Sem-II)**

CO1 Understand prime fields, polynomial rings, integral domain, Euclidean domain, principal ideal domain and unique factorization domain and their related theorems.

CO2 Understand concept of modules, sub module, Quotient modules with suitable examples. Fundamental theorem of homomorphism and isomorphism.

CO3 Understand finitely generated modules with fundamental theorem, Noetherian and Artinian modules and related theorems.

CO4 Understand field extension with examples types of extension. Perfect field and finite fields.

CO5 Understand Automorphism, Galois theory of field extension and its theorem. Solution of polynomial equations.

COs of the course **"Complex Analysis" (Sem-II)**

CO1 Interpret complex numbers Geometrically and study the concept of analytic function and their applications.

CO2 Understand the concept of conformal transformation and apply it in various problems.

CO3 Discuses the concept of complex integrations and its application.

CO4 Study of various types of singularities and zero and application of Cauchy's Residue's theorem.

COs of the course **"Special Functions" (Sem-II)**

CO1 Find solutions of various differential equations using series solution.

CO2 Understand concept of various special functions and their relations.

CO3 Study properties of various special functions.

CO4 Discuss applications of special functions in various problems.

CO5 Understand concept of generating functions and their applications.

COs of the course **"Mechanics" (Sem-II)**

CO1 Understand the concept of Rigid dynamics, moment of inertia, product of inertia, Momental ellipsoid and principal anes.

CO2 Understand D' Alembert's principle and drive equations of motion. Study motion about a fixed axis

CO3 Understand the motion in two dimensions under finite forces and impulsive forces.

CO4 Understand principles of the conservation of momentum and conservation of energy.

CO5 Derive Lagrange's equations in generalized coordinates under finite and impulsive forces.

COs of the course **"Differential Geometry-II" (Sem-II)**

CO1 Understand the concept of differential geometry.

CO2 Understand the basic of surfaces. Ruled surface and developable surface and related theorems.

CO3 Understand the concept of curvature of normal section principal radii.

CO4 Understand the concept of an oblique section radius of curvature, lines of curvature of an ellipsoid.

CO5 Understand the concept of umbilicus, curvature at point of a generator of a skew surface curve linear coordinates.

COs of the course **"Topology" (Sem-III)**

CO1 Understand the concept of metric space with properties and examples open set, closed set, sequence, compact space and related theorems.

CO2 Understand basic concepts of topology, bases, countable space and related theorems.

CO3 Understand the various types of topological space T_0 T_1 T_2 etc. and

related theorems, compactness and their theorems.

CO4 Understand Connectedness and continuity related theorems.

CO5 Understand function algebra and some important theorems.

COs of the course **"Tensor Analysis" (Sem-III)**

CO1 Understand the concepts of tensors, its types end operations. Define Quotient law, fundamental tensor and associate tensors.

CO2 Understand the concepts of Christoffel symbols, transformation of Christoffel symbols and covariant differentiation of tensors.

CO3 Define Geodesics, null geodesics and applications, understand the concept of Riemannian, Normal Gaussian Coordinates and parallel propagation.

CO4 Define and understand Riemannian, Curvature tensor, its properties and conformal curvature tensor.

CO5 Understand the concept of electromagnetism, Max well's equations, transformation of elective and magnetic intensities and energy momentum tensor for electromagnetic field.

COs of the course **"Numerical Analysis-I" (Sem-III)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Understand the basic concept of iteration theory, rate of convergence, acceleration of convergence, multiple and complex roots.

CO2 Understand the real and complex roots, Bisection method, secant method, Regula falsie method, Newton Raphson method.

CO3 Concept of synthetic division Birge vieta method, Graffes root squaring method.

CO4 Understand the solution of Gauss Jordan method, partition method, Jacobi method.

CO5 Understand the basic concept of Eigen value problem, power method complex Eigen values.

COs of the course **"Computer Programming in-C" (Sem-III)**

CO1 Understand basic concepts of computer and generations of computer.

CO2 Understand concepts of computer languages, use of all PC software's, Algorithm, flow chart.

CO3 Understand concepts and features of High level language C.

CO4 Understand concepts of how to compile and run C Programs.

CO5 Understand concepts of writing and run all programs on topics mentioned in syllabus.

COs of the course **"Discrete Mathematics" (Sem-III)**

CO1 Understanding fundamental concepts of mathematical logic and certain Algebra concepts from the view point of Discrete Mathematics.

CO2 Expansion of the Algebra concepts from the view point of Discrete Mathematics.

CO3 Introduction to the Mathematical structure of Lattices, Partially ordered sets and their various kinds of Lattices.

CO4 Introduction to Boolean Algebra, its relation with Lattices and relevant concepts.

CO5 Minimization of Boolean function, Various canonical forms and Karnaugh-Map.

COs of the course **"Optimization Techniques-I" (Sem-III)**

CO1 Explain linear programming problem (L.P.P.), parametric linear programming and method used to solve it.

CO2 Analyse the discrete changes in the parameters of the problem and its effect on optimal solution.

CO3 Enumerate fundamentals of integer programming techniques and apply different techniques to solve various optimization problems arising from

different areas.

CO4 Understanding of project scheduling by PERT and CPM.

CO5 Understand how optimization can be used to solve industrial problems.

COs of the course **"Mathematical Theory of Statistics-I" (M-III)**

CO1 Understand concepts of probability, laws of probability, Baye's theorem and its applications.

CO2 Understand basic concepts of Mathematical expectations, moments generating function, inversion theorem and its applications.

CO3 Understand and apply Binomial, Poisson distribution etc.

CO4 Understand Normal, Gamma and Beta distributions and its applications in real life problem.

CO5 Understand basic concepts of curve fitting, Correlation and regression and their applications.

COs of the course **"Integral Equation" (Sem-III)**

CO1 Study the concept of linear integral equations and their classifications.

CO2 Finding solution of linear integral equations.

CO3 Study the various properties of Eigen values and Eigen functions.

CO4 Apply Hilbert Schmidt theorem in solving freedholm integral equation of second kind.

CO5 Discuses freedholm theorems and their applications.

COs of the course **"Functional Analysis" (Sem-IV)**

CO1 Know about normal linear and Banach space and their applications.

CO2 Understand the various Important theorems.

CO3 Know about inner product space and Hilbert space with various important law.

CO4 Understand orthonormal basis and sets.

CO5 Learn various operation and apply to solve problems.

COs of the course **"Relativity and Cosmology" (Sem-IV)**

CO1 Understand the principle of covariance equivalence, Mach's principle and Newton's potential derive Einstein field equations.

CO2 Disuses Schwarzschild extensor solution singularise and related problems. Derive energy momentum tensor for perfect fluid.

CO3 Discuss planetary orbit, Three crucial tests of general relativity, Radar echo delay and study Schwarzschild interior solution.

CO4 Understand principle of cosmology, Einstein and De-sitter Universes and their derivations with properties and their comparison.

CO5 Understand the concept of non-static cosmological models, Hubble's law derivation of Robertson-walker metric, its geometric feature and expressions for FRW model.

COs of the course **"Numerical Analysis-II" (Sem-IV)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Understand the concept of curve fitting with least square principle.

CO2 Understand the numerical solution of ordinary differential equations by Taylors series method, Picard's method, Fuler's method and modified eulers method.

CO3 Understand the solution of Rungekutta method and stability analysis.

CO4 Understand the solution of linear boundary value problems of ordinary differential equations by finite difference methods.

CO5 Understand the solution of Non linear boundary value problems by finite difference scheme.

COs of the course **"Computer Programming of Numerical Methods" (Sem-IV)**

CO1 Understand concepts of Normalized floating numbers, perform

operations of normalized floating number and to write & run C program on Normalized floating Number.

CO2 Understand concepts of write and run programs to find roots of Algebraic and Transcendental equations.

CO3 Understand concepts of write and run programs to solve numerical solutions of simultaneous linear equations.

CO4 Understand concepts of write and run programs of Differentiation and integration.

CO5 Understand concepts of write and run Programs of numerical solutions of Differential equation.

COs of the course **"Discrete Mathematics" (Sem-IV)**

CO1 Understand basic concept of Graph Theory, introducing planar graphs.

CO2 Trees (an important class of graphs, planar graphs, Bipartite graphs, Spanning trees and their properties.

CO3 Discussion of Euler's Theorem related to Euler graphs, Directed graphs and certain other advanced concepts of trees.

CO4 Finite state machines and related concepts and their various kinds understanding.

CO5 Grammar, Languages and their construction derivations etc. with their various type and certain advanced concepts.

COs of the course **"Optimization Techniques-II" (M-I)**

CO1 Explain the fundamental knowledge of non linear programming and dynamic programming problems.

CO2 Uses of classical optimization techniques.

CO3 Describes the basics of different evolutionary algorithms.

CO4 Analyse and appreciate variety of performance measure for various optimization problems.

CO5 Understand the different methods of optimization and be able to suggest

a technique for a specific problem.

COs of the course **"Mathematical Theory of Statistics-II" (M-IV)**

CO1 Describe Chi square and t distribution with properties and applications.

CO2 Understand F distribution with properties and applications.

CO3 Understand basic concepts of estimation, criterion of good estimators, consistency, efficiency, sufficiency and untiaseelness.

CO4 Discuss the method of maximum Likelihood estimator and its properties and find M.L.E. for binomial, Poisson and Normal populations.

CO5 Discuss testing of hypothesis, error Neyman Pearson Lemma and its applications.

COs of the course **"Integral Transform" (Sem-IV)**

CO1 Understand the concept of Laplace transform and study its applications in finding solution of differential equations.

CO2 Study the concept of Fourier transform and its applications.

CO3 Discuss the application of Mellin transform.

CO4 Study the Henkel transform with elementary property and its applications.

Programme Specific Outcomes and Course Outcomes
Department of Mathematics and Statistics

Programme Specific Outcomes	**PSOs of B.Sc. Statistics** PSO1. Understand the basic concept of descriptive statistics, probability theory along with computational techniques, official statistics and Statistical Quality Control. PSO2. Focus on Discrete and continuous probability distributions and density functions, and basic concepts of Vital Statistics with its application. PSO3. Introduction of Statistical Inference, concept of Design of experiments and Theory of sample survey and Project work on assigned topic. **PSOs of M.Sc. Statistics** PSO1. Preliminaries of integration and probability& Theoretical distribution with their application in MS-Excel & SPSS. PSO2. Study of different sampling methods and classification of design of experiments along with the basic concepts of R a Statistical software with application. PSO3. Study of multivariate analysis theory of sample surveys, optimization techniques and preliminaries of stochastic process. PSO4. Introduction of Demography, Econometrics and Linear model & Regression with their application in SPSS & R along with Project work with Dissertations.

Course Outcomes	

COs of the course "Descriptive Statistics" (B.Sc. I Year)

After completion of classes students will be able to learn:-

CO1 Describe the concept o statistics, population sample, types of data, method to collect them, their classification, tabulation and presentation with the help of different frequency curves and diagrams.

CO2 Learn various measure of location, quartiles deciles and their properties, merits and demerits.

CO3 Learn various measure of dispersion, Lorenz curve and requisites to obtain an ideal measure of dispersion.

CO4 Understand different types of moments and different measure of Skewness and Kurtosis.

CO5 Learn theory of attributes upto three variable, also consistency, association and independence of attributes.

COs of the course "Probability Theory" (B.Sc. I Year)

After completion of classes students will be able to learn:-

CO1 All the basic term for probability its definition and addition law of probability also solve simple problem of probability.

CO2 Conditional and multiplication law of probability and simple applications.

CO3 Types o random variable their probability mass function and density functions.

CO4 Mathematical expectation its definition, additive and multiplicative law and elementary idea of conditional expectation etc.

CO5 Moments and cumulates generating function and their properties.

COs of the course "Computational Techniques & Official Statistics" (B.Sc. I Year)

After completion of classes students will be able to learn:-

CO1 Interpolation formulae, different operators with their properties and estimation of missing value.

CO2 Divided difference formulae and inverse interpolation. Numerical integration and related problems.

CO3 Linear programming problem its formulation and presentation by different method.

CO4 Statistical quality control with different charts for variables and attributes. Principles of acceptance of sampling plan and their functions.

CO5 Statistical organization of India, its functions and publication.

COs of the course "Statistics Practical" (B.Sc. I Year)

Course outcome:- After completion of classes students will learn:

* Presentation of raw data.
* Graphical presentation of frequency polygon, curve and ogives.
* Diagrammatic representation of Bars and Diagram.
* Measure of central tendency.
* Measure of dispersion.
* Moments and measures of skewness and Kurtosis.
* Statistical Quality Control
* Evaluation of probabilities by different method.
* Association of attributes.
* Problems based on interpretation.

COs of the course **"Probability Distributions"(B.Sc. II Year)**

After completion of classes students will be able to learn:-

CO1 Weak law of large numbers and central limit theorem for i.i.d. random variables.

CO2 Different univariate discrete distribution their properties and application.

CO3 Some other discrete distributions their properties and application like geometric, multinomial and distribution etc.

CO4 Different univariate continuous distribution their properties and application.

CO5 Some more continuous distributions and their properties and application.

COs of the course **"Sampling Distributions And Elements Of Estimation"(B.Sc. II Year)**

After completion of classes students will be able to learn:-

CO1 Univariate sampling distribution its concept, properties and concepts of standard error of an estimate. Chi-square distribution its derivation, properties and problems.

CO2 t, F and Z sampling distribution with their properties.

CO3 Concept of point estimation and its properties.

CO4 Bias, Mean square error and variance, MVUE and its properties.

CO5 Concept of interval estimation and its properties.

COs of the course **"Applied Statistics" (B.Sc. II Year)**

After completion of classes students will be able to learn:-

CO1 Method of least square, fitting of polynomial and plausible solution of linear equations.

CO2 Concept of correlation, regression. Partial and multiple correlation coefficient and multiple regression.

CO3 Uses of vital statistics and method to obtaining it and measurements of different components of vital statistics and description and construction of life table.

CO4 Different components of time series and different mother to obtain it.

CO5 Construction of Index numbers types of it and requisites of an ideal index number.

COs of the course **"Statistics Practical" (B.Sc. II Year)**

After completion of classes students will be able to learn:-

* Fitting of Binomial, Poisson and Normal distribution.
* Calculation of area of normal curve.
* Calculation of correlation coefficient by different method.
* Fitting of curves.
* Construction of regression line.
* Calculation of multiple and partial correlation coefficient and regression equations (for three variables only)

* Determination of trend line by different method.
* Determination of seasonal variation by different method.
* Construction and index method.
* Vital Statistics

COs of the course **"Statistical Inference" (B.Sc. III Year)**

After completion of classes students will be able to learn:-

CO1 Procedure of testing hypothesis its terminology and determination of BCR for testing simple v/s simple hypothesis in uniform and normal population.

CO2 Theory of test of significance for large samples and t-distribution.

CO3 Test of significance for Chi-square and F-sampling distribution.

CO4 Different method of estimation with their properties.

CO5 Elements of Non-parametric inference and sequential analysis. Construction of O.C. and ASIN function and properties of SPRT. Elements of decision problems

COs of the course **"Design of Experiments and Sample Surveys" (B.Sc. III Year)**

After completion of classes students will be able to learn:-

CO1 ANOVA for one-way and two-way classification. Basic concepts, models and its types in design of experiments.

CO2 ANOVA for CRD, RBD& LSD and its efficiency. Missing plot technique for single value in RBD and ANOVA for LSD.

CO3 Concepts of sample surveys principle steps in a sample survey, its limitations. Principle of sampling design and procedure of selecting random samples.

CO4 Simple Random Sampling and Stratified Random Sampling.

CO5 Cluster and two stage sampling their definition and estimation of mean and variance.

COs of the course "Project Work" (B.Sc. III Year)

After completion of classes students will be able to learn: -

A project may be undertaken by a group of students. However, the project report shall be submitted by each member of the group separately.

COs of the course "Statistics Practical" (B.Sc. III Year)

After completion of classes students will be able to learn:-

* Testing of hypothesis for large samples.
* t-test for the significance of single and difference of mean.
* F-test for equality of variances.
* χ^2- test for specified variance, goodness of fit, independence of attributes and Homogeneity of correlation coefficient.
* Non-parametric test.
* ANOVA for one-way classification and two-way classification.
* ANOVA of CRD, RBD and LSD.
* Estimation of missing value.
* Sample surveys problem by SRS and stratified sampling.
* Computer Programming in C-Language; Introduction to C-Language and its uses & advantages, C-Fundamentals.

COs of the course **"Measure and Integration" (Sem-I)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Set theory with its limits, classes and functions.

CO2 Measure and its properties.

CO3 Probability measure- measurable space.

CO4 Measurable functions and its properties.

CO5 Properties of Integral.

COs of the course **"Matrices and Linear Algebra" (Sem-I)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Matrices properties, partitioning and universe matrices with linear dependence and independence.

CO2 Basic and dimension, orthonormal basis.

CO3 Characteristic equations with Eigen values and vectors.

CO4 Bilinear and quadratic forms.

CO5 Singular value and Jordon decomposition.

COs of the course **"Probability Theory" (Sem-I)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Axiomatic approach to probability and its application.

CO2 Independence of experiments and events, Baye's theorem and its application.

CO3 Random variables, distribution function and multivariate and frequency function.

CO4 Mathematical expectation and its properties.

CO5 WLLN and central limit theorem.

COs of the course "Theoretical Distributions" (Sem-I)

Course outcome:- at the end of class students will gain knowledge of

CO1 Generating functions and their applications.

CO2 Inversion theorem, derivation of distribution function and application of central lime theorem.

CO3 Discrete distributions with their properties and application.

CO4 Continuous distributions with their properties and application.

CO5 Compound distributions, Pearsonian system of frequency curve.

COs of the course "Practical Based on Statistical methods using MS-EXCEL & SPSS" (Sem-I)

Course outcome: - at the end of class students will gain knowledge of MS-Excel & SPSS.

COs of the course "Practicals Based on CT 03 & CT 04" (Sem-I)

Course outcome:- at the end of class students will gain knowledge of

* Calculation of moments, Skewness and Kurtosis.
* Fitting of Binomial, Poisson and Normal distribution.
* Calculation of area under normal curve.

COs of the course "Sampling Distributions" (Sem-II)

Course outcome:- at the end of class students will gain knowledge of

CO1 Univariate sampling distributions, Chi-square distribution (central and non-central) and their applications.

CO2 t- and F distribution (central and non central) and their applications.

CO3 Orthogonal polynomials, order statistics and their distribution.

CO4 Sampling distribution of median and range, regression and correlation, null and non-null distribution of sample correlation coefficient.

CO5 Bivariate distribution (discrete and Continuous)

COs of the course **"Statistical Inference" (Sem-II)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Elements of statistical decision functions, point estimation and their properties.

CO2 Minimum mean square, MVU and UMVU estimators, CR bounds.

CO3 Various method to obtain maximum likelihood estimators (MLE's) interval estimation.

CO4 Basic concepts of testing hypothesis, two kind of errors, NP Lemma for determination of best critical region.

CO5 Non-parametric test and sequential analysis its construction and its application.

COs of the course **"Design of Experiments" (Sem-II)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Factorial experiments and confounding.

CO2 Properties of general block design and Estimation of BLUE.

CO3 Construction of MOLS in Latin Square and Analysis of BIBD.

CO4 Intra & Inter Block analysis of BIBD, Analysis of Lattice, Linked block and Youden square design

CO5 Block analysis of PBIBD and Construction of GDD.

COs of the course **"Statistical Computing with R" (Sem-II)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Essential of R.

CO2 Matrices &Arrays in R.

CO3 Data frame in R.

CO4 Probability & Distribution in R.

CO5 Correlation & Regression in R.

COs of the course **"Practicals Based on CT 05 & CT 06" (Sem-II)**

Course outcome:- at the end of class students will gain knowledge of

* Calculate correlation and regression for Bivariate frequency distribution.
* Large sample test, F-test, Chi-Square test and t-test.
* Barlet's test for homogeneity of variance.
* Power curves for testing simple hypothesis v/s composite hypothesis.
* Test of significance for simple correlation coefficient.
* Non-parametric test.
* SPRT calculations of constants.
* Fitting of orthogonal polynomials.

COs of the course **"Practicals Based on CT 07 & CT 08" (Sem-II)**

Course outcome:- at the end of class students will gain knowledge of

* Analysis of BIBD,
* Construction of SBIBD.
* Analysis of Linked Block, Lattice Square and Youden Square Design.
* Practical based on Statistical computing.

COs of the course **"Multivariate Analysis" (Sem-III)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Multivariate normal distribution and its properties and distribution o quadratic forms.

CO2 MLE's of the mean vector and covariance matrix.

CO3 Hotelling's T^2 its properties and uses, Mahalnobis D^2.

CO4 Wishart distribution and its properties classification of observations.

CO5 Null and non-null distributions of partial and multiple correlation coefficients and multivariate central limit theorem.

COs of the course "Theory of Sample Surveys" (Sem-III)

Course outcome:- at the end of class students will gain knowledge of

CO1 Partition of sample space and definition of T-classes of linear estimators.

CO2 Quenouille's techniques of bias reduction and its applications, methods of estimation in PPSWR, ratio method of estimation.

CO3 Ratio and regression method of estimation for PPSWR, Variance by HT-estimator and YG-estimators.

CO4 Sen- Midzuno scheme of sampling of inclusion probabilities.

CO5 The theory of multistage sampling with VPWR and VPWOR.

COs of the course "Practicals Based on CT 09" (Sem-III)

Course outcome:- at the end of class students will gain knowledge of

* Multivariate analysis.
* Linear combination of correlated normal variates and evaluation of probabilities.
* Estimation and testing of mean vector, covariance, partial and multiple correlation coefficient.
* Analysis of discriminate functions. Their software development in C-language.

COs of the course "Operations Research" (Sem-III)

Course outcome:- at the end of class students will gain knowledge of

CO1 OR definition, scope and nature, transpiration and assignment problems.

CO2 Deterministic, Inventory models with at most one linear restriction and without restriction probabilistic inventory models.

CO3 Queuing theory and its differ models of process.

CO4 Simulation, definition, its types uses and limitations.

CO5 Steady state, solutions of Markovian queuing models.

COs of the course "Stochastic Processes" (Sem-III)

Course outcome:- at the end of class students will gain knowledge of

CO1 Stochastic process with stationary transition probabilities and its

properties.

CO2 Classification of states stationary distribution of a Markov chain.

CO3 Markov pure jump process, passion process, birth and death process.

CO4 Second order processes mean and covariance function.

CO5 Stochastic differential equations, estimation theory and special distribution.

COs of the course **"Practicals Based on DSE 01 & DSE 02" (Sem-III)**

Course outcome:- at the end of class students will gain knowledge of

* OP and stochastic.
* process and their software developments in C-language.

COs of the course **"Demography" (Sem-IV)**

Course outcome:- at the end of class students will gain knowledge of

CO1 Census and vital data, Ratio & Rates.

CO2 Mortality & Fertility & their determinants.

CO3 Construction of Life table.

CO4 Growth rates & Stable & Stationary population & their Projection

CO5 Migration & population projection method.

COs of the course **"Project work and Viva-voce/Dissertation" (Sem-IV)**

Course outcome:- at the end of class students will gain knowledge of

A project report shall clearly state the problem addressed, the methodology adopted, the assumptions and the hypotheses formulated, any previous reference to the study undertaken. Student will learn statistical analyses using some advance statistical softwares/ packages such as R/ STATA/ SPSS/ Latex etc.

COs of the course **"Practicals Based on CT 11" (Sem-IV)**

Course outcome:- at the end of class students will gain knowledge of

* Computation of Rates & Ratios.

	* Determination of Fertility and Mortality. * Life tables * Growth rates, Population Projection and migration models &its measurement. **COs** of the course **"Econometrics" (Sem-IV)** Course outcome:- at the end of class students will gain knowledge of CO1 General review of linear model & their estimation. CO2 Heteroscedasticity, Ridge regression, distributed lag models CO3 Linear equations model, condition & Restriction. CO4 Recursive system, k-class estimators. CO5 Casuality and their types, multivariate Cointegration. **COs** of the course **"Linear models & Regression analysis" (Sem-IV)** Course outcome:- at the end of class students will gain knowledge of CO1 Concepts of Linear and various models. CO2 ANOVA one way and two way CO3 Regression models and their fitting. CO4 Multicolinearity and Ridge regression. CO5 Concept of Robust regression & resampling procedure of regression models. **COs** of the course **"Practicals Based on Econometrics & Linear Models & Regression Analysis" (Sem-IV)** Course outcome:- at the end of class students will gain knowledge of * Based on Econometrics And Regression models

fMS C-2

FMS

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 up to 31st J 021)

(Please send all soft copies by email to **iqac@mlsu.ac.in** by 5PM on 10th Jan 2022 positively with cc to **vcmlsu@mlsu.ac.in**

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

Database.xlsx

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
MBA GAS		11	6	5	4	4	250	11	6	5	4	4
MBA SFS		21	3	2	2	2	250	21	3	2	2	2
MBA FSM		19	10	8	6	16	250	19	10	8	6	16
MBA ECOM		19	10	8	6	16	250	19	10	8	6	8
BBA ED GAS		11	6	5	4	4	270	11	6	5	4	4
BBA ED SFS		21	3	2	2	2	270	21	3	2	2	2
Executive MBA Program		11	6	5	4	4	30	9	0	0	1	0
Diploma in Digital Marketing		11	6	5	4	4	52	20	6	3	0	1

Diploma in Retail Marketing Management		11	6	5	4	4		0	0	0	0	0
Certificate Program in Digital Marketing		11	6	5	4	4		4	0	0	0	2

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)
(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Prof. Karunesh Saxena	AFVPS9502F	Professor	Faculty of Management Studies	Permanent	31.01.1997	24 Year	NO

Prof. Anil Kothari	ADXPK6754B	Professor	Faculty of Management Studies	Permanent	18.01.1991	30 Year	Yes
Prof. Hanuman Prasad	ABPPP4449Q	Professor	Faculty of Management Studies	Permanent	16.01.1997	24 Year	Yes
Prof. Meera Mathur	ABGPR9465H	Professor	Faculty of Management Studies, MLSU	Permanent	21.03.1997	24 Year	Yes

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Prof. Hanuman Prasad	28 December 2021	ABPPP4449Q	Professor	Fellow of IEA	Indian Economic Association	No	Annexure 2.1
Prof. Meera Mathur	5 September 2020	ABGPR9465H	Professor	Best Teacher Award	Sanskar Manjari, Gwalior	No	Annexure 2.1

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree program in India, POs of all professional Programs in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

DIPLOMA IN DIGITAL MARKETING

S.No.	Subject Paper Code	Subject Name	Course Outcome
1	FMS/DMD101	English and Communication	English and Communication: The outcome of this paper is to equip the students with the necessary techniques and skills of communication and enlist their activity and willing cooperation in the performance of their jobs.
2	FMS/DMD102	Functional Management:	Functional Management: The idea is to enhance the managerial skills of students so that they can lead in the best possible way.

3	FMS/DMD103	Computer Skills and Internet Proficiency:	Computer Skills and Internet Proficiency: Looking at the digitalization in the routine life, the outcome of this course is to make students able to handle the internet and other web components.
4	FMS/DMD104	Website Planning and Designing:	Website Planning and Designing: After going through this course, students became proficient in Graphic designing tools and their applications along with knowing concepts like web planning etc.
5	FMS/DMD105	Social media and search marketing	Social media and search marketing: Knowledge of digital marketing platforms, SEOs etc. has been indulged among the students.
6	FMS/DMD106	Email Marketing & Affiliate Marketing:	Email Marketing & Affiliate Marketing: The present scenario calls for content writers and this course is contributing towards the same by engaging topics like related Tools and techniques and strategies.
7	FMS/DMD107	Content Creation and Management:	Content Creation and Management: This further enhanced the content creation framework along with platforms for blogging etc. and measuring and analyzing content.
8	FMS/DMD108	Practical Project:	Practical Project: The students got an aid in applying the knowledge in the practical world and students engaged in hands-on of the applications and their implementation.

DIPLOMA IN RETAIL MARKETING MANAGEMENT

Objective of the programme:

With an emphasis on retail management and marketing topics, the diploma explores key developments and trends in this area. The course is job oriented targeting the growing retail industry. The students will be able to deliver the expected skill set required by the industry after completion of the programme. This course aims at providing a comprehensive view of retailing, and an analysis of the retail environment and exposure to issues and developments in the industry. The students, who are pursuing the course of retail management are taught about the introduction and concept of retail management, retailing trends, pricing and merchandising, segmentation, relationship marketing and information technology in retailing.

Subject specific outcomes are as follows:

Subject Code	Subject Name	Course Outcome
Paper 1: (FMS/DRMM101)	Basics of Marketing and Retailing	This subject provides a comprehensive view of retailing, and an analysis of the retail environment and exposure to issues and developments in the industry
Paper 2: (FMS/DRMM102	Marketing and Communication in Retailing	This subject gives introduction and concept of retail management, retailing trends, pricing and merchandising, segmentation, relationship marketing and information technology in retailing
Paper 3: (FMS/DRMM103)	Retention in Retail Marketing	This subject provides a comprehensive view of customer relationship management in retail industry, an overview of the Indian rural market & opportunities and benefits of going

		global
Paper 4: (FMS/DRMM104)	Training with Dissertation	A project dissertation/report based on the internship/training will have to be submitted in the fifth month from the commencement. The written part for project study FMS/DRMM104 shall account for 50% of marks and the viva-voce to be conducted by a duly constituted examination board for the remaining 50% of marks.

CERTIFICATE DIGITAL MARKETING

S.No.	Subject Name	Course Outcome
1	Functional Management:	Functional Management: The idea is to enhance the managerial skills of students so that they can lead in the best possible way.

2	Computer Skills and Internet Proficiency:	Computer Skills and Internet Proficiency: Looking at the digitalization in the routine life, the outcome of this course is to make students able to handle the internet and other web components.
3	Social media and search marketing	Social media and search marketing: Knowledge of digital marketing platforms, SEOs etc. has been indulged among the students.
4	Email Marketing & Affiliate Marketing:	Email Marketing & Affiliate Marketing: The present scenario calls for content writers and this course is contributing towards the same by engaging topics like related Tools and techniques and strategies.
5	Practical Project:	Practical Project: The students got an aid in applying the knowledge in the practical world and students engaged in hands-on of the applications and their implementation.

THE PROGRAMME MBA EXECUTIVE

The Master of Business Administration- Executive (MBA-Executive) is a two-year full-time programme. The program shall run in hybrid mode or as per the UGC guidelines. The course structure and programme administration are as follows:

COURSE STRUCTURE

The programme has been organized in two years-First Year and Second Year, each year comprising two semesters. The list of papers offered during First Year and Second Year of the programme shall be as follows:

FIRST YEAR-

MBAEX-101 Management Process and Organizational Behavior –

The Study of organizational behavior includes areas of research dedicated to Improving job performance, increasing job satisfaction, promoting innovation and encouraging leadership , promoting team building and states various ways of stress management.

MBAEX102- STATISTICS AND RESEARCH METHODOLOGY

The aim of statistics is to draw a conclusion from data…performing descriptive data analysis.

Using appropriate statistical methods to solve the research problem and application of various tests such as - Z-Test, T-Test, F- Annova Test, Chi-Square Test.

MBAEX103: MANAGERIAL ECONOMICS

The Objectives of this

MBAEX-104 ENVIRONMENT MANAGEMENT

The objectives of this course is to consider the relationship between human beings and the world, from air pollution to the depletion of natural resources. It covers the importance of sustainability and started studying the moral and ethical relationship between humans and the environment.

It covers pollution and waste management and various standards such as ISO 14000,9000,20000.

MBAEX-105: MANAGERIAL SKILL DEVELOPMENT

The course is aimed at equipping the students with the necessary & techniques and skills of communication to inform others, inspire them and enlist their activity and willing cooperation in the performance of their jobs.

MBAEX-106: INDIAN ETHOS AND VALUES

Indian Ethos in Management refers to the values and practices that the culture of India (Bharatheeya Sanskriti) can contribute to service, leadership and management. These values and practices are rooted in Sanathana Dharma (the eternal essence), and have been influenced by various strands of Indian philosophy

MBAEX- 107: ACCOUNTING FOR MANAGERS

Objectives

The basic purpose of this course is to develop an insight of postulates, principles and techniques of accounting and utilisation of financial and accounting information for planning, decision-making and control.

MBAEX-108: COMPUTER APPLICATIONS IN MANAGEMENT

Objectives:
The objectives of this course include developing an appreciation of different software and hardware systems available in the industry among the participants and build up the experience of computer usage in business organizations with specific reference to commercial data processing systems

MBAEX-201: ORGANIZATION EFFECTIVENESS AND CHANGE

Objectives

To familiarize the students with basic organizational processes to bring about organizational effectiveness and change.

MBAEX – 202: MANAGEMENT SCIENCE

Course Objectives:

The real world problems are complex problems; they require finding of an optimum solution subject to a large number of constraints and decision variables. Handling them so as to achieve OPTIMUM SOLUTIONS is one of the biggest challenges among the players of the real world. Keeping this in mind, the whole Course is targeted to equip the students with necessary quantitative techniques (especially mathematical optimization methods) so that they become capable of solving managerial and financial decision problems in an objective and a scientific manner.

MBAEX-203: HUMAN RESOURCE MANAGEMENT

Objectives

In a complex world of industry and business, organisational efficiency is largely dependent on the contribution made by the members of the Organisation. The Objectives of this course is to sensitize students to the various facets of managing people and to create an understanding of the various policies and practices of human resource management.

MBAEX-204: FINANCIAL MANAGEMENT

Objectives:
The purpose of this course is to acquaint the students with the broad framework of financial decision making in a business unit.

MBAEX-205: MARKETING MANAGEMENT

Objectives

The purpose of this course is to develop and understanding of the underlying concepts, strategies and issues involved in the marketing of products and services

MBAEX- 206: PRODUCTION AND OPERATIONS MANAGEMENT

Objectives
The Course is designed to acquaint the students with decision making in: Planning, scheduling and control of

Production and Operation functions in both manufacturing and services; Productivity improvement in operations through layout engineering and quality management e tc.; Effective and efficient flow, replenishment and control of materials with reference to both manufacturing and services organizations.

MBAEX-207 E- COMMERCE

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems
After Completion of the subject student should able to
- Understand the basic concepts and technologies used in the field of management information systems
- Have the knowledge of the different types of management information systems
- Understand the processes of developing and implementing information systems
- Be aware of the ethical, social, and security issues of information systems.

MBAEX-208: INTERNATIONAL BUSINESS ENVIRONMENT AND MANAGEMENT

Objectives
The primary Objectives of this course is to acquaint the students to emerging global trends in business environment

MBAEX-301: BUSINESS POLICY & STRATEGIC MANAGEMENT

Objectives
The Objectives of this course is to develop understanding about strategic processes and their impact on a firm.

MBAEX-302: DECISION SUPPORT SYSTEMS AND MANAGEMENT INFORMATION SYSTEM

Objective
The objective of the course is to develop the basic understanding of the decision support system of the Artificial Intelligence for Business Organization

MBAEX-303: BUSINESS LEGISLATION

Objectives
The course is designed to assist the students in understanding basic laws affecting the operations of a business enterprise.

MBAEX-304: SUMMER TRAINING PROJECT

At the end of second semester, all students will have to undergo summer and training of 8-10 weeks with industrial, business or service organization by taking up a project study.

This helps the students in developing practical understanding about the industries and about their world culture.

MBAEX 401- BUSINESS ANALYTICS
Objective-

This course aims to devlop overall anatytical skills of the students and to help them to apply analytical techniques to business decision making.

FM-3102: SECURITY ANALYSIS AND INVESTMENT MANAGEMENT

Objectives
The objective of this course is to impart knowledge to students regarding the theory and practice of Security Analysis and Investment Decision Making Process

FM-3103: PORTFOLIO MANAGEMENT

Objectives
The objective of this course is to give the students an in-depth knowledge of the theory and practice of Portfolio Management.

FM-3105: MANAGEMENT OF FINANCIAL SERVICES

Objectives

The main objective of this course is to help students to learn the various financial services and their role in the overall financial system.

FM-3109: FINANCIAL DERIVATIVES

Objectives
The objective of this course is to give an in depth knowledge of the functioning of derivative securities market.

FM-3110: PROJECTS PLANNING, ANALYSIS AND MANAGEMENT

Objectives
The basic purpose of this course is to understand the framework for evaluating capital expenditure proposals, their planning and management in the review of the projects undertaken.

FM-3114: FOREIGN EXCHANGE MANAGEMENT

Objectives
To acquaint the participants with the mechanism of the foreign exchange markets, measurement of the foreign exchange exposure, and hedging against exposure risk.

MBA EX-3201: CONSUMER BEHAVIOUR

OBJECTIVES:
To understand the conceptual foundations of consumer buying behavior. To equip the learner to apply the principles and prepare for a career in Product and Brand Management in the FMCG and consumer durables industry

MBA EX-3202: ADVERTISING AND SALES PROMOTION MANAGEMENT

OBJECTIVES: To equip students for a career in Product and Brand Management, Advertising – with special reference

to Client servicing, Media planning and research.

MBA EX-3203: STRATEGIC MARKETING

Objectives

The basic objective of this course is to develop skills for analysing market competition and design appropriate competitive marketing strategies for higher market share.

MBA EX-3205: SALES AND DISTRIBUTION MANAGEMENT

Objectives

The purpose of this paper is to acquaint the student with the concepts which are helpful in developing a sound sales and distribution policy and in organising and managing sales force and marketing channels.

MBA EX-3208: MARKETING OF SERVICES

Objective: To differentiate between product and service businesses and equip for a career in marketing in the service industry.

MBA EX-3211: BRAND MANAGEMENT

Objective:
The objective of this course is to impart in-depth knowledge to the students regarding the theory and practice of Brand Management

MBA EX - 3213 PLANNING AND MANAGING RETAIL BUSINESS

Objectives :
The Course will focus manufacturers' perspective on retailers and understanding of the retail business

MBA EX 3215: LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Objectives:

To introduce process and functions of physical distribution system. To introduce the major building blocks, functions, business process, performance metrics and decision making in supply chain network. To provide an insight into the role of Internet Technologies and electronics commerce in supply chain management

MBA EX3216- Digital Marketing

Objectives

The objective of this paper is to create awareness about Digital Marketing and educate the learner about use of electronics in marketing management.

MBAEX-3301: MANAGEMENT OF INDUSTRIAL RELATIONS

Objectives

Organisational efficiency and performance are intricately interlinked with industrial relations. This course is an attempt to appreciate the conceptual and practical aspects of industrial relations at the macro and micro levels.

MBAEX- 3305: LEGAL FRAMEWORK GOVERNING HUMAN RELATIONS

Objectives

Understanding of the legal framework is important for the efficient decision making relating to man management and industrial relations. The course aims to provide an understanding, application and interpretation of the various labour laws and their implications for industrial relations and labour issues.

MBAEX-3306: MANAGEMENT TRAINING AND DEVELOPMENT

Objectives

The purpose of this paper is to provide an in-depth understanding of the role of Training in the HRD, and to enable the course participants to manage the Training systems and processes.

MBAEX-3308: ORGANIZATIONAL CHANGE AND INTERVENTION STRATEGIES

Objectives

The objective of this paper is to prepare students as organizational change facilitators using the knowledge and techniques of behavioural science.

MBAEX-3310: HUMAN RESOURCE DEVELOPMENT: STRATEGIES AND SYSTEMS

Objectives

The purpose of this course is to facilitate an understanding of the concepts, methods and strategies for HRD.

MBAEX-3311: HUMAN RESOURCE PLANNING AND DEVELOPMENT

Objectives

The objective of this paper is to develop a conceptual as well as a practical understanding of Human Resource Planning, Deployment and Development in organizations

MBAEX-3311: Hospital Planning

Course Objectives:

The objectives of the course are to enable the participants to - develop a basic understanding of the hospital planning and designing process; enable them to understand functional requirements; layout parameters in planning of the departments of the hospital; to learn new concepts in designing of healthcare facilities; and, to understand safety issues in hospital buildings and legal.

Describe the functional requirements and layout of various departments of the hospital.

- Have adequate knowledge of space and equipment planning for the departments of the hospital.
- Evaluate the legal compliances for hospital buildings
- Develop understanding of safety issues in hospital buildings

• Understand the modern and emerging trends in hospital architecture.
• To develop an understanding for efficient and economic hospital designs.

MBAEX-3412: Analytics for Health Care Management

Course Objectives:

In an environment where complexity is growing, decision makers in healthcare systems need to use data to make pertinent and accurate decisions. Their practices and policies should be supported and strengthened by data. Tools of analytics provide the capability to identify patterns in data and to implement this knowledge in developing strategies and improving performance. The objectives of this course are to enable the participants to develop an understanding of basic principles of data analysis and familiarize them with key tools and techniques that would enable them to take data-driven decisions in a hospital/healthcare delivery setting.

Course Learning Outcomes:

After the course, participants should be able to:
• Identify sources of data, suggest methods for collecting, sharing and analyzing data
• Understanding the issues involved in data quality and their management
• Discuss the difference between descriptive, predictive and prescriptive analytics
• Able to use basic data presentation and visualization tools and manipulate simple data-sets
• Discuss the basics of big-data, machine learning and artificial intelligence
• Able to identify decision problems amenable for analytics-based solutions. Understand how data analytics can provide potential solutions to improve quality and lower cost
• Able to lead team comprising of data scientists

MBAEX-3413: Health Care Ethics, Governance and Society

Course Objective:

The aim of the course is to help students gain understanding of how healthcare needs and delivery systems depend on the socio- cultural context of recipients of the society. The course contents focus on developing a People Centered Approach in health care professionals and creating health care delivery systems aligned with its principles. Finally, the course will sensitize participants towards ethics and regulation involved in private or public health care practice and engages in critical thinking to solve ethical dilemmas.

Course Learning Outcomes:

• To understand changing global trends with respect to disease and planning for the health care of the future in a progressively global, aging and urbanized context.
• Understanding what is culture and examining the elements of landmark and successful culture centered health interventions

To become familiar with elements of People Centered health care systems so that effective and equitable preventive, secondary and tertiary health care is available to all sections of the society.

- Special needs of marginalized sections of society like women, street children, those from war and disaster ravaged environments and others.
- Ethics involved in issues like surrogacy, organ donation, clinical trials, euthanasia and others.
- Governance, regulation and ethical protocols during practice for doctors and health practitioners and learning how to solve ethical dilemmas.

MBAEX-3414: Total Quality Management and Accreditation for Health Care

Course Objectives:

The key objective of this course is to acquaint the students with the conceptualization of Total Quality (TQ) from design assurance to processes' assurance to service assurance. TQM is to be linked with business excellence through management frameworks and award criteria. Additional objective is to give focus on Quality Management Systems (QMS) like 1SO-9001.The course would also aim to closely link management of quality with that of reliability and maintainability for total product assurance. Integration of operations systems like ISO 14001 (EMS) and occupational safety and health (OSH) and total productive maintenance (TPM) is also to be analyzed. The dimensions of quality in services in the contemporary environment are also to be focused. Course Learning Outcomes:

- Appreciate the nature, need and scope of total quality management and its relationship with operational and then business excellence.
- Appreciate the quality of design, off-line control, losses and costs of quality.
- Develop and analyses tools for hazard analysis
- Understand conceptual framework of TPM and study concept of OEE.
- Build knowledge about statistical process control through process capability studies.
- Deploy total quality principles in supply and vendor management
- Develop knowledge and skills about quality improvement tools.
- Develop total quality relationship with environment and safety systems.

MBAEX-3416: Innovations in Health Care and Health Care Entrepreneurship

Course Objectives:

The objectives of this are to introduce the participants to a wide range of advances and innovations that are happening in healthcare services. The innovations relate to use of technology, information technology, business and service delivery models. The objective of this course is to help the executives develop an entrepreneurial mind set and gain an understanding of the entire entrepreneurial process through analysis of various situations in health care organizations. Additionally, the purpose of the course is also to gain insights about the critical role of creativity and innovation to the development of new products and services in entrepreneurial start-ups in the health care

sector.

Course Learning Outcomes:

- Familiarization with innovations in healthcare technology – diagnostics, medical devices, etc., their impact on future of healthcare and their relevance to the Indian healthcare industry
- Introduction to the concepts of advances in Healthcare Information Technology like mHealth, Big Data, Artificial Intelligence, Genomics, etc.
- Introduction to newer models of service delivery like – telemedicine, remote health monitoring, home healthcare, etc., understanding opportunities and challenges posed by these models
- Introduction to newer business models in healthcare – mobile health apps, doctor discovery and networking platforms, understanding opportunities and challenges posed by these models
- Critically analyze issues involved in utilizing these advances in current and anticipated healthcare delivery models.

MBAEX-3417: Regulation and Laws in Health Sector and International Health Systems

Course Objectives:

The objective of this course is to make the participants familiar with the laws that govern health care services in the country. The course is aimed at enabling the participant in understanding the rationale behind existing legal framework and its tenets in India to safeguard the interests of the health care service providers (organizations and individuals) and consumers.

The objectives of this course is to enable the participants to - develop an understanding of basic healthcare delivery models of various developed and developing countries; to understand in detail about different approaches to the organization, financing and delivery of health services in these countries; to understand the health care reform programs and perform a strengths, weaknesses, opportunities, and threats (SWOT analysis) of healthcare delivery system of a country; and, to develop and understanding of healthcare reform strategies in different countries.

Course Learning Outcomes:

- Understand the existing legal framework in India that governs health care delivery
- Understand expected standards of ethical behavior and promote standards of ethical behavior
- Analyze role of legal system in health policy and health care delivery
- Contribute to legal reasoning in running of a healthcare organization
- Understand the rationale of legal system in the country
- Interpret legal provisions under various laws related to health care system
- Have adequate knowledge of all the laws that are currently in force in matters related to health care delivery

- Critically evaluate the legal provisions and interpret the laws and byelaws
- Develop skills to judiciously exercise powers, responsibilities and protect one's own rights as health care provider
- Understanding of the concept of various healthcare delivery models of countries both in developed and developing economics.
- Understanding demographic and macroeconomic indicators of various countries.
- Ability to evaluate health system performance of different countries in terms of efficiency and equity.
- Ability to identify specific health system strengths, weaknesses, opportunities, and threats (SWOT analysis) employing comparative analysis as a research tool.
- To compare the health system performance of the one country with other economically similar and different country.
- Understanding health care reform programs of several countries and to apply these reforms for betterment of healthcare delivery in India.
- Discussion on newer initiatives and strategies of Govt. of India in healthcare delivery.

MBAEX-3418: Management of Hospital Support Services

Course Objectives:

The objective of this course is to familiarize the participants with support services in the hospitals. It is aimed at enabling the participants to understand the framework of support services in hospital and their role in assisting clinical departments in the hospital to achieve clinical and service excellence. Support services under the purview of this course include Biomedical engineering department, Engineering department, clinical nutrition and dietetics, administration, human resource department, Front Office (OPD+IPD), laundry & housekeeping department, security department, food and beverages department, commercial department, medical records and Information technology department, etc.

Course Learning Outcomes:

At the end of the course, the learner should be able to know and understand:

- Major support services in the hospitals.
- Their contribution in achieving service excellence in hospital along with clinical excellence.
- Impact of support services on patient care.
- Impact of support services on the business of a hospital.
- Rationale of the support services- policies and procedures
- Roles and responsibilities of the managers and other functionaries in support services.
- Coordination among all the support services departments.

ANNEXURE 2.1

FACULTY OF MANAGEMENT STUDIES
MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

e-mail id

Minutes of meeting for committee of courses in management studies

The meeting for Committee of courses in Management studies was held both in online (using Google meet) and offline mode today on 19/11/2020 at 11.00A.M. at Faculty of Management studies, Mohanlal Sukhadia University. Following members were present in the meeting

1. Prof. Hanuman Prasad (Chairman &Convener)
2. Prof. Shurveer Bhanawat (External Member)
3. Prof. Shiv Prasad (Joined online)
4. Prof. Uma Shankar (Joined online)
5. Dr. Neha Paliwal (Joined online)
6. Prof. Karunesh Saxena
7. Prof. Anil Kothari
8. Prof Meera Mathur

The committee unanimously decided the following:

1.) **The minutes of previous Committee of Courses held on 07/05/2019 was approved.**

2.) The minor changes in existing MBA& BBA courses run in both UMS & BHM building were approved including changes in nomenclature of MBA E-Commerce to MBA E-Business.

3.) As per the courses proposed in RUSA projects following certificate and diploma courses were approved:
i) Certificate course in Digital Marketing
ii) Diploma course in Digital Marketing
iii) Diploma course in Retail Marketing

4.) It was decided that the proposal for creation of department under UMS be put in department committee for consideration.

The meeting ended with thanks to the chair.

Prof. Hanuman Prasad
(Chairman &Convener)

Prof. Shurveer Bhanawat

Prof. Karunesh Saxena
19.11.2020

Prof. Anil Kothari

Prof. Meera Mathur

Dr. Neha Paliwal

Geography
C-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

2.1. Demand Ratio

Programme	**2020-2021**	Annexure (Self-attested list of students admitted category-wise/Admission list)
PG	1:2.24 (112/50)	*C 2.1 a*
PhD	1:23.5 (470/20)	*C 2.1 b*
	2021-2022	
PG	1: 1.7 (68/40)	*C 2.1 c*
PhD	NIL (No admissions during reporting period)	N.A.

Programme name	**Programme Code**	**Number of seats available/sanctioned**					**Number of eligible applications received**	**Number of Students admitted**				
		Gen	**OBC**	**SC**	**ST**	**Others**		**Gen**	**OBC**	**SC**	**ST**	**Others**
2020-21												
M.A./ M.Sc. Semester programme	MAGeog_CBCS	15	08	06	05	06	112	16	09	06	05	04

HEAD
DEPARTMENT OF GEOGRAPHY
M.L. SUKHADIA UNIVERSITY
UDAIPUR (Rajasthan)

							2021-2022					
M.A./ M.Sc. Semester programme	MAGeog_CBCS	15	08	06	05	06	68	15	08	06	05	06

2.4.1 Average percentage of full-time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years) (10)							66.67%
Name of the Full-time teacher	**PAN**	**Designation**	**Name of the Department**	**Nature of appointment (Against Sanctioned post, temporary, permanent)**	**Year of appointment**	**Total years of Experience in the same institution**	**Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution**
Prof. Sadhana Kothari	*ACJPK5799F*	*Professor*	Department of Geography	Permanent	*1984 (DoCE) 1984(MLSU)*	37	Retired (January 2021)
Prof. Seema Jalan	*ADGPJ4370F*	*Professor*			1999 (DoCE) 2012 (MLSU)	22	Serving
Dr. D.S. Chouhan	*AQRPC6795M*	*Assistant Professor*			2016	5	Serving
Dr. BhanwarVishvendra Raj Singh	*KCZPS5186Q*	*Assistant Professor*			2018	3	Serving
Ms.Urmi Sharma	*FLHPS0962Q*	*Assistant Professor*			2018	3	Serving

Dr. Sabiha Khan	*BMEPK0261L*	*Assistant Professor*	2018	3	Serving
Dr. Vijay Singh Meena	*ANCPM7042D*	*Assistant Professor*	2018	3	Serving

2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1. Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website

(5)

Name of full-time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
N.A.							

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.	***Annexures*** *C 2.6.1 (a) UG Programme, C 2.6.1 (b) PG Programme and C 2.6.1 (c) PhD Programme*

DEPARTMENT OF GEOGRAPHY

Mohanlal Sukhadia University, Udaipur

Faculty of Earth Sciences

Final Merit List of Admissions to M.A/M.Sc. (Geography) CBCS Semester Programme, 2020 - 2021

SR. NO.	STUDENT MERIT NO.	REG NO.	NAME	FATHER NAME	CASTE CATEGORY	ADMITTED CATEGORY(ALLOTED SEAT)	FEE CATEGORY(ITP/NITP/EXEMPTE /SFS-ITP/SFS-NITP ETC.)
1	1	M20P137696	MANASVI BHATNAGAR	MR.HARISH BHATNAGAR	GENERAL	General	EXEMPTE
2	2	M20P178879	RUCHIKA RAO	Mr. MAN SINGH RAO	General	General	EXEMPTE
3	3	M20P188911	JAGRATI TIWARI	Mr. VIJAYKANT TIWARI	General	General	EXEMPTE
4	4	M20P189576	PREETI PAREEK	Mr. RAVI SHANKER PAREEK	General	General	EXEMPTE
5	5	M20P160717	PUSHPA BHATNAGAR	MR.NAGA RAM	SC	General	EXEMPTE
6	7	M20P150307	ARJUN LAL MEGHWAL	MR.UDAI LAL MEGHWAL	SC	General	EXEMPTE
7	9	M20P183229	SNEHA RAJPUT	MR.KUSHAL SINGH	OBC(NON CREAMY LAYER)	General	EXEMPTE
8	10	M20P182480	MEENA REGAR	MR.DALICHAND REGAR	SC	General	EXEMPTE
9	15	M20P168272	BHUMIKA TANK	MR.PRAKASH TANK	OBC(NON CREAMY LAYER)	General	EXEMPTE
10	23	M20P118718	MAHIPAL SINGH	MR.LAXMAN RAM	OBC(NON CREAMY LAYER)	OBC(NON CREAMY LAYER)	NITP
11	27	M20P131226	NARENDRA KUMAR	MR.SHANKAR LAL	OBC-NCL	OBC-NCL	NITP
12	28	M20P124864	ASHMITA KUMARI	MR.JAYANTI LAL	OBC(NON CREAMY LAYER)	OBC(NON CREAMY LAYER)	EXEMPTE
13	29	M20P103800	BHAVANA PATEL	MR.VELARAM PATEL	OBC(NON CREAMY LAYER)	OBC(NON CREAMY LAYER)	EXEMPTE
14	19	M20P122658	PAYAL MEENA	MR.LALA MEENA	ST	ST	EXEMPTE
15	52	M20P135658	MS. LAXMI KUMARI GARASIYA	MR.VALCHAND GARASIYA	ST	ST	EXEMPTE
16	53	M20P116930	BHERU SINGH GARASIYA	MR.KHUMAN SINGH	ST	ST	NITP
17	37	M20P181183	GAJENDRA SINGH SISODIYA	Mr.GOVERDHAN SINGH SISODIYA	EWS	EWS	NITP
18	61	M20P149172	PRADHYUMNA AMETA	Mr. DINESH AMETA	General	EWS	NITP
19	72	M20P118109	AYUSHI JAIN	MR.VIMAL KUMAR JAIN	ECONOMICALLY WEAKER SECTION	ECONOMICALLY WEAKER SECTION	EXEMPTE
20	87	M20P125737	DEVENDRA SINGH	Mr. KAPTAN SINGH	MBC	MBC	NITP
21	20	M20P166113	NISHA CHOUHAN	MR.DURGA SINGH CHOUHAN	GENERAL	GENERAL	EXEMPTE
22	26	M20P100186	HARPAL SINGH	Mr. INDRA SINGH	General	GENERAL	ITP
23	31	M20P104316	PARAMJEET GULIA	MR.DHEERPAL SINGH	GENERAL	GENERAL	ITP
24	32	M20P159026	DARSHAN KUNWAR	Mr.SHAMBHU SINGH	General	GENERAL	EXEMPTE
25	35	M20P100239	GOPAL LAL PRAJAPAT	MR.PRABHU LAL	OBC(NON CREAMY LAYER)	GENERAL	EXEMPTE
26	49	M20P182910	YASHVINI SUWALKA	MR.LOKESH SUWALKA	OBC(NON CREAMY LAYER)	OBC	EXEMPTE

TDC III Year Arts

C 2.1a

27	71	M20P175989	RAJESH YADAV	SHRI KACHARU YADAV	SC	SC	EXEMPTE
28	73	M20P113918	PRAHLAD KUMAR RAV	Mr. JAGDISH CHANDRA DHOLI	SC	SC	EXEMPTE
29	76	M20P105685	RAJENDRA BAMNIYA	MR HEERA LAL BAMNIYA	ST	ST	EXEMPTE
30	81	M20P157738	SHANTI MEGHWAL	SHRI PRABHU RAM	SC	SC	EXEMPTE
31	77	M20P140410	PINKI KUMARI	MR LAXMAN LAL MEENA	ST	ST	EXEMPTE
32	89	M20P152135	ARJUN LAL GAMAR	Mr. PREM CHAND GAMAR	ST	GENERAL	EXEMPTE
33	92	M20P183397	PAVAN KUMAR MEENA	Mr. DEVI LAL MEENA	ST	GENERAL	EXEMPTE
34	99	M20P128228	TARA KUMARI JAT	MR BALU RAM JAT	OBC-NCL	OBC-NCL	EXEMPTE
35	102	M20P101664	LALITA JAT	MR.MADHAV LAL JAT	OBC-NCL	OBC-NCL	EXEMPTE
36	118	M20P109090	KAVITA CHOUDHARY	MR BHANWAR LAL JAT	OBC-NCL	OBC-NCL	EXEMPTE
37	148	M20P179730	KISHAN SINGH JAT	Mr. VEER SINGH JAT	OBC-NCL	OBC-NCL	EXEMPTE
38	149	M20P120718	TEJPAL VERMA	SHRI DEVRAM VERMA	SC	SC	EXEMPTE
39	164	M20P172587	CHIRAG MEGHWAL	MR LAXMAN LAL MEGHWAL	SC	SC	EXEMPTE
40	126	M20P151097	PRAKASH CHANDRA BUNKAR	MR MAGNI RAM BUNKAR	SC	SC	EXEMPTE
41	163	M20P132942	AYUSH BHATT	MR MAHESH KUMAR BHATT	GENERAL	SFS	SFS-NITP

04.02.2021

MERIT LIST OF THE CANDIDATES PROVISIONALLY ADMITTED TO THE PH.D PROGRAM 2020-21

Date of Interview: 05.03.2021 to 10.03.2021

Department: GEOGRAPHY

MERIT NO	ROLL NO	CATEGORY	NAME OF CANDIDATE	PG SUBJECT	WEIGHTAGE MARKS				TOTAL (200)	NAME OF SUPERVISOR ALLOTTED
					MARKS IN PAPER II (100)	PAST ACADEMIC RECORD (60)	RESEARCH APTITUDE / TEACHING EXPERIENCE (20)	INTERVIEW (20)		
				UNRESERVED (09)						
1	104329	GENERAL	ANUBHAV SINGH	Geography	73	46.95	20	15	154.95	Prof. Seema Jalan
2	104894	EWS	MEHTAB SINGH RATHORE	Geography	70	50.58	20	14	154.58	Dr. D.S. Chouhan
3	104443	ST	LAXMI NARAYAN MEENA	Geography	75	43.10	20	14	152.10	Dr. Shivani Swarnakar
4	104801	GENERAL	ADITI RATHORE	Geography	73	44.60	20	14	151.60	Prof. Seema Jalan
5	104658	GENERAL	SUMIT KARAGWAL	Geography	75	38.60	20	14	147.60	Dr. Narendra Gupta
6	104366	OBC-NCL	DEEPA YADAV	Geography	71	46.45	20	10	147.45	Dr. Narendra Gupta
7	104697	GENERAL	VIKAS ESHARWAL	Geography	72	39.27	20	14	145.27	Dr. Vijay Singh Meena
8	104977	GENERAL	VIJAY KUMAR	Geography	75	36.18	20	14	145.18	Dr. D.S. Chouhan
9	104301	OBC-NCL	ABHAYVEER SINGH CHOUDHARY	Geography	78	37.76	20	9	144.76	Dr. Narendra Gupta
				OBC-NCL (21 %) (04)						
10	104559	OBC-NCL	RAJSHREE BHATI	Geography	71	44.00	20	8	143.00	Dr. Sabiha Khan
12	104326	OBC-NCL	ANJANA RATNU	Geography	69	41.31	20	12	142.31	Dr. D.S. Chouhan
15	104964	OBC-NCL	SHRIKANT	Geography	68	45.73	15	13	141.73	Dr. Monika Roat
17	104680	OBC-NCL	SURYA KANT SAINI	Geography	72	39.71	20	10	141.71	Dr. Monika Roat
				MBC-NCL (5 %) (01)						
16	191990	SBC	HARI SINGH GURJAR	Geography	74	35.72	20	12	141.72	Dr. Purnima Singh
				SC (16 %) (03)						
23	191940	SC	BHARTI CHOUHAN	Geography	70	38.64	20	11	139.64	Dr. Sabiha Khan
35	104499	SC	NEHA CHHILWAL	Geography	66	41.70	20	8	135.70	Dr. Monika Roat
40	104864	SC	KAILASH	Geography	62	40.77	20	12	134.77	Dr. Sabiha Khan
				ST (12 %) (02)						
11	104637	ST	SOHAN LAL MEENA	Geography	67	45.94	20	10	142.94	Dr. Narendra Gupta
24	104710	ST	VISHANU DUTT MEENA	Geography	69	41.32	20	9	139.32	Dr. Vijay Singh Meena
				PH (4%) (01)						
136	104956	PH	SAWA RAM	Geography	54	35.45	10	8	107.45	Dr. Monika Roat

Signature Interview Committee

(Dr. Vijay Singh Meena) (Dr. Sabiha Khan) (Dr. Bh. V.K. Singh) (Dr. D.S. Chouhan) (Prof. B.M. Vyas) (Observer)

Dept. of Geography

TDC III Year Arts
Paper I : Geography of India

C-2.16

Annexure

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

MERIT LIST OF THE CANDIDATES PROVISIONALLY WAITLISTED TO THE PH.D PROGRAM 2020-21

Date of Interview: 05.03.2021 to 10.03.2021

Department: GEOGRAPHY

MERIT NO.	ROLL NO.	CATEGORY	NAME OF CANDIDATE	PG SUBJECT	WEIGHTAGE MARKS				TOTAL (200)
					MARKS IN PAPER II (100)	PAST ACADEMIC RECORD (60)	RESEARCH APTITUDE / TEACHING EXPERIENCE (20)	INTERVIEW (20)	
			UNRESERVED (05)						
13	104810	GENERAL	ARSHEE KHAN	Geography	68	48.26	10	16	142.26
14	104691	GENERAL	URMILA	Geography	65	42.73	20	14	141.73
18	104537	OBC-NCL	PRIYANKA YADAV	Geography	59	45.11	20	17	141.11
19	192075	OBC-NCL	MOHAN LAL PRAJAPAT	Geography	74	42.01	20	5	141.01
20	104849	OBC-NCL	GIRDHARI LAL TAK	Geography	65	40.90	20	15	140.90
			OBC-NCL (02)						
18	104537	OBC-NCL	PRIYANKA YADAV	Geography	59	45.11	20	17	141.11
19	192075	OBC-NCL	MOHAN LAL PRAJAPAT	Geography	74	42.01	20	5	141.01
			MBC-NCL (01)						
36	192047	SBC	LAKSHMAN LAL GUJAR	Geography	72	37.55	16	10	135.55
			SC (02)						
41	104515	SC	PANKAJ KUMAR DEEGWAL	Geography	63	38.45	20	13	134.45
44	104888	SC	MAHIMA CHANDAURIYA	Geography	72	42.57	10	9	133.57
			ST (01)						
53	104671	ST	SURENDRA SINGH	Geography	56	41.07	20	13	130.07

Signature Interview Committee

(Dr. Vijay Singh Meena) (Dr. Sabiha Khan) (Dr. Bir V.K. Singh) (Dr. D.L. Chouhan) (Prof. B.M. Vyas)
(Observer)

HEAD
Dept. of Geography
MLSU, Udaipur

DEPARTMENT OF GEOGRAPHY

Faculty of Earth Sciences

Mohanlal Sukhadia University, Udaipur

Final Merit List of Admissions to M.A/M.Sc. (Geography) CBCS Semester Programme, 2021 - 2022

SR. NO.	STUDENT MERIT NO.	REG NO.	NAME	FATHER NAME	CASTE CATEGORY	ADMITTED CATEGORY(ALLOTED SEAT)
UR (UNRESERVED)						
1	2	M21P159252	MANDAVI KRISHNAWAT	MR.UDAI BHANU PRATAP SINGH	GENERAL	UR (UNRESERVED)
2	3	M21P100889	KAUSHLYA VYAS	MR.SHANKER LAL VYAS	GENERAL	UR (UNRESERVED)
3	4	M21P125268	POOJA KUMAWAT	MR.AMBALAL KUMAWAT	OBC(NON CREAMY LAYER)	UR (UNRESERVED)
4	5	M21P139822	KAJAL JAIN	MR.SAMPAT LAL JAIN	ECONOMICALLY WEAKER SECTION	UR (UNRESERVED)
5	6	M21P171658	PRIYANKA KUNWAR CHUNDAWAT	MR.RAM SINGH CHUNDAWAT	ECONOMICALLY WEAKER SECTION	UR (UNRESERVED)
6	7	M21P135615	PRIYANKA KUNWAR SISODIYA	MR.BHERU SINGH SISODIYA	ECONOMICALLY WEAKER SECTION	UR (UNRESERVED)
7	11	M21P146175	DIVYA KUNWAR RAV	MR.KAN SINGH RAV	OBC(NON CREAMY LAYER)	UR (UNRESERVED)
8	12	M21P180780	PRIYA KUNWAR CHUNDAWAT	MR.KALU SINGH CHUNDAWAT	ECONOMICALLY WEAKER SECTION	UR (UNRESERVED)
9	14	M21P103654	SUNITA VAIRAGEE	MR.RAMESHDAS VAIRAGEE	OBC(NON CREAMY LAYER)	UR (UNRESERVED)
10	16	M21P185644	JITENDRA PATEL	MR.PEMA RAM PATEL	OBC(NON CREAMY LAYER)	UR (UNRESERVED)
11	17	M21P158638	NARENDRA SALVI	MR.SOHAN LAL	SC	UR (UNRESERVED)
12	21	M21P107011	REKHA MEGHWAL	MR.RAJU LAL MEGHWAL	SC	UR (UNRESERVED)
13	22	M21P154439	VARSHA KHATIK	MR.CHANDRA PRAKASH KHATIK	SC	UR (UNRESERVED)
14	27	M21P115731	GARGI SHARMA	MR.ARUN SHARMA	GENERAL	UR (UNRESERVED)
15	28	M21P174446	JITENDRA KUMAR MEGHWAL	MR.SITA RAM	SC	UR (UNRESERVED)
OTHER BACKWARD CLASS (OBC)						
16	8	M21P155556	SARVAN KUMAR	MR.KARISHAN KUMAR	OBC(NON CREAMY LAYER)	OBC
17	18	M21P183634	RAJENDRA MEWARA	MR.ROSHAN LAL MEWARA	OBC(NON CREAMY LAYER)	OBC
18	29	M21P139015	SATISH PATIDAR	MR.DHANESHWAR PATIDAR	OBC(NON CREAMY LAYER)	OBC
19	31	M21P104560	MEERA KUMARI MALI	MR.SATYANARAYAN MALI	OBC(NON CREAMY LAYER)	OBC

SR. NO.	STUDENT MERIT NO.	REG NO.	NAME	FATHER NAME	CASTE CATEGORY	ADMITTED CATEGORY(ALLOTED SEAT)
20	35	M21P174325	ALOK CHAUDHARY	MR.ANTAR SINGH	OBC(NON CREAMY LAYER)	OBC
21	36	M21P143868	RAVINA KUMARI JANWA	MR.UDAY LAL JANWA	OBC(NON CREAMY LAYER)	OBC
22	53	M21P130515	NANA LAL PRAJAPAT	MR.SUKH LAL PRAJAPAT	OBC(NON CREAMY LAYER)	OBC
23	54	M21P158591	GAURAV BHOI	MR.GHANSHYAM BHOI	OBC(NON CREAMY LAYER)	OBC
SCHEDULED CASTE (SC)						
24	32	M21P171824	MANISH KUMAR	MR.JIVAN RAM ALARIYA	SC	SC
25	51	M21P168618	UJJWAL GARG	MR.MUKESH KUMAR GARG	SC	SC
26	52	M21P145171	CHETNA SINGH	MR.AJIT SINGH	GENERAL	SC
27	57	M21P153443	ISHWAR LAL KHATEEK	MR.MANOHAR LAL KHATEEK	SC	SC
28	58	M21P124135	BHAWNA JAT	MR.GANESH LAL JAT	OBC(NON CREAMY LAYER)	SC
29	68	M21P112407	UMA JAT	MR.BADRI LAL JAT	OBC(NON CREAMY LAYER)	SC
SCHEDULED TRIBE (ST)						
30	39	M21P151957	PAPPU SINGH MEENA	MR.SHANKAR SINGH MEENA	ST	ST
31	43	M21P161889	SHYAM LAL KATARA	MR.LAL SINGH	ST	ST
32	44	M21P116913	PAWAN KUMAR KHER	SHRI VITIYA	ST	ST
33	47	M21P123979	ARTI MEENA	MR.GOVIND MEENA	ST	ST
34	50	M21P169774	PUSHPA KUMARI MEENA	MR.MANIYA MEENA	ST	ST
ECONOMIC WEAKER SECTION (EWS)						
35	40	M21P110861	YOGEETA SINGH RANAWAT	MR.JASWANT SINGH RANAWAT	GENERAL	EWS
36	48	M21P103563	SATYADEEP KANWAR	SHRI.MAHENDRA SINGH	GENERAL	EWS
37	49	M21P114744	PAYAL KUNWAR SISODIYA	MR.SURENDRA SINGH SISODIYA	GENERAL	EWS
38	66	M21P158735	RUPESH SHRIMALI	MR.HEM SHANKAR SHRIMALI	ECONOMICALLY WEAKER SECTION	EWS
MOST BACKWARD CLASS (MBC)						
39	59	M21P183455	MAYA DEVASI	MR.GANESH DEVASI	MBC(NON CREAMY LAYER)	MBC
40	67	M21P175553	ASHA JAT	MR.UDAI LAL JAT	OBC(NON CREAMY LAYER)	MBC

DEPARTMENT OF GEOGRAPHY

University College of Social Sciences & Humanities
Mohanlal Sukhadia University, Udaipur, Raj. - 313001

(Programme Specific Outcomes and Course Outcomes)

Programme Specific Outcomes: (B.A. Three Year Pass Course)

PSO 1. To introduce the students to the importance of the discipline to understand the surroundings.

PSO 2. To understand the fundamental approaches and branches of the discipline.

PSO 3. To impart comprehensive knowledge of the regional geography of the State, country and the world.

PSO 4. To enable students to prepare for competitive examinations relevant for graduate students.

PSO 5. To develop an understanding of the cartographic tools and methods for representation of geographical data, surveying and mapping.

Proposed Scheme of Courses in Geography
Three-Year Pass Course (B. A.) 2015-16

TDC I Year Arts
Paper I : Physical Geography

Paper II : Human Geography

Practical : Cartography-I (Scales and presentation of geomorphic and climatic data)

TDC II Year Arts
Paper I : World Regional Geography

Paper II : Economic & Resource Geography

Practical : Cartography-II (Projections and presentation of socio-economic data & elementary statistical methods)

TDC III Year Arts
Paper I : Geography of India

Paper II : Geography of Rajasthan

Practical : Surveying and Remote Sensing

Notes:

1. Each theory paper will be of 70 marks each with minimum pass marks of 28
2. Each practical will be of 60marks with minimum pass marks of 23.
3. Teaching hours for each theory paper and practical will be three hours per week.
4. Practical batch will comprise of twenty Five students in one batch.
5. Use of map stencils (outline of political boundaries only) and simple function calculators are allowed in the examination.
6. Each theory paper of three hour duration will be divided into five units and questions will be asked as per following scheme:

Sections	Questions		Marks	Distribution of Questions
	To be Asked	To be Attempted		
1. Very Short (20-50 Words Answers)	10	10	20	Proportionately from each Unit with internal choice
2. Short Answers from each Unit with internal choice (250 words)	10	5	20	
3. Analytic/Descriptive Answers (500 words)	5	2	30	
Total	25	17	70	

DEPARTMENT OF GEOGRAPHY

Faculty of Earth Sciences

Mohanlal Sukhadia University, Udaipur

Course Outcomes: B.A. Geography (First Year) – Course – P (I) Physical Geography

CO 1. To make students understand their immediate surroundings
CO 2. To develop an understanding of theoretical concepts related with formation of the earth
CO 3. To create strong foundation of various geomorphological phenomena shaping the earth surface.
CO 4. To extend knowledge of landform dynamics, atmospheric phenomena and oceanography: three fundamental elements of the earth crust.
CO 5. To cover basic contents for various competitive examinations such as civil services, state level PSC exams, school education exams and so on.

B.A. First Year
Subject: Geography
Paper I - Physical Geography

Unit – I

a) Definition and scope of physical geography.
b) Origin of the earth - Tidal Hypothesis of James Jeans and Big Bang theory.
c) Interior of the earth.
d) Origin of the continent and oceans:- Wegner's theory of Continental drift and Plate tectonics.
e) Theories of mountain building:- Geosynclines Organ theory of Kober and Plate tectonic theory.

Unit – II

a) Isostacy :- Concept and Views of Airy and Pratt.
b) Diastrophism: - Faults & folds.
c) Weathering: - Physical, Chemical and Biological.
d) Drainage pattern and Cycle of erosion :- Davis & Penck.
e) Landforms: - Fluvial, coastal and arid.

Unit – III

a) Composition and structure of the atmosphere.
b) Atmospheric temperature: – Isolation and heat budget.
c) Atmospheric pressure :- Vertical and horizontal distribution of air pressure.
d) Winds: - Planetary, periodic and local winds.
e) Jet stream.

Unit – IV

a) Air masses: - Source region and classification of air masses.
b) Fronts :- Front genesis and frontolysis , Type of fronts.
c) Cyclones :- Tropical and temperate cyclones.
d) Anti cyclones.
e) Climatic classification by Koeppen.

Unit – V

a) Reliefs of the ocean basins - Bottom reliefs of the Indian ocean.

b) Distribution of temperature and Salinity of oceans.
c) Ocean currents : - Atlantic ocean and Pacific ocean currents.
d) Tides :- Type and theory of origin (Progressive wave and Stationary Wave theory.
e) Coral reefs :- Conditions of growth, types and origin according to Darwin and Murray.

Suggested Readings:

1. Dayal, P., A Text book of Geomorphology, Shukla Book Depot, Patna, 1996.
2. Dury, G. H., The Face of the Earth, Penguins, 1980.
3. Ernst, W.G., Earth Systems: Process and Issues, Cambridge University Press 2000.
4. ICSSR, A Survey of Research in Physical Geography, Concept, New Delhi, 1983.
5. Kale, V. and Gupta, A., Elements of Geomorphology, Oxford University Press, Calcutta, 2001.
6. Monkhouse, F. J., Principles of Physical Geography, Hodder and Stoughton, London, 1960.
7. Pitty, A., Introduction to Geomorphology, Methuen, London, 1974.
8. Sharma, H. S., Tropical Geomorphology, Concept, New Delhi, 1987.
9. Singh, S., Geomorphology, Prayag Pustakalaya, Allahabad, 1998.
10. Small, R. J., The Study of Landforms, McGraw Hill, New York, 1985.
11. Sparks, B. W., Geomorphology, Longmans, London, 1960.
12. Steers, J. A., The Unstable Earth: Some Recent Views in Geography, Kalyani Publishers, New Delhi, 1964.
13. Strahler, A. N., Environmental Geo-Science, Hamilton Publishing, Santa Barbara, 1973.
14. Strahler, A. N. and A. H. Strahler, Modern Physical Geography, John Wiley & Sons, 1992.
15. Summerfield, M. A., Global Geomorphology, Longman, 1991
16. Thornbury, W. D., Principles of Geomorphology, Wiley Eastern, I969.
17. Wooldridge, S. W. and R. S. Morgan, The Physical Basis of Geography: An Outline of Geomorphology, Longman Green & Co., London, 1959.
18. Wooldridge, S. W., The Geographer as Scientist, Thomas Nelson and Sons Ltd., London, 1956.
19. Barry, R. G. and R. J. Chorley, Atmosphere, Weather and Climate, Routledge, 1998.
20. Critchfield, H., General Climatology, Prentice-Hall, New York, 1 975.
21. Das, P. K., The Monsoons, National Book Trust, New Delhi, 1968.
22. Lydolph, Paul E., The Climate of the Earth, Rowman and Allanheld, Totowa, N. J., 1985.
23. Mather, J. R., Climatology, McGraw Hill, New York, 1974.
24. Patterson, S., Introduction of Meteorology, McGraw Hill Book Co., London, 1 969.
25. Stringer, E. T., Foundation of Climatology, Surjeet Publications, Delhi, 1982.
26. Trewartha, G. T., An Introduction to Climate, International Students Edition, McGraw Hill, New York, 1980.
27. Anikouchine, W. A. and R. W. Sternberg, The World Oceans: An Introduction to Oceanography, Englewood Cliffs, N. J. 1973.
28. Gerald, S., General Oceanography: An Introduction, John Wiley & Sons, New York, 1980.
29. Garrison, T., Oceanography, Wadsworth Co. USA, 1998.
30. King, C. A. M., Beaches and Coasts, E. Arnold, London, 1972.
31. King, C. A. M., Oceanography for Geographers, E. Arnold, London, 1975.
32. Sharma, R. C. and M. Vatel, Oceanography for Geographers, Chetnya Publishing House, Allahabad, 1970.

33. Shepard, F. P., Submarine Geology, Harper & Sons, New York, 1948.
34. Thurman, H. B., Introductory Oceanography, Charles Webber E. Merril Publishing Co., 1984.
35. Weisberg, J. and Howard, Introductory Oceanography, McGraw Hill Book Co., New York, 1976.
36॰ सविन्द्रसिंह : भौतिक भूगोल, वसुन्धरा प्रकाषन, गोरखपुर, 1997
37॰ शर्मा एच.एस. : "भौतिक भूगोल" पंचशील प्रकाशन, जयपुर
38॰ चतुर्भुज मामोरिया एव जैन : भौतिक भूगोल एवं जीव मण्डल, साहित्य भवन आगरा, 1996
39॰ वीरेन्द्र सिंह चौहान : भौतिक भूगोल, रस्तोगी पब्लिकेषन्स, मेरठ, 1996
40॰ उपाध्याय एल. एन. : भौतिक भूगोल, राज. हिन्दी ग्रन्थ अकादमी, जयपुर
41॰ तिक्खा, रामनाथ : भौतिक भूगोल, केदारनाथ रामनाथ, मेरठ
42॰ तिवारी, ए. के. : जलवायु विज्ञान के मूल तत्व, राज.हिन्दी ग्रन्थ अकादमी, जयपुर
43॰ नेगी, बी. सी. : जलवायु विज्ञान तथा समुद्र विज्ञान, केदारनाथ रामनाथ, मेरठ

Course Outcomes: B.A. Geography (First Year) – Course - P (II) Human Geography

CO 1. To extend knowledge of core concepts, theories and ideologies of Human Geography.
CO 2. To develop fundamental understanding of evolution of human races and distribution and socio-economic fabric of major tribes in the world and India.
CO 3. To foster knowledge about distribution of population in the world, fundamental demographic concepts and population challenges with respect to India.
CO 4. Basic contents for various competitive examinations for civil services, state PSC exams, school education exams, and so on.

B.A. First Year
Subject: Geography
Paper: II Human Geography

Unit – I

a) Definition and scope of Human geography.
b) Its relation with other social sciences.
c) Schools of Human geography: - Determinism, Possibilism and Neo – Determinism.
d) Concept of Man – Environment relationship.
e) Fundamental principles of Human geography: Principles of activities, Principle of areal differentiation, Principle of terrestrial unity.

Unit – II

a) Stages of evolution of man
b) Races of mankind: - criteria of classification according to G. Taylor
c) Classification and distribution of races according to G. Taylor
d) Factors of evolution of human races
e) Migration zone theory by Griffith Taylor

Unit – III

a) Distribution of Tribes in the world.
b) Habitat, Occupation & social organization: Pigmies, Badawins, Eskimos and Khirgiz,
c) Distribution of Tribes in India
d) Habitat, economic activities and social organization of Bhil, Naga, Toda and Santhal.
e) Early economic activities of mankind :- Food gathering, Hunting, Fishing & Shifting cultivation.

Unit – IV

a) Distribution of population: world distribution pattern physical, economic and social factors influencing spatial distribution.
b) Concept of over population, under population, optimum population and zero population growth.
c) Demographic transition theory.
d) Migration-internal and international, general laws of Migration
e) Concept of human development and population problems and policy of India.

Unit – V

a) Settlement: origin and types of settlement.
b) Rural settlement-Pattern of rural settlements, house types and building materials, rural settlement in India
c) Urban settlement- origin of towns, patterns of cities.
d) Functional classification of cities, zoning of cities, Christaller's theory
e) Urbanization and problems: slums, town planning, concept and principles.

*Note – Stencils are to be permitted in the examination.

Suggested Readings:

1. Brunhes, J. : Human Geography
2. Huntington, E.: The Principles of Human Geography, John Wiley & Sons, N.Y.
3. Perpillou, A.V. : Human Geography, Longmans, 1965
4. Money, D.C.: An Introduction to Human Geography; U.I.P. London
5. Karan, M.P. : Manav Bhugol ke Siddhant, Kitabghar, Kanpur
6. Mamoria, C.B. : Principles of Human Geography
7. Negi, B.S. : Human Geography- An Ecological Aproach, Kedarnath Ramnath, Meerut,1982
8. Dwivedi, R.L. & Singh, R.L. : Manav Bhugol ki Samiksha
9. Blache Vidal de la : Manav Bhugol ke Siddhant (in Hindi)

Course Outcomes: B.A. Geography (First Year) – Course - Practical: Cartography – I

CO 1. To develop an understanding of fundamentals of scales.
CO 2. To develop skills of representing geomorphic features using cartographic methods.
CO 3. To train students to represent climatic data using various graphs.
CO 4. To impart sound knowledge of weather symbols and instruments.

B. A. First Year (Geography)

PRACTICAL

UNIT – I

a) History of Cartography (as art and science)
b) Scales: definition, types – Statement scale, Representative Fraction (R.F.) and Graphical scale. Inter-conversion of R.F. and Statement scale. Construction of Plain, Comparative, Diagonal, Time and Vernier scales *10 exercises*
c) Enlargement, reduction and combination of maps *02 exercises*

UNIT – II

a) Methods of representation of relief – Hachures, Formlines, Contours and Layer Tint methods *04 exercises*

b) Composite features to be drawn with help of contours patterns representing glaciated, arid and fluvial topography (any two of either youth, mature and old stage) *06 exercises*

c) Profiles- types of profiles. Construction of serial (at least four),superimposed, projected and composite profiles *02 exercises*

UNIT - III

a) Principles and working of weather instruments – thermometer, thermograph, barometer, barograph, hygrometer, hygrograph, rain gauge, wind vane and cup anemometer

b) Weather symbols. *01 exercise*
Interpretation of Indian weather maps (One each of December- January and July- August) *02 exercises*

c) Representation and interpretation of climatic data – Rainfall histogram, Hythergraph, Climograph, Rainfall variability graph (departure from mean) *04 exercises*

Notes

1. Each exercise should be drawn on 1/4th of a full drawing sheet.
2. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
3. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.

Scheme of examination

1. Candidates will be examined by Internal Examiner as per existing norms of the University
2. The distribution of marks will be as follows:

a)	Test Paper	36 marks
b)	Record	14 marks
c)	Viva Voce	10 marks
	Total	***60 marks***

Suggested Readings

1. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
2. Robinson, A. R.,Elements of Cartography, Chapman & Hall.
3. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
4. Raize, E., General Cartography, McGraw Hill Book Co., London.
5. Singh, R. N. and Kanaujia L. R. S., Map Work & Practical Geography, Central Book Depot, Allahabad.
6. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
7. शर्मा, जे. पी. : प्रायोगिक भूगोल, रस्तोगी प्रकाशन, मेरठ
8. जैन, शेषमल : प्रयोगात्मक भूगोल, साहित्य भवन, आगरा
9. भल्ला, आर. एल. : प्रायोगात्मक भूगोल, के. ड़ी प्रकाशन, अजमेर
10. मामोरिया, चतुर्भज : मानचित्र विज्ञान एवं प्रायोगात्मक भूगोल, साहित्य भवन, आगरा
11. वर्मा, एल. एन. व लोढ़ा, आर. एम. : प्रायोगात्मक भूगोल, राज. हिन्दी ग्रंथ अकादमी, जयपुर
12. सिंह, एल. आर. : मानचित्र एवं प्रायोगात्मक भूगोल, सेन्ट्रल बुक डिपो, इलाहाबाद
13. सिंह एवंकन्नोजिया : प्रायोगात्मक भूगोल की रूपरेखा, सेन्ट्रल बुक डिपो, इलाहाबाद
14. खुल्लर, डी. आर., प्रयोगात्मक भूगोल, कल्याणी पब्लिशर्स, नईदिल्ली
15. मिश्रा, आर. एन. एवं शर्मा, पी. के.: प्रायोगिक भूगोल, रावत पब्लिकेषन्स, जयपुर

Course Outcomes: B.A. Geography (Second Year) – Course - P (I) World Regional Geography

CO 1. To develop an understanding of terrain, climate, natural vegetation and soil of various continents.

CO 2. To gain knowledge about demographic and economic aspects of major continents of the world.

CO 3. To enrich the knowledge of regional geography of various continents.

CO 4. Basic contents for various competitive examinations for civil services, state level PSC exams, school education exams and so on.

B.A. Second Year
Subject: Geography
Paper I: World Regional Geography

UNIT I: Japan (Asia)

a) Geographical Location and Importance of Japan in Asia
b) Physical Division, Drainage and Climate
c) Population Distribution and Urbanization
d) Horticulture and Natural Resources: Vegetation and Major Minerals
e) Industrial Regions of Japan

UNIT II: Egypt (Africa)

a) Geographical Location and Importance of Egypt in Africa
b) Physical Division, Drainage and Climate
c) Population Distribution and Natural Resources: Vegetation and Major Minerals
d) Agricultural Development in Nile Valley: Aswan Project & Irrigation
e) Industrial Development

UNIT III: United State of America (North America)

a) Geographical Location and Importance of USA in North America
b) Physical Division, Drainage and Climate
c) Population Distribution and Development of Megalopolis (East Coast)
d) Agricultural Belts: Wheat, Corn and Cotton
e) Industrials Regions: Iron-Steel and Engineering Industry

UNIT IV: Brazil (South America)

a) Geographical Location and Importance of Brazil in South America
b) Physical Division, Drainage and Climate
c) Population Distribution and Natural Resources: Vegetation and Major Minerals
d) Agricultural Development: Coffee & Sugarcane: Distribution and Production
e) Industrial development and Urbanization

UNIT IV: France (Europe) & New Zealand (Oceania)

a) Geographical Location and Importance of France in Europe
b) Physical Division, Drainage and Climate of France
c) Population Distribution and Paris basin: Agriculture, Industrial Regions, Transportation
d) Geographical Location, Physical Division and Climate of New Zealand
e) Population Distribution and Dairy Farming

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1. Cole, J., A Geography of the World's Major Regions, Routledge, London, 1996.
2. Cole, J. P., Latin America - Economic and Social Geography, Butterworth, USA, 1975.
3. Cole, M. M., South Africa, Dutton, New York, 1961.
4. de Blij, H. J., Geography: Regions and Concepts, John Wiley & Sons Inc., New York, 1994.
5. Dickenson, J. P. et al., The Geography of the Third World, Routledge, London, 1996.
6. Gourou, R., The Tropical World, Longman, London, 1980.
7. Jackson, R. H. and L. E. Hudman, World Regional Geography: Issues for Today, John
8. Kolb, A., East Asia: Geography of a Cultural Region, Methuen, London, 1977.
9. Minshull, G. N., Western Europe, Hoddard & Stoughton, New York, 1984.
10. Patterson, J. H., Geography of Canada and the United States, Oxford University Press, 1985.
11. Songquiao, Z., Geography of China, John Wiley & Sons Inc., New York, 1994.
12. Ward, R. W. and A. Miller, World Regional Geography: A Question of Place, John Wiley &Sons Inc., New York, 1989.
13. वर्मा, लक्ष्मी नारायण, प्रादेशिक भूगोल, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
14. हुसैन, माजिद, विश्व का भूगोल, रावत पब्लिकेशन, नई दिल्ली
15. मिश्र, निरंजन, क्षैत्रीय भूगोल, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर

Course Outcomes: B.A. Geography (Second Year) – Course - P (II) Economic & Resource Geography

CO 1. To enhance spatial knowledge of various economic activities of man in relation to his natural milieu.

CO 2. To develop an understanding of classification and conservation of natural resources.

CO 3. To develop insight into distribution, production and status in international trade of selective agricultural and industrial activities.

CO 4. To develop a comprehensive understanding of international trade and transport activities and trade organizations at world level.

B. A. SECOND YEAR
SUBJECT: GEOGRAPHY
Paper-II: Economic & Resource Geography

Unit – I

a) Definition, nature and scope of economic geography
b) Recent trends in economic geography; its relation with economics, and allied subjects.
c) Classification of economies and spatial organization.
d) Sectors of economy: primary, secondary and tertiary.
e) Impact of economic activities on environment.

Unit – II

a) Natural resources: meaning; Classification of resources.
b) Conservation of resources; Water and forest resource conservation.
c) Changing nature of economic activities: Mining and forestry,
d) Changing nature of economic activities: Agriculture and industry.
e) Changing nature of economic activities: Trade and transport.

Unit – III

a) Agricultural types and classification.
b) Agriculture: physical, social, cultural environment influencing crop production.
c) Spatial distribution, production and international trade of rice and wheat
d) Spatial distribution, production and international trade of cotton and rubber.
e) Spatial distribution, production and international trade of coffee and tea.

Unit – IV

a) Classification of minerals; distribution, production and trade of iron ore and bauxite.
b) Distribution and production of coal, petroleum and hydroelectricity.
c) Factors of localization of industries; iron and steel industry.
d) Chemical and cement industries.
e) Textile and ship building industries.

Unit – V

a) Trade and transport: geographical factors in their development.
b) Major water, land and air transport routes.
c) Internal and international trade.
d) World Trade Organization (WTO) and globalisation.
e) Impact of WTO and globalisation on developing countries of the world.

Suggested Readings:

1. Bengston, N. A. and V. L. Royen, Fundamental of Economic Geography, Prentice Hall, New York.
2. Boesch, H., A Geography of World Economy, D. Van-Nostrand Co., New York, 1964.
3. Chapman, J. D., Geography and Energy, Longman, London, 1989.
4. Gregor, H. F., Geography of Agriculture, Prentice Hall, New Jersey, USA, 1970.
5. Griggs, D. B., The Agricultural Systems of the World, Cambridge University Press, New York, 1974.
6. Hartshorne, T. N. and J. W. Alexander, Economic Geography, Prentice Hall, New Delhi, 1988.
7. Jones, C. F. and G. G. Darkenwald, Economic Geography, McMillan Co., New York. 1975.
8. Millar E., Geography of Manufacturing, Prentice Hall, New York, 1962.
9. Pickes, L. D., The Wealth of The World, Dan & Co., London.
10. Raza. M. and Y. Agrawal, Transport Geography of India, Concept, New Delhi, 1986.
11. Robinson, H., Economic Geography, Longmans.
12. Smith, D. M., Industrial Location - An Economic Geographical Analysis, John Wiley, New York, 1971.
13. Stamp, L. D., A Commercial Geography, Longmans.
14. Thomas, R. S., The Geography of Economic Activities, McGraw Hill, New York 1962.
15. UNO, Statistical Year Book (Latest Edition).

16ण दास, गुप्ता एवं कपूर :आर्थिक और वाणिज्य भूगोल, एस चांद एण्ड कम्पनी, दिल्ली

17ण दुबे रामनाथ :आर्थिक–वाणिज्य भूगोल, किताब महल, इलाहाबाद

18ण नेगी :संसाधन भूगोल

19ण नेगी :मानव तथा आर्थिक भूगोल

20ण जैन, पी. :आर्थिक भूगोल की समीक्षा

21ण कौशिक, एस.डी. :आर्थिक भूगोल की समीक्षा

22ण कौशिक, एस.डी. :संसाधन भूगोल

Course Outcomes: B.A. Geography (Second Year) – Course – Practical: Cartography-II (Projections and Presentation of socio-economic data)

CO 1. To develop a fundamental understanding of various types and use of map projections.

CO 2. To understand the pre-conditions, suitability and limitations of various maps and diagrams.

CO 3. To learn the various techniques for cartographic representation of socio-economic phenomena using thematic maps, diagrams and graphs.

CO 4. To learn fundamentals of quantitative techniques.

B. A. Second Year (Geography)

PRACTICAL

UNIT – I

a) Maps – definition and classification; map elements, principles of map composition

b) Drawing of Dot, Chorochromatic, Choroschematic, Isopleth (temperature and rainfall data of Rajasthan/ India) maps, Choropleth *06 exercises*

c) Topographical sheets- history, conventional symbols, scheme of classification-old and new

Study and interpretation of Survey of India toposheet at 1: 50,000 representing typical areas of Rajasthan in respect of relief, drainage, land use, settlement and means of transportation *04 exercises*

Scale of slope *02 exercises*

UNIT – II

a) Graphs – elements, characteristics and construction of poly, band and triangular graphs *03 exercises*

b) Diagrams – Elements and characteristics of one, two and three dimensional diagrams using appropriate socio-economic data *08exercises*

c) Flow diagram (traffic/population data) *01 exercise*

UNIT - III

a) Utility of statistical methods in Geography, Frequency distribution, histograms

b) Measures of central tendency – Arithmetic mean, median and mode

c) Measures of dispersion – standard deviation and coefficient of variation

d) Measures of correlation – Scatterplot, Spearman's rank correlation and Karl Pearson's Product Moment correlation

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Notes

1. Each exercise should be drawn on 1/4th of a full drawing sheet.
2. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
3. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.

Scheme of examination

1. Candidates will be examined by Internal Examiner as per existing norms of the University
3. The distribution of marks will be as follows:

a)	Test Paper	36 marks
b)	Record	14 marks
c)	Viva Voce	10 marks
	Total	***60 marks***

4. The distribution of marks will be as follows:

a. Paper 36 Marks
b. Record Work* 14 Marks
c. Viva-voce** 10 Marks

* Record work will be assessed by the teacher in-charge of the practical group and the external examiner.

** Viva-voce will be based on the record work.

5. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.

Suggested Readings:

Suggested Readings

1. Bygott, J., An Introduction to Map Work and Practical Geography, University Tutorial Press, London.
2. Cole, John P. and Cuchlaine A. M. King, Quantitative Geography: Techniques and Theories in Geography, John Wiley & Sons Ltd., London, 1970.
3. Hammond, Robert and McCullagh Patrick, Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford, 1978.
4. Meux, A. H., Reading Topographical Maps, University of London Press.
5. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
6. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
7. Raize, E., General Cartography, McGraw Hill Book Co., London.

8. Robinson, A. R., Elements of Cartography, Chapman & Hall.
9. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
10. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
11. Singh, R. N. and L. R. S. Kanaujia, Map Work & Practical Geography, Central Book Depot, Allahabad.
12. Tamaskar E. G. and V. M. Deshmukh, Geographical Interpretation of Indian Topographical Maps, Orient Longman.
13. शर्मा, जे. पी. : प्रायोगिक भूगोल, रस्तोगी प्रकाशन, मेरठ
14. जैन, शेषमल : प्रयोगात्मक भूगोल, साहित्य भवन, आगरा
15. भल्ला, आर. एल. : प्रायोगात्मक भूगोल, के. डी प्रकाशन, अजमेर
16. मामोरिया, चतुर्भज : मानचित्र विज्ञान एव प्रायोगात्मक भूगोल, साहित्य भवन, आगरा
17. वर्मा, एल. एन. व लोढ़ा, आर. एम. : प्रायोगात्मक भूगोल, राज. हिन्दी ग्रंथ अकादमी, जयपुर
18. सिंह, एल. आर. : मानचित्र एवं प्रायोगात्मक भूगोल, सेन्ट्रल बुक डिपो, इलाहाबाद
19. सिंह एवं कन्नोजिया : प्रायोगात्मक भूगोल की रूपरेखा, सेन्ट्रल बुक डिपो, इलाहाबाद
20. खुल्लर, डी. आर., प्रयोगात्मक भूगोल, कल्याणी पब्लिशर्स, नई दिल्ली
21. मिश्रा, आर. एन. एवं शर्मा, पी. के.: प्रायोगिक भूगोल, रावत पब्लिकेषन्स, जयपुर
22. Ahmed, K. S., Simple Map Projection, Friends Book House, Aligarh.
23. Bygott, J., An Introduction to Map Work and Practical Geography, University Tutorial Press, London.
24. Meux, A. H., Reading Topographical Maps, University of London Press.
25. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
26. Monkhouse, F. J., Maps and Diagrams, Methuen & Co. Ltd., London.
27. Raize, E., General Cartography, McGraw Hill Book Co., London.
28. Robinson, A. R., Elements of Cartography, Chapman & Hall.
29. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
30. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.
31. Singh, R. N. and L. R. S. Kanaujia, Map Work & Practical Geography, Central Book Depot, Allahabad.
32. Tamaskar E. G. and V. M. Deshmukh, Geographical Interpretation of Indian Topographical Maps, Orient Longman.

12. शर्मा, जे. पी. : प्रायोगिक भूगोल, रस्तोगी प्रकाशन, मेरठ
13. जैन शेषमल : प्रायोगात्मक भूगोल, साहित्य भवन आगरा
14. भल्ला, एल. आर. : प्रायोगात्मक भूगोल, के.डी. प्रकाशन, अजमेर
15. मामोरिया चतुर्भुज : मानचित्र विज्ञान एवं प्रायोगात्मक भूगोल, साहित्य भवन, आगरा
16. पंवार, आर. एस. : मानचित्र विज्ञान एवं प्रायोगात्मक भूगोल, तुलसी प्रकाषन, मेरठ
17. वर्मा एवं लोढा : प्रायोगात्मक भूगोल, राज. हिन्दी ग्रन्थ अकादमी, जयपुर
18. सिंह, एल.आर.; : मानचित्र एवं प्रायोगात्मक भूगोल, सेन्ट्रल बुक डिपो, इलाहाबाद
19. सिंह एवं कन्नोजिया : प्रायोगात्मक भूगोल की रूपरेखा, सेन्ट्रल बुक डिपो, इलाहाबाद

Course Outcomes: B.A. Geography (Third Year) – Course - P (I) Geography of India

CO 1. To develop a sound understanding of natural and cultural landscape of India.

CO 2. To develop comprehensive understanding of the physical, economic and demographic aspects of the country.

CO 3. To develop an understanding of the planning regions and developmental challenges on regional basis.

CO 4. To cover the fundamental contents of general studies for various competitive examinations such as civil services, state level PSC exams, school education exams and so on.

B.A. Third Year
Subject: Geography
Paper-I: Geography of India

Unit – I

a) India in the context of Southeast and South Asia.
b) India: a land of diversities; unity within diversities.
c) Major terrain elements of India and their role in shaping physical landscape of India.
d) Drainage systems of India and their functional significance.
e) The morphological regions of India.

Unit – II

a) Regional and seasonal variations of climate: the monsoon, western disturbance, norwesters, climatic regions of India.
b) Soil types of India: their distribution and characteristics
c) Vegetation types and their distribution; forest resources
d) Status, use and need for conservation of mineral resources
e) Status, use and need for conservation of power resources

Unit – III

a) Spatial distribution of population and density; socio-economic implications of population growth; urbanization;
b) Changing nature of Indian economy.
c) Agricultural growth during the plan period; Green Revolution vis-à-vis traditional farming;
d) Major crops and their status; wheat, Rice, Sugarcane, cotton
e) Regionalization of Indian agriculture;

Unit – IV

a) Industrial development and Indian economy.
b) Industrial regions of India and their industrial structure.
c) Major industries: Iron and steel, Cotton, cement, chemical Industries
d) Means of transportations: Roads, Railways and Railways
e) Composition of Domestic and International trade.

Unit – V

a) Basis of regional divisions of India.
b) Classification of Economic Regions of India: P. Sen Gupta
c) Comparative Analysis of macro regions.
d) Resource regions of India.

Course Outcomes: B.A. Geography (Third Year) – Course - P (I) Geography of India

CO 1. To develop a sound understanding of natural and cultural landscape of India.

CO 2. To develop comprehensive understanding of the physical, economic and demographic aspects of the country.

CO 3. To develop an understanding of the planning regions and developmental challenges on regional basis.

CO 4. To cover the fundamental contents of general studies for various competitive examinations such as civil services, state level PSC exams, school education exams and so on.

B.A. Third Year
Subject: Geography
Paper-I: Geography of India

Unit – I

a) India in the context of Southeast and South Asia.
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c) Major terrain elements of India and their role in shaping physical landscape of India.
d) Drainage systems of India and their functional significance.
e) The morphological regions of India.

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b) Soil types of India: their distribution and characteristics
c) Vegetation types and their distribution; forest resources
d) Status, use and need for conservation of mineral resources
e) Status, use and need for conservation of power resources

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a) Spatial distribution of population and density; socio-economic implications of population growth; urbanization;
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e) Regionalization of Indian agriculture;

Unit – IV

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b) Industrial regions of India and their industrial structure.
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Unit – V

a) Basis of regional divisions of India.
b) Classification of Economic Regions of India: P. Sen Gupta
c) Comparative Analysis of macro regions.
d) Resource regions of India.

e) Planning region of India

Suggesting Readings:

1. Deshpande, C. D., India - A Regional Interpretation, Northern Book Centre, New Delhi, 1992.
2. Farmer, B. H., An Introduction to South Asia, Methuen, London, 1983.
3. Govt. of India, India - Reference Annual, Pub. Div, New Delhi, (latest edition)
4. Govt. of India, National Atlas of India, NATMO Publication, Calcutta.
5. Govt. of India, The Gazetteer of India, Vol. I & III Publication Division, New Delhi, 1965.
6. Khullar, D. R., India: A Comprehensive Geography, Kalyani Publishers, Ludhiana, 2000.
7. Learmonth, A. T. A. et al (ed), Man and Land of South Asia, Concept, New Delhi.
8. Manorama Press, Manorma Year Book, Kottayam (Kerala), (Latest Edition).
9. Mitra, A., Levels of Regional Development of India, Census of India, Vol. 1, Part I-A (i) and (ii), New Delhi, 1967.
10. Routray, J. K., Geography of Regional Disparity, Asian Institute of Technology, Bangkok, 1993.
11. Shafi, M, Geography of South Asia, McMillan & Co., Calcutta, 2000.
12. Singh, G., Geography of India. Atmaram & Sons, Delhi.
13. Singh, R. L. (ed), India: A Regional Geography, National Geographical Society, India,
14. Spate, O. H. K. and Learmonth, A. T. A., India and Pakistan - Land, People and Economy Methuen & Co., London, 1967.
15. Times of India Press, Times of India Year Book, Bombay (Latest Edition)
16. Vaidiya, K. S., Dynamic Himalaya, University Press, Hyderabad, 1998,
17. Wadia, D. N., Geology of India, McMillan & Co., London, 1967.
18. गौड कृपाशंकर : भारत की भौगोलिक समीक्षा, हिन्दी प्रचार पुस्तकालय, वाराणसी
19. मामोरिया चतुर्भुज : भारत का आर्थिक भूगोल, आगरा बुक स्टोर, आगरा
20. दुबे, रामनाथ : भारत का आर्थिक भूगोल, किताब महल, इलाहाबाद
21. तिवारी विश्वनाथ : भारत का वृहद् भूगोल, रामप्रसाद एण्ड सन्स, आगरा
22. चौहान, वीरेन्द्रसिंह : विशाल भारत, रस्तोगी एण्ड कम्पनी, मेरठ
23. चौहान, तेजसिंह : भारत का भूगोल, विज्ञान प्रकाशन, जयपुर

Course Outcomes: B.A. Geography (Third Year) – Course - P (II) Geography of Rajasthan

CO 1. To provide a comprehensive understanding of the geographical landscape of the state including all physical, socio-economic and cultural aspects.

CO 2. To develop a sound understanding of demographic composition, distribution and their challenges in the state.

CO 3. To understand the fundamental environmental challenges of the state associated at regional level.

CO 4. To cover the basic contents for various competitive examinations viz. civil services, state level PSC exams, school education exams and so on.

B. A. Third year
Subject:Geography
Paper-II: Geography of Rajasthan

Unit – I

a) Rajasthan in the context of India; diversity and unity; history of emergence.
b) Geological structure and formation of the state.

c) Relief features and physiographic regions; drainage characteristics.
d) The monsoon rhythm and weather conditions; climatic regions; climate and man.
e) Vegetation; forests; soils types.

Unit – II

a) Distribution of population: status, factors and implications.
b) Population characteristics: gender, literacy and workforce.
c) Urbanization and migration.
d) Tribal population: composition, concentration and principal tribal groups.
e) Population growth and associated problems.

Unit – III

a) Agriculture and economy of Rajasthan
b) Cropping pattern: detailed study of bajra, maize, wheat, pulses and oilseed crops
c) Source of irrigation; irrigation system of Indira Gandhi Canal and Chambal Command Area; problem of depleting ground water resources
d) Livestock resource: distribution by composition and size; dairy development
e) Major agricultural problems and their solution.

Unit – IV

a) Minerals, industries and economy of Rajasthan.
b) Detailed study of minerals: rock phosphate, mica, marble, soapstone and limestone.
c) Status and potential of energy minerals: lignite, petroleum and natural gas.
d) Detailed study of industries: zinc, cement, chemical, cottage and small-scale industries.
e) Industrial problems and prospects of the state.

Unit – V

a) Tourism: basis of tourism in Rajasthan; major destinations; tourists by place of origin.
b) Means of transportation: net work of roads and railways and related problems.
c) Droughts in Rajasthan: nature, causes, implications and coping measures.
d) Basis of regions of Rajasthan and study of different schemes of regionalization.
e) Detailed study of Marusthali and Aravalli regions.

Suggesting Readings:

1. Bhalla, L. R., Rajasthan ka Bhugol, Kuldeep Publication, Ajmer (Hindi).
2. Census of India, Rajasthan Series, General Population Tables of 1961to 2001.
3. DST (Govt. of Rajasthan), Resource Atlas of Rajasthan, Jaipur.
4. Govt. of Rajasthan, Statistical Abstract (latest edition), Jaipur.
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10. लोढा, राजमल एवं महेश्वरी : राजस्थान का भूगोल, हिमांशु पब्लिकेशन्स, उदयपुर
11. मामोरिया, चतुर्भुज व जैन शेषमल : राजस्थान का भूगोल, साहित्य भवन पब्लिकेशन्स, आगरा
12. सक्सेना, एच.एम. : राजस्थान का भूगोल, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
13. विजयवर्गीय, राम रक्षपाल : राजस्थान का भू–विज्ञान एवं खनिज सम्पदा, राजस्थान हिन्दी ग्रन्थ अकादमी,

जयपुर

Course Outcomes: B.A. Geography (Third Year) - Course - Practical: Surveying, Topographical Maps and Remote Sensing

CO 1. To develop skills to map locations of real-world features.
CO 2. To develop a sound knowledge of basic surveying techniques and instruments.
CO 3. To learn fundamentals of studying and interpreting topographic maps with particular reference to Rajasthan.
CO 4. To understand the fundamentals of aerial photographs and satellite imageries in order to introduce the students to the field of remote sensing.

B. A. Third Year (Geography)
PRACTICAL

UNIT – I

a) Graticule, Meridians and parallels - definition and characteristics

b) Map Projections – definition, basic concepts, classification, characteristics and choice of projections

c) Graphical construction of Conical projections-one standard parallel, two standard parallels, Bonne's and Polyconic

04 exercises

UNIT – II

a) Graphical construction of Cylindrical projections – Natural Cylindrical, Equi-distant, Equal Area, Gall's Stereographic, Mercator's. Great circle and Loxodrome

b) Graphical construction of Zenithal projections (polar case only) - Gnomonic, Stereographic, Orthographic

c) Introduction to conventional projections

08 exercises

UNIT – III

a) Surveying – Objectives, primary division and classification, principles of surveying

b) Prismatic Compass Survey – types and conversion of bearings

Radiation and Intersection methods; open and closed traverse (with minimum of five stations) *04 exercises*

Calculation of included angles, correction of bearings, closing of the error

c) Plane Table survey – Radiation and Intersection methods; open and closed traverse (with minimum of five stations) *04 exercises*

Resectioning - three point problem (mechanical method) *01 exercise*

Notes

1. Exercises on projections should be drawn on 1/4th of a full drawing sheet.
2. Survey exercises should be drawn on full drawing sheets.
3. Ex-students will have to complete the prescribed practical work under the guidance of the Head of the Department of the respective college and to produce a certificate to that effect before the commencement of the examination.
4. The test paper will be of two hours duration. Candidates will be required to answer three questions out of six attempting at least one question from each unit.
5. Field work will be of two hours duration including preparation of final sheet.

Scheme of examination

Candidates will be examined by External Examiner in consultation with Internal Examiner.

The distribution of marks will be as follows:

a)	Test Paper	30 marks
b)	Field Work (Survey Instruments)	10 marks
c)	Record work	10 marks
d)	Viva Voce	10 marks
Total		***60 marks***

Suggested Readings

1. Ahmed, K. S., Simple Map Projection, Friends Book House, Aligarh.
2. Kanetkar, T. P., Surveying and Levelling, Vol. I, A. V. GrihaPrakashan, Bombay, 1985.
3. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
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6. Singh, R. L. and P. K. Dutt, Elements of Practical Geography, Student Friends, Allahabad
7. Singh, R. L., Elements of Practical Geography, Kalyani Publishers.

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16. शर्मा, जे. पी. : प्रायोगिक भूगोल, रस्तोगी प्रकाशन, मेरठ
17. जैन, शेषमल : प्रयोगात्मक भूगोल, साहित्य भवन, आगरा
18. भल्ला, आर. एल. : प्रायोगात्मक भूगोल, के. ड़ी प्रकाशन, अजमेर
19. मामोरिया, चतुर्भज : मानचित्र विज्ञान एवं प्रायोगात्मक भूगोल, साहित्य भवन, आगरा
20. वर्मा, एल. एन. व लोढ़ा, आर. एम. : प्रायोगात्मक भूगोल, राज. हिन्दी ग्रंथ अकादमी, जयपुर
21. सिंह, एल. आर. : मानचित्र एवं प्रायोगात्मक भूगोल, सेन्ट्रल बुक डिपो, इलाहाबाद
22. सिंह एवंकन्नोजिया : प्रायोगात्मक भूगोल की रूपरेखा, सेन्ट्रल बुक डिपो, इलाहाबाद
23. खुल्लर, डी. आर., प्रयोगात्मक भूगोल, कल्याणी पब्लिशर्स, नईदिल्ली
24. मिश्रा, आर. एन. एवं शर्मा, पी. के.: प्रायोगिक भूगोल, रावत पब्लिकेषन्स, जयपुर

DEPARTMENT OF GEOGRAPHY

Faculty of Earth Sciences

Mohanlal Sukhadia University, Udaipur

(Programme Specific Outcomes and Course Outcomes)

Programme Specific Outcomes: (M.A./M.Sc. (Geography) (CBCS Scheme))

PSO 1. Developing a strong theoretical foundation and research orientation in the subject covering all major sub-disciplines.

PSO 2. Training the students in field specific state of the art tools and methodologies to develop vocational skills, and research skills as well.

PSO 3. Enabling preparation of various competitive examinations- particularly relating to school/higher education and civil services – along with PG studies.

PSO 4. Developing entrepreneurship skills by imparting quality training in geospatial technology, statistical software based analysis with activities enabling personality development.

M.A. / M.Sc. Geography (Semester I) - Course – P (I) (M1GEOG1-CT01) Geographical Thought

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of historical and evolutionary perspective of the subject
CO 2. To make students learn new concepts and recent developments in the subject.
CO 3. To develop fundamental understanding of various approaches to geographical studies.
CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – I (M1GEOG1-CT01) Geographical Thought

Unit – I

a) Definition, philosophy and nature of geography
b) Scope and contents of geography
c) Detailed study of Greek and Roman scholars
d) Nature of geographical thought in ancient India

Unit – II

a) Geographical knowledge during the ancient & medieval period
b) Dark age of geography
c) The Arabic period
d) Contribution of Varenius and Kant

Unit – III

a) Main characteristics of German school of thoughts- contribution of Alexander von Humbolt

b) Contribution of Carl Ritter & Ratzel

c) Main characteristics of French school of thought-Contributions of Paul Vidal de la Blache

d) Contribution of Jean Brunhes

Unit – IV

a) Main characteristics of American school of thoughts- Contribution of W. M. Davis

b) Contribution of Carl O. Sauer

c) Main characteristics of British school of thoughts

d) Changing methods & techniques in Geography.

Unit – V

a) Environmental determinism, possibilism and neo-determinism

b) Concept of Region, study of aerial differentiation

c) Dichotomies in geography, systematic and regional, qualitative and quantitative geography

d) Impact of Positivism, Humanism, Radicalism & Behaviouralism in Geography.

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4. Chatterjee, S. P., Fifty Years of Geography in India, Indian Science Congress, New Delhi
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23. Jensen, A. H., Geography: Its History and Concepts, Harper & Row

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35. Peet, R., Modern Geographical Thought, Blackwell, Oxford. 1998

36. Prasad, H., Research Methods and Techniques in Geography, Rawat Publications, Jaipur

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43. जैन, एस.एम. : भौगोलिक चिन्तन का विकास (साहित्य भवन, आगरा)
44. कौशिक, एस. डी. : भौगोलिक विचारधारा एवं विधि तंत्र (रस्तोगी प्रकाषन, मेरठ)
45. माथुर एवं जोशी : भौगोलिक विचारधाराओं का इतिहास (आर.बी.एस. पब्लिशर्स,जयपुर)
46. सिंह, जे. : भौगोलिक चिन्तन के मूलाधार (वसुन्धरा प्रकाशन, नई दिल्ली)
47. सिंह, यू. : भौगोलिक चिन्तन का विकास (कल्याणी पब्लिशर्स, नई दिल्ली)
48. वर्मा एल. एन. : भौगोलिक विचारधाराएँ (राज. हिन्दी ग्रंथ अकादमी, जयपुर)
49. रमेश दत दीक्षित : भौगोलिक चिन्तन का विकास (प्रिन्टिस हाल ऑफ इण्डिया प्राइवेट लिमिटेड, नई दिल्ली)

M.A. / M.Sc. Geography (Semester I) - Course – P (II) (M1GEOG2-CT02) Geomorphology

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of major relief features and process of their formation on the earth surface.
CO 2. To develop an understanding of landform dynamics and predict their changes on the earth surface.
CO 3. To develop knowledge and skills to carry out geomorphological mapping and field investigations.
CO 4. To develop research aptitude in the field of Geomorphology.
CO 5. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – II (M1GEOG2-CT02) Geomorphology

Unit – I

a) Development in geomorphology
b) Concept & scope of geomorphology
c) Development of slopes: approaches to the study of slopes; views of W. Penck, A. Wood and A. N. Strahler
d) Isostasy : concept and theories

Unit – II

a) Continental Drift Theory and Plate Tectonic theory
b) Theories of mountain building
c) Processes: weathering, types of weathering
d) Processes: cycle of erosion, views of Davis and Penck

Unit – III

a) Geomorphic processes and landforms – fluvial
b) Geomorphic processes and landforms – glacial and fluvio-glacial
c) River forms and processes – stream flow, hydrographs and flood frequency analysis
d) Geomorphic processes and landforms – aeolian

Unit – IV

a) Geomorphic processes and landforms – coastal
b) Geomorphic processes and landforms – karst
c) Submarine relief
d) Geomorphometry: geomorphology and topographic analysis

Unit – V

a) Extra-terrestrial geomorphology
b) Environmental change – causes, effects on processes and landforms
c) Soil processes and conservation
d) Dams and reservoirs: geomorphic consideration and environmental impact

References:

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M.A. / M.Sc. Geography (Semester I) - Course – P (III) (M1GEOG3-CT03) Economic Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To enhance spatial knowledge of various economic activities of man in relation to his natural milieu.
CO 2. To develop an understanding of diversified economic regions of the world in context of case studies.
CO 3. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.
CO 4. To develop insight into various issues for applied research in the field of economic geography.
CO 5. To develop a comprehensive understanding of the agro, economic and industrial landscape at regional level.

Paper – III (M1GEOG3-CT03) Economic Geography

Unit –I

a) Definitions, aims and scope of Economic Geography

b) Approaches and recent trends in Economic Geography

c) Classification of economies – sectors of economy- primary, secondary, tertiary & quaternary occupations

d) Relationship between economic activities & environment

Unit –II

a) Location – importance , Christaller – Central Place Theory

b) Movement & interaction in the simplified and heterogeneous economic landscape

c) Significance & elements of production cost – raw materials, labour, capital, technical knowledge –spatial variation in production costs & locational impact

d) Spatial variation in transportation cost-location & structure of transport cost, factors affecting the transportation cost

Unit- III

a) World agricultural regionalization – Whittlesey's classification of agricultural region

b) Subsistence intensive agriculture

c) Mediterranean agriculture & tropical plantation

d) Commercial grain farming and Cohen region of USA

Unit – IV

a) Major industrial regions of the world : study of Great Lake industrial region of USA

b) Study of Ruhr industrial region

c) Study of industrial region of Ukraine

d) Study of industrial belt of Japan

Unit - V

a) Means of transportation : factors affecting the choice of particular means of transport

b) World pattern of water transportation & trade : oceanic transport routes

c) International trade : types of trade

d) Economic regions of the world

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38. जैन, हरकचन्द : सैद्वान्तिक आर्थिक भूगोल (कमलेष प्रकाषन, भीलवाडा)
39. रजा, एम. एवं सिंह, ए. : संसाधन भूगोल
40. नैगी, बी. एस. : संसाधन भूगोल
41. सिंह एवं सिंह : आर्थिक और संसाधन भूगोल

M.A. / M.Sc. Geography (Semester I) - Course – P (IV) (M1GEOG4-CT04) Climatology and Oceanography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To extend knowledge of major climatic and oceanic phenomena and their inert-related processes taking place on the earth surface.

CO 2. To develop an understanding of applying knowledge of day to day weather and climatic phenomenon which is very significant in everyday life.

CO 3. To develop a perspective of impact of climatic change on our ecosystem.

CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – IV (M1GEOG4-CT04) Climatology and Oceanography

Unit-1: ***Basic Concepts and Atmospheric Phenomenon***

a) Nature and scope of Climatology

b) Composition and layered structure of the atmosphere

c) Insolation; energy balance of the Earth; horizontal and vertical distribution of temperature

d) Atmospheric pressure and pressure belts

Unit-2: Atmospheric Circulation

a) Winds: forces-PGF, CF, FF

b) Planetary, periodic and local winds; jet streams

c) Atmospheric humidity–process and forms of precipitation: types of rainfall; world distribution of rainfall.

d) Air masses and fronts; tropical and temperate cyclones

Unit-3: Climate Types and Climate Change

a) Approaches to classification of world climates; Koppen's classifications

b) Major climates of the world: Characteristics of Equatorial, Tropical Monsoon, Savanna, Hot Desert, Mediterranean and Mountain type of climate

c) Ocean atmosphere interaction: El Nino- La Nina; Walker's circulation & El Nino Southern Oscillation (ENSO)

d) Ozone depletion; greenhouse effect; global warming

Unit-4: Oceans-Physical Characteristics

a) Nature and scope of Oceanography

b) Ocean bottom relief; relief of Indian and Atlantic oceans

c) Ocean temperature and salinity: factors and distribution patterns

d) Coral reefs: types and theories of formation

Unit-5: Dynamics of Ocean Water and Human-marine Interface

a) Tides: types, theories of origin of tides

b) Ocean currents: currents of Indian, Atlantic and Pacific ocean

c) Marine resources: food, mineral and energy resources

d) Sea level changes; human impact on marine communities

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M.A. / M.Sc. Geography (Semester I) - Course – Practical -I (M1GEOG2-CP01): Surveying & Levelling

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop skill to map locations of real-world features.
CO 2. Develops skill to determine the distances on ground and height of various features on the earth.
CO 3. Develops a sound knowledge of surveying and levelling instruments with focus on improving precision in field measurements.
CO 4. To develop vocational expertise for work as surveyors, town planners and cartographers.

Practical -I (M1GEOG2-CP01) Surveying & Levelling

Unit – I Introduction

a) Surveying as an art and science, principles of surveying
b) General errors and inaccuracies in surveying
c) Precautions in using survey instruments
d) Trignometrical methods of solution of triangles and computation of lengths

Unit – II Plane table

a) Use of Plane Table in composite surveys and related methods, methods of resectioning
b) General planning of large area plane surveys
c) A composite survey of college campus or village/neighborhood
d) Drawing of control points and surveyed plan

Unit – III Theodolite and Tacheometer

a) Theodolite as an instrument of surveying and leveling, adjustment of Theodolite
b) Computation of Theodolite bearings
c) Computation of length of triangles and plotting of control points
d) Telemetry: stadia and tangential

Unit – IV Clinometer

a) Use of Clinometer as instrument of leveling
b) Measuring spot heights
c) Contouring and interpolation of contours
d) Drawing of profiles

Unit – V Dumpy level

a) Use of Dumpy level as an instrument of leveling and adjustment of the dumpy level
b) Principles: calculation of difference of level, series leveling, back sights, foresights, intermediate sights
c) Level book and computation of reduced level: Rise and Fall and collimation method
d) Plotting of profiles

Note:

1. Candidates will submit following exercises as record work:
   i. Resectioning: 3 exercises of geographical methods of Llano's, Bessel's and trial and error
   ii. Profiles: 2 exercises based on leveling measurements obtained with dumpy level
   iii. Contouring: 1 exercise based on leveling measurements obtained with dumpy level
   iv. Contouring: 1 exercise based on leveling measurements obtained with clinometers
   v. Measuring and plotting reduced levels using tacheometer: 2 exercises
   vi. Triangulation survey based on a minimum of 15 control points using theodolite: 2 exercises including one related to composite survey
   vii. Plan of un-surveyed campus/neighbourhood/village area based on composite survey: 1 exercise (10 day's camp)
   viii. Thematic maps showing characteristics of the surveyed area: form of built-up area, and building material: 6 exercises
2. All exercises will be based on surveying and leveling work done by the candidates themselves for areas hitherto un-surveyed

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Practical Exam Scheme

Distribution of Marks: - Total Marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. Test paper - 10 Marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner

The distribution of 80 marks will be as follows:

A. Test paper	-	20 Marks
B. Survey exercise	-	25 Marks
C. Record work	-	15 Marks
D. Viva-voce	-	10 Marks
E. Performance in survey camp	-	10 marks

A- Test Paper – 20 marks

The practical test paper of two hours duration and candidates will be required to answer two questions out of four questions.

B- Survey exercise – 25 marks

Working on each instrument with following distribution of marks:

Instrument	Exercise	Marks	Time (minutes)
A. Plane Table	Resectioning	5	35
B. Theodolite	Measurement of angle between two points	5	10
C. Dumpy Level	Measuring level difference between two distant points	5	10
D. Clinometer	Measuring heights of and level difference between two distant points	5	10
E. Tacheometer	Measurement distance of any distant point	5	10

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester I) - Course – Practical -II (M1GEOG2-CP02): Air Photo Interpretation

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the basic structure of remote sensing data.
CO 2. To understand process of acquisition and geometry of remotely sensed data and visualization of various earth features using aerial photos.
CO 3. Develops skill for use of aerial photographic techniques and instruments.

Develops skill to extract features and create thematic maps using aerial photos.

Practical -II (M1GEOG2-CP02) Air Photo Interpretation

Unit – I: Introduction

a) Definition
b) Scope
c) Development of aerial photography
d) Interpretation techniques

Unit – II: Types and quality of aerial photographs

a) Types of aerial photographs
b) Factors affecting quality of aerial photographs

c) Aerial photographs versus maps
d) Usages of aerial photographs in interdisciplinary research

Unit – III: Tools and geometry of air photography and interpretation:

a) Pocket stereoscope and mirror stereoscope
b) Aerial camera, lens and filters
c) Geometry of aerial photographs
d) Stereogram, stereo triplet and mosaic

Unit – IV: Basic air photo measurements:

a) Photographic scale
b) Measuring height of object
c) Calculation of area, number of strips and number of air photos
d) Measuring angles, direction and slope measurement

Unit – V

a) Elements of object identification,
b) Interpretation and mapping of natural landscapes
c) Interpretation and mapping of cultural landscapes
d) Field checking

Practical Exercises

Notes:

Students are required to perform one experiment from each unit during examination.

1) Stereo test
2) Orientation of stereo model under mirror stereoscope (1 exercise)
3) Calculate the photo base & flight line. (2 exercises)
4) Determination of photo/image scale (1exercise)
5) Determination of heights using single photograph (1exercise)
6) Objects identification by Pocket Stereograph (1 exercises)
7) Interpretation and mapping of natural landscapes :physical aspects, drainage patterns, river basins, and vegetation (8 exercises)
8) Interpretation and mapping of cultural landscapes: land use, agricultural utilisation, field patterns, cultural aspects, settlements and transportation lines (8 Exercises)

One local field trip will be conducted for field verification of aerial photographs of Udaipur city and nearby areas. Students will be required to prepare a Field Report and submit along with the Record Work.

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Practical Exam Scheme

Distribution of marks: - Total marks (100) = Internal marks (20) + External marks (80)

Internal marks - 20

1. The identification of objects (at least 10) on the air photo pairs shall be of 30 minutes duration and will carry 10 marks
2. Objective paper -10 marks (10 objective questions)

External marks - 80

Candidates will be examined by an external examiner in consultation with the internal examiner.

The distribution of 80 marks will be as follows:

A. Test paper	-	25 Marks
B. Lab exercise	-	30 Marks
C. Record work	-	15 Marks
D. Viva-voce	-	10 Marks

A- Test Paper – 25 marks

The Practical test paper of two hours duration and candidates will be required to answer two questions out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on aerial photographs.

C- Record work – 15 marks

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

Course Outcomes: M.A. Geography (I Semester) – Anandam

CO 1. To introduce for the community service and inspired by the Gandhian approach of the holistic development.

CO 2. To provide a comprehensive education to the students of higher education to contribute to society and earn academic credits in return.

CO 3. To develop leadership qualities in the youth by connecting them with society and its problems.

CO 4. To develop leadership qualities in the youth by connecting them with society and its problems.

M.A. / M.Sc. Geography (Semester II) - Course –P (I) (M2GEOG1-CT05) Geography of India

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop a sound understanding of natural and cultural landscape of India.
CO 2. To develop comprehensive understanding of the physical, economic, demographic, social and environmental aspects of the country.
CO 3. To develop understanding of the resource base and developmental challenges on regional basis.
CO 4. To cover the fundamental contents of general studies for various competitive examinations.

Paper – I (M2GEOG1-CT05) Geography of India

UNIT I: Physical Aspects

a) Historical/administrative background of India, Physical divisions of India
b) Climate: seasonal variations in climate; mechanism of Indian monsoon; climatic regionalization by Koppen
c) Forests: types and distribution
d) Soil regions; problem of soil erosion

UNIT II: Human Aspects

a) Population distribution, density and growth
b) Population problems
c) Population policy of India
d) Tribal population: distribution pattern and belts

UNIT III: Economic Aspects: Resource Base

a) Water resources: status and problems
b) Agriculture: major characteristics and problems; green revolution; agro-climatic regions
c) Minerals: distribution, production and development potential with special reference to Iron-ore, Manganese, Bauxite and Copper
d) Power resources: distribution, production and potential with respect to coal, petroleum, natural gas, hydel, solar and atomic power.

UNIT IV: Industrial Development and Transportation

a) Major industries: mineral based- Iron & Steel, cement; agro based – cotton textile, sugar industry
b) Industrial regions of India
c) Industrial development in five year plans
d) Transportation development-road, rail, air, ports.

UNIT V: Regionalization and Problems

a) Geographical regions of India- outline of scheme proposed by R.L.Singh

b) Resources regions of India
c) Regional disparities in socio-economic development in India
d) Geographical problems of India; cyclones, earthquake, floods, drought

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M.A. / M.Sc. Geography (Semester II) - Course –P (II) (M2GEOG2-CT06) Geography of Resources

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of distribution of various resources in the world.
CO 2. To foster knowledge about conservation of resources and their role in regional planning for development.
CO 3. To develop perspective towards sustainable utilization of resources.
CO 4. Basic contents for various competitive examinations for lecturership, school education and so on.

Paper – II (M2GEOG2-CT06) Geography of Resources

Unit – I

a) Meaning, scope of Resource Geography
b) Approaches and recent trends of resource geography
c) Resources: meaning & clarification
d) Concepts of resources

Unit –II

a) Conservation of resources : concept & aims
b) World distribution, production and problems of conservation of Iron & Manganese
c) World distribution, production and problems of conservation of Coal, Petroleum & Hydroelectricity
d) Forest & water resources : world distribution, utility & conservation

Unit –III

a) Human as a sources and a resources
b) World distribution, density and growth of human resources
c) Distribution, density and growth of human resources of India
d) Population –resource equilibrium & population resource region of world

Unit - IV

a) Problems of resource utilization
b) Resource conservation and preservation
c) Problems of conservation & trends of resource development
d) Planning of conservation of natural resources

Unit –V

a) Resource region - meaning & determinant elements of resource region
b) Major resource region of the World
c) Region of bounty resources & region of resource scarcity
d) Indian resource region – a case study of Aravali region

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16. सिंह एवं सिंह : आर्थिक और संसाधन भूगोल

M.A. / M.Sc. Geography (Semester II) - Course – P (III) (M2GEOG2-CT07) Regional Development and Planning

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop understanding of the fundamentals of regional planning.
CO 2. To assess the impact of government policies on regional development and planning
CO 3. To gain knowledge of various schemes and models on regionalization of India.
CO 4. To impart a strong conceptual base regarding development patterns, disparities, planning, challenges and priorities for students opting for administrative services as career.

Paper – III (M2GEOG2-CT07) Regional Development and Planning

Unit – I

a) Concept of space, area and locational attributes
b) Development: concepts and indicators; planning: concept need and levels
c) Region: concept, types and delineation
d) Planning regions: Planning regions of India

Unit – II

Main themes of regional development theories

a) Economic growth doctrines and their impact on regional development
b) Theories of transmission of economic growth: (G. Myrdal, A.O. Hirschmann, Friedmann
c) Debate on the relevance of development theories: D. Seers, Marxists
d) Multifaceted paradigms of regional development: Eco-development, sustainable development

Unit – III

Regional planning strategies

a) Urban-industrial growth pole strategies as a tool of diffusion of modernisation
b) Neo-populist regional development strategies: Integrated rural development, basic need approach, target area and target group approach
c) Multi-level regional planning

d) Peoples participation in the planning process; Panchayati Raj system; role and relationship of Panchayati Raj Institutions (Gram Panchayat, Panchayat Samiti and Zila Parishad) and administrative structure (village, block and district)

Unit – IV

a) Delineating regions for planning: planning regions v/s geographical regions
b) Schemes of regionalization V. Nath, L.S. Bhat, P. Sengupta, territorial production complexes
c) The role of cities and the urbanization process in regional development in India; Planning for supra-urban spaces
d) The state and regional policy in India; the status of regional planning in the Five Year Plans

Unit – V

a) National plans: South East resource region plan and The Western Ghat plan
b) Administrative machineries of regional planning in India: The Planning Commission, the Town and Country Planning Organization, district level planning
c) Regional social movements in India and their linkages with state regional policy and development strategies
d) The New Economic Policy and its impact on the regional structure and regional planning problems in India

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M.A. / M.Sc. Geography (Semester II) – Course - P (IV) (M2GEOG4-CT08) Political Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. Helps in understanding the fundamentals of political phenomenon across the world.
CO 2. To extend knowledge on various Geopolitical models.
CO 3. To learn electoral behaviour patterns in context of India and Rajasthan.
CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – IV (M2GEOG4-CT08) Political Geography

Unit – I

a) Nature, scope and subject matter of political geography
b) Geopolitics: meaning and contributions of Emmanuel Kant, Karl Ritter, Friedrick Ratzel, H. V. Tritischke, Rudolf Kjellen and Karl Haushofer
c) Development of political geography
d) Contributions of Alfred Thayer Mahan, H. J. Mackinder and Alexander-de-Seversky, D.W. Meining, N.J. Spykman and Hooson

Unit – II

a) Recent trends in political geography
b) The functional approach in political geography
c) The unified field theory of political geography
d) Nature of administrative areas and geography of public policy and finance

Unit – III

a) Concept of nation, state and nation state

b) The state as a politico-geographical region: location, shape, size
c) Resources of state: natural, cultural and human
d) Frontiers and boundaries: types and functions, boundary making and boundary problems

Unit – IV

a) Core areas and capitals
b) Unitary and federal states
c) The impress of government on landscape
d) Politics of world resources; globalization and WTO

Unit – V

a) Electoral studies in political geography
b) Conceptual model of voting decision; Gerrymandering: gerrymandering in relation to India
c) Geographical influence on voting behavior of the electors in India
d) Spatial pattern of voting behavior in Rajasthan

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26. Taylor, Peter; Political Geography Longman, London. 1985
27. Wigert, H. W. et al, Principles of Political Geography, Appleton Century-Crofts Inc. New York
28. चौहान, पी.आर. : राजनीतिक भूगोल (वसुन्धरा प्रकाषन, गोरखपुर)

29. भट्टाचार्य, ए.एन. एवं आच्छा, एस. एल : राजनीतिक भूगोल (राजस्थान हिन्दी ग्रन्थ अकादमी जयपुर)
30. दीक्षित, आर. डी. : राजनीतिक भूगोल – समसामयिक परिदृष्टि (प्रेन्टिस हॉल आफ इण्डिया)
31. सक्सेना, एच. एम.: राजनीतिक भूगोल (रस्तोगी पब्लिकेषनस, मेरठ)
32. कपूर कालीदास : भारतीय भू–नीति (हिन्दी समिती सूचना विभाग)
33. कोलोषोव, वी. : राजनीतिक भूगोल (प्रगति प्रकाषन, मास्को)
34. दीक्षित श्रीकान्त : राजनीतिक भूगोल (ज्ञानोदय प्रकाषन, गोरखपुर)

M.A. / M.Sc. Geography (Semester II) - Course – Practical – I (M2GEOG1-CP03): Cartography-I (Basics of Cartography and Physical Aspects)

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To learn the fundamentals of cartography, manual map-making - the basic element of geographical studies.
CO 2. To understand the techniques of extraction of geomorphological attributes from base maps and representation of relief.
CO 3. To learn the techniques of representation of climatic data through diagrams and graphs.
CO 4. To enhance cartographic skills for applied research.

Practical -I (M2GEOG1-CP03) Cartography I
Basics of Cartography and Physical Aspects

Unit – I

Introduction

a) Definition and nature of cartography
b) Scope & history of cartography
c) Cartographic techniques.
d) Cartographic materials and tools

Unit – II

Maps and Diagrams

a) Map: definition and basic concepts
b) Classification of maps
c) Distributional maps and cartograms
d) Representation of statistical data: Diagrams- one, two, three dimensional **(3 exercises)**

The representation of data, information, features related to the following geographical aspects through maps and diagrams and their interpretation (To be submitted along with the record work)

Unit – III

Geomorphic aspects based on toposheets of 1:50000 or 1:25000 (5 exercise)

a) Stream orders and basin demarcation
b) Drainage density and texture
c) Slope : average slope maps according to Wentworth's method
d) Profiles : serial, composite, super- imposed & projected Profiles

Unit – IV

Climatic aspects: I **(4 exercises)**

a) Rainfall variability graphs (running average, cumulative deviation & trend line).
b) Rainfall dispersion diagram
c) Isohyets or isotherms
d) Temperature variation graph.

Unit – V

Climatic aspects: II **(5 exercises)**

a) Ergograph & Ogilvie's ergograph
b) Climatograph
c) Climograph
d) Hythergraph

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3. Govt. of Rajasthan, District Census Handbooks, latest as well as of previous Census,
4. Keates, J. S., Cartographic Design and Production, Longman, London.
5. Loxton, J., Practical Map Production, John Wiley & Sons, New York.
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8. Raisz, E., General Cartography, McGraw Hill Book Co., New York.
9. Robinson, A. H., Elements of Cartography, Chapman & Hall.
10. Sing, R. L., Elements of Practical Geography, Kalyani Publishing.
11. Singh, R. N., Map Work and Practical Geography, Central Book Depot.
12. शर्मा, जे. पी.: प्रयोगात्मक भूगोल (रस्तोगी पब्लिशर्स, मेरठ)

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. Test paper - 10 marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner.

The distribution of 80 marks will be as follow:

A. Test paper - 25 Marks

B. Lab exercise - 30 Marks
C. Record Work - 15 Marks
D. Viva-voce - 10 Marks

A- Test Paper – 25 marks

The practical test paper of two hours duration and candidates will be required another two question out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises.

C- Record work – 15 marks

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester II) - Course – Practical – II (M2GEOG2-CP04): Basics of Remote Sensing and Image Interpretation

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the fundamentals of Remote Sensing.
CO 2. To understand various aspects of digital images acquired from satellites.
CO 3. To develop technical skills to interpret satellite data and extraction of required information in image processing softwares.
CO 4. To train the students in geospatial technology with state-of-the-art technical, research and professional skills.
CO 5. To create a strong foundation for students planning to opt for employment as GIS analyst and consultancy as their career.

Practical -II (M2GEOG2-CP04) Basics of Remote Sensing and Image Interpretation

UNIT I Basics of Remote Sensing

a) Historical development; significance of remote sensing in geographical studies
b) Electromagnetic Radiation (EMR) Spectrum; Laws of radiation
c) Stages of Remote Sensing, EMR interaction with earth's surface
d) Spectral signatures, typical spectral reflectance curves of vegetation, soil and water

UNIT II Remote Sensing Satellites and Platforms

a) Orbits and platforms for earth observation; Swath, Row, Path
b) Satellite and sensor types: geo-synchronous and polar satellites, active and passive systems
c) Sensor types: Along Track, Across Track
d) Sensor specifications of IRS and Landsat satellite series

UNIT III Image Characteristics

a) Image formats - BIL, BIP, BSQ; Image display, color composites
b) Fundamental image statistics, image histogram
c) Image resolutions - spatial, spectral, radiometric and temporal resolution
d) Characteristics of major satellite systems: IRS, Landsat, NOAA, IKONOS, World-View satellite System

UNIT III Image Preparation

a) Geometric errors: Types
b) Geometric corrections: Image to map rectification, georeferencing
c) Resampling techniques
d) Contrast enhancement techniques: stretching, histogram equalization, density slicing

Unit V Image Interpretation and Thematic Map Generation

a) Visual Image Interpretation: principles, elements, interpretation keys
b) Manual Digitization and map composition
c) Interpretation and mapping of natural landscapes using satellite image.
d) Interpretation and mapping of cultural landscapes using satellite image.

Practical Exercises:

1. Familiarization with the software –ILLWIS/ Erdas Imagine/ ENVI/ SAGA
2. Data acquisition-accessing satellite data of area of interest, digital referencing system
3. Data import and subset
4. Observation and identification of earth's features in various spectral bands and different types of images (PAN/ multi-spectral)
5. Observation of spectral profiles of water, soil and vegetation
6. Analysis of image histograms
7. Image display – Grey scale, pseudo color, TCC, FCC
8. Georeferencing toposheets
9. Geometric correction- Image to map rectification: NN, Bi-linear and Cubic interpolation
10. Image enhancement: Stretching, interpretation of results
11. Image enhancement: Histogram Equalization, interpretation of results
12. Image enhancement: Density Slicing, interpretation of results
13. Identification of features using elements of visual interpretation
14. Thematic map generation using visual interpretation and on-screen manual digitization/ analog multi-spectral images: Natural landscape
15. Thematic map generation using visual interpretation and on-screen manual digitization/ analog images: Cultural landscape
16. Computation of area of different classes

Exercises will be implemented in ERDAS, ENVI, ILLWIS, SAGA or any other DIP Software as per availability. One computer system will be provided to each student for conducting practical exercises.

One local field trip will be conducted for field verification of satellite image of Udaipur city and nearby areas. Students will be required to prepare a Field Report and submit along with the Record Work.

Suggested Readings

1. American Society of Photogrammetry, 1983. *Manual of Remote Sensing*, ASP, Falls Church, VA
2. Barrett, E. C. and L. F. Curtis, 1992. *Fundamentals of Remote Sensing and Air Photo Interpretation*, Macmillan, New York
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9. Pratt W.K., 1978. *Digital Image Processing*. Wiley, New York
10. Vyas P.R., Remote sensing and Geographical Information System : basics and Applications 2014

WEB RESOURCES

1. *Ebook on Remote Sensing Applications*, www.**nrsc**.gov.in/Learning_Centre_**EBook**.html
2. *E-Tutorial on Fundamentals of Remote Sensing*, Canada Centre for Mapping and Earth Observation, Natural Resources Canada, accessible at http://www.nrcan.gc.ca/earth-sciences/geomatics

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks - 20

1. The identification of objects (at least 10) on the satellite imagery shall be of 30 minutes duration and will carry 10 marks.
2. Objective paper – 10 marks (10 objective questions)

External marks -80

Candidates will be examined by an external examiner in consultation with the internal examiner.

The distribution of 80 marks will be as follows:

A- Test paper	-	25 Marks
B- Lab exercise	-	30 Marks
C- Record work	-	15 Marks
D- Viva-voce	-	10 Marks

A- Test paper – 25 marks

The practical test paper of two hours duration and candidates will be required another two question out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises one based on the satellite imagery.

C- Record work – 15 marks

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester II) - Course – Skill-I (M2GEOG1-SKILL-01): Digital Cartography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To create an understanding of handling geographical data in softwares with special focus on cartographic modelling.

CO 2. To introduce the students to proprietary and open source GIS softwares such as ArcGIS, and QGIS.

CO 3. To develop preliminary expertise of statistical analysis and representation of geographical data in MS Excel and SPSS.

CO 4. To learn tools and techniques of digital representation of physical, climatic and socio-economic data in form of maps and diagrams using GIS softwares

CO 5. Enhancing technical skills for self-employment and job opportunities relating to cartographic services across public and private sector.

M.A./M.Sc. Geography
Second Semester
Skill-I (M2GEOG1-SKILL-01) Digital Cartography

Unit-I: Introduction

a) Nature & Scope
b) Concepts in Digital Cartography
c) Cartographic Visualization
d) Geo-visualization

Unit II: Overview of Software Packages

a) ArcGIS

b) QGIS
c) Microsoft Excel, SPSS
d) AUTOCAD

Unit-III: Maps

a) Introduction to maps: types
b) Cartographic communication – virtual, cognitive, temporal and permanent maps
c) Mapping techniques: preparation of dot, choropleth, isopleths chorochromatic and choroschematic maps
d) Map composition: symbolization, map layout, labeling and annotation

Unit IV: Diagrams

a) Construction of simple line, poly line, trend graphs
b) Construction of simple, multiple, compound bar diagrams, histograms
c) Construction of cartograms, value area cartograms
d) Preparation of maps using proportional squares, circles, spheres

Unit V: Cartographic Modeling

a) Cartographic modeling and its types
b) 3D modeling
c) TIN
d) DEM

Lab exercises

a) Preparation and editing of data in microsoft excel
a) Preparation and editing of data in SPSS
b) Generation of vector point, line, polygon map and cartographic symbolization
c) Map composition

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2. Bagrew,L.: History of Cartography, C.A.Watts and Co., London, 1964.
3. Barrett,E.C. and Curtis,L.F.: Introduction to Environmental Remote Sensing, Chapman and Hall Ltd., London, 1976.
4. Bernhardsen, Tor, Geographic Information Systems, Viak IT, Longum Park, Norway, 1992
5. Lobeck, A.K. and Tellington, W.J., Military Maps and Air-Photographs [Mc Graw Hill]
6. Lobeck, A.K., Block Diagrams [John Wiley]
7. Mather, Paul M., 1991: Computer Applications in Geography, John Wiley & Sons, Inc., New York.
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9. Raisz, E., Principles of Cartography [Mc Graw hill]
10. Robinson, A.H., Elements of Cartography [John Wiley]
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12. Sylvester, D., Maps and Landscape [George Philip and sons] Allpress, J.D., Visual geography, Part-I [George Harrap]

Practical Exam Scheme

Distribution of Marks: - Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. One assignment based on computer – 10 marks
2. Objective Paper- 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner.

The distribution of 80 marks will be as follows:

A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks

A- Test Paper – 25 marks

The Practical test paper of two hours duration and candidates will be required another two question out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on computer.

C- Record work – 15 marks

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester III) - Course –P (I) (M3GEOG1-CT09) Agricultural Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To learn fundamentals of agricultural geography
CO 2. To gain knowledge about world agricultural systems and models of agricultural land use.
CO 3. To develop sound understanding of the use of quantitative techniques in agricultural studies.
CO 4. To develop understanding regarding the course of agricultural development in India, problems, policies, planning and agricultural regionalization.
CO 5. To impart comprehensive theoretical and conceptual understanding for a potential field of applied geographical research.

Paper – I (M3GEOG1-CT09) Agricultural Geography

Unit – I

a) The nature and development of agricultural geography
b) Approaches recent trends in agricultural geography
c) Origin and dispersal of agriculture
d) Sources of agricultural data

Unit – II

a) Factors affecting agriculture: physical, institutional and technological
b) Agricultural systems of the world
c) Critical review of classification of agricultural types of Whittlesy
d) Detailed study of intensive subsistence, commercial grain farming and tropical plantation agriculture

Unit – III

a) Land use classification; landuse pattern in India; and land capability classification
b) Von Thunen's agricultural model of agricultural land use and recent modification in it
c) Nutrition and food balance sheet; food surplus and food deficient regions of India
d) Diffusion model

Unit – IV

a) Concept and techniques of delimitation of agricultural regions; agricultural regions of India and their characteristics
b) Measures of agricultural productivity and efficiency levels and other characteristics
c) Crop combination methods: Weaver's, Doi's and Rafiullah's methods and their applications
d) Agricultural typology: concept and methodology; patterns with special reference to the world and Rajasthan

Unit – V

a) Sustainable development of agriculture
b) Green and white revolutions: their components, impact and consequences
c) Specific problems in Indian agriculture and their management and planning
d) Agricultural policy of India

References:

1. Bayliss Smith, T. P., The Ecology of Agricultural Systems, Cambridge University Press, London, 1987
2. Berry, B. J. L. et al, The Geography of Economic Systems, Prentice hall, New York, 1976
3. Brown, L. R., The Changing World Food Prospects: The Nineties and Beyond, World Watch Institute, Washington D. C., 1990
4. Coppock, J. K. , An Agricultural Atlas of England and Wales, Faber and Haber, London
5. Cox, K. R., Man, Location and Behaviour: An Introduction to Human Geography, John Willey and Sons, London
6. Dyson, T., Population and Food: Global Trends and Future Prospects, Routledge, London, 1996
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12. Mannion, A. M., Agriculture and Environment Change, John Wiley and Sons, London, 1995
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23. Whittlesey, D., Major Agricultural Region of the Earth, AAAG, Vol.26, pp.199 and 240-296
24. Whyle, R. O., Land, Livestock and Human Nutrition in India, F. A. Paragon

M.A. / M.Sc. Geography (Semester III) - Course –P (II) (M3GEOG2-CT10) Urban Geography & Planning

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand site evolution, growth and classification of cities.
CO 2. To provide scientific study of urban settlements and morphology.
CO 3. To understand potential solutions to problems of urbanization.
CO 4. Focuses on core concepts of town planning, helping students to prepare for better careers in this field.

Paper – II (M3GEOG2-CT10) Urban Geography & Planning

Unit – I

a) Nature, scope and development of urban geography; urban concepts
b) Origin and growth of urban centers: ancient and medieval age
c) Process of urbanization: trends of urbanization in the world
d) Urbanization In India , development of metropolitan cities in India

Unit – II

a) Classification of urban centers: views of Mum ford and Griffith Taylor
b) Development of conurbation and megalopolises : North Eastern Sea board of USA , Rhine- Ruhr conurbations, Mumbai and Kolkata conurbations in India
c) Theories of urban system: the law of primate city and the rank-size rule
d) Central place theories: Christaller's central place system, Losch's economic landscape

Unit – III

a) Urban land use: human ecology and urban land use models of Burgess, Harris-Ullman and Hoyt; land economics and urban land use
b) Central business district (CBD): criteria and methods of areal definition, historical process and CBD; the zone in transition
c) Functional classification of cities: empirical and statistical methods
d) Centripetal and centrifugal forces of urban growth

Unit – IV

a) Rural urban fringe : concept, criteria's of delimitation and characteristics
b) Morphology of Indian cities : ancient , medieval and modern planned cities of India with special studies of Jaipur and Chandigarh cities
c) Concept of basic and non-basic functions, internal functional structure of urban centers
d) Social structure in urban areas of India , social segregation in Indian cities

Unit – V

a) Urban problems: development of slums in urban areas and their problems, problems of housing and social infrastructure
b) Urban planning: principles of urban planning , layout plans of cities
c) Urban environment: industrial pollution and environmental panning
d) Sustainable urban development: studies of master plans of Udaipur and Jaipur cities.

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6. Chapin, F. Stuart, Urban Land Use Planning, University of Illinois Press
7. Chorley, R. J. and P. Haggett (eds.), Models in Geography, Methuen, London, 1966
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10. Duncan, O. D., Metropolis and Region, John Hopkins Press, Baltimore
11. Dwyer, D. J. (ed.), The City as a Centre of Change in Asia, University of Hong Kong Press, Hong Kong, 1971
12. Forrester, Jay W., Urban Dynamics, M. I. T. Press, Cambridge
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33. Robson, B. T., Urban Analysis, Cambridge University Press, London, 1969
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M.A. / M.Sc. Geography (Semester III) - Course –P (III - A) (M3GEOG3-ET11-A) Environmental Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of man and environment relationship.
CO 2. Creating awareness about current environmental issues, related laws and global initiatives to combat environmental degradation.
CO 3. To study various types of ecosystems.
CO 4. To provide knowledge regarding tools and methods of environmental management and planning.

Paper – III-A (M3GEOG3-ET11-A) Environmental Geography

Unit – I

a) Environment: meaning, elements, and types
b) Human ecology: meaning, scope and concepts
c) Principles of environmental geography
d) Man-environment relationship: review of different perspectives

Unit – II

a) Ecosystem: concept, definitions, characteristics and types
b) Components and functioning of ecosystem
c) Trophic level, food chain and ecological pyramids; energy flow in ecosystem
d) Geo-chemical cycles and circulation of element in the ecosystem: carbon cycle, nitrogen cycle and oxygen cycle

Unit – III

a) Fresh water ecosystems: meaning, types and their properties
b) Marine ecosystems: meaning, types and their properties
c) Terrestrial ecosystems: meaning, types and their properties
d) Biomes: concept, types, characteristics and distribution; detail study of tropical desert biomes

Unit – IV

a) Environmental hazards and disasters: meaning, types and impacts
b) Environmental degradation and pollution: meaning, process, causes, types and impacts
c) Environmental planning and management: concept, objectives and strategies
d) Sustainable development: concept, need, problems and strategies

Unit – V

a) Ecology of tropical farming systems
b) Mountain ecosystem with special reference to Aravalli hills
c) The Stockholm Conference and the Earth Summit
d) Environmental laws in India related to wild life, water, forest and environment

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39. सक्सेना, एवं उपाध्याय : मानव एवं पर्यावरण, के.डी. प्रकाषन, अजमेर।
40. राव, बी. पी. एवं बी. के. श्रीवास्तव : पारिस्थितिकी विज्ञान, वसुन्धरा प्रकाशन, गोरखपुर।
41. नेगी, बी. एस. : पारिस्थितिकी एवं पर्यावरण भूगोल, रस्तोगी प्रकाशन, मेरठ।
42. रघुवंशी, अरूण एवं चन्द्रलेखा : पर्यावरण एवं प्रदूशण, मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, भोपाल।

M.A. / M.Sc. Geography (Semester III) - Course –P (III - B) (M3GEOG3-ET11-B)
Geography of Rajasthan

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To provide a comprehensive understanding of the geographical landscape of the state including all physical, socio-economic and cultural aspects.
CO 2. To develop a sound understanding of resource base, its distribution and challenges of utilization.
CO 3. To understand the major developmental and environmental challenges of the state.
CO 4. To cover the basic contents for various competitive examinations viz. civil services, state level PSC exams, lecturership, school education and so on.

Paper – III-B (M3GEOG3-ET11-B) Geography of Rajasthan

UNIT I: Physical Aspects

a) Geographical and political introduction of Rajasthan
b) Physical divisions of Rajasthan
c) Climate: seasonal variations in climate; monsoon; climatic regions
d) Water resources: status and problems

UNIT II: Resources

a) Forests: types and distribution
b) Soil regions; problems of soil
c) Demographic characteristics: distribution, density, growth rate, literacy, sex ratio
d) Major tribes of Rajasthan; Bhil, Meena, Sahriya, Kathodi (distribution and socio-economic characteristics)

UNIT III: Economic Aspects: Resource Base

a) Agriculture: major characteristics, problems, solutions and agro-climatic regions
b) Livestock and dairy development

c) Minerals: distribution, production and development potential with special reference to zinc-lead, copper, marble, lime stone and rock phosphate
d) Power resources: distribution, production and potential with respect to coal, petroleum, natural gas, solar and wind power.

UNIT IV: Industrial Development and Transportation

a) Major industries: mineral based- zinc, cement and marble
b) Agro based industries- cotton textile and sugar industry
c) Major problems in industrial development
d) Transportation development-road, rail, air

UNIT V: Tourism, Regionalization and Problems

a) Tourism: basis of tourism in Rajasthan and major destinations
b) Geographical regions of Rajasthan- outline of scheme proposed by R.L. Singh
c) Special area development programs in Rajasthan (ADP, DPAP, DDP, IGC)
d) Geographical problems of Rajasthan; desertification, drought, water logging, depleting ground water and flood

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2. Bhalla, L.R., Geography of Rajasthan. Kuldeep Publication, Jaipur
3. Census of India, Rajasthan Series, General Population Tables of 1961 to 2011.
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6. NCEAR. Tecno-economic Survey of Rajasthan, Vol. 1 & 2, New Delhi
7. Spate, O.H.K., India and Pakistan, Methoen, 1960
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9. चौहान, तेज सिंह, राजस्थान का भूगोल, विज्ञान प्रकाशन जोधपुर
10. लोढ़ा, राजमल एवं माहेश्वरी, दीपक, राजस्थान का भूगोल, हिमांशु पब्लिकेशन्स, उदयपुर
11. मामोरिया, चतुर्भुज एवं जैन, शैषमल, राजस्थान का भूगोल, साहित्य भवन पब्लिकेशन्स, आगरा
12. सक्सेना, एच.एम., राजस्थान का भूगोल, राजस्थान ग्रन्थ अकादमी, जयपुर
13. विजयवर्गीय, राम रक्षपाल, राजस्थान का भू–विज्ञान एवं खनिज सम्पदा, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर

M.A. / M.Sc. Geography (Semester III) - Course –P (IV - A) (M3GEOG4-ET12-A) Cultural Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand various cultural realms and cultural regions of the world.
CO 2. To understand socio-cultural trends of various tribes and human races.
CO 3. To understand the cultural conflicts in context of globalization.

CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – IV-A (M3GEOG4-ET12-A) Cultural Geography

Unit – I

a) Definition, nature, development and scope of cultural geography
b) Cultural elements, environment and culture, components of culture
c) Divergence process and convergence process
d) Cultural changes: perception, behaviouralism and cultural relativism

Unit – II

a) Races of mankind: origin, traits and classification
b) Cultural diversity: nature and bases
c) Language: evolution, dispersion, classification and distribution
d) Religion: evolution, dispersion, classification and distribution

Unit – III

a) Origin and dispersion of agriculture
b) Industrial revolution and cultural development
c) Economy and society of tribal groups, theories of tribal groups; dwelling places as cultural explorations
d) Economy and cultural landscape

Unit – IV

a) Human settlements: relation to ideology
b) Social structure and technology
c) Pattern of rural & urban society
d) Social process in the city

Unit – V

a) World cultural realms and regions
b) Cultural regions of Europe
c) Cultural regions of Indian Sub-continent
d) Globalization and culture conflicts

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4. Hazra, (ed.), Dimensions in Human Geography, Rawat Publication, Jaipur, 1997
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9. Singh, A.K., Approaches to Tribal Development, Swarup and Sona, New Delhi, 1994

10. Sopher, D.E., Exploration of India: Geographical Perspectives on Society and Culture, Longman, London, 1980
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M.A. / M.Sc. Geography (Semester III) - Course –P (IV - B) (M3GEOG4-ET12-B) Transport Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the movement of people, goods and ideas in transport network.
CO 2. To understand the concept and models of transport system.
CO 3. To understand spatial relations in transport network – flow, connectivity and accessibility.
CO 4. To understand the problems related to urban transportation systems and potential solutions.

Paper – IV-B (M3GEOG4-ET12-B) Transport Geography

Unit – I

a) Meaning, scope and development of transportation geography
b) Factors associated with the development of transport system: historical, technological, physical, economic, political and social
c) Spatial interaction: ideas of Edward Ullman; functional approach of M. E. Hurst
d) Concepts of distance: point to point distance and distance in a group of points; measures of distance

Unit – II

a) The functional region, linkages and nodes, diagrammatic representation of hinterlands and hierarchies
b) Transportation and spatial processes: regional specialization and agglomeration economies
c) Cost of overcoming distance: transportation cost, price and rate structure; transport costs as factor of production
d) An idealized process of transport development

Unit – III

a) Graph theoretic concepts; networks as models
b) Types of connectivity: concept and indices of connectivity
c) Measures of nodal accessibility: the network as a matrix; degree of connectivity: direct and indirect connectivity
d) Indices of accessibility: accessibility matrix, matrix T, shortest path matrix and valued matrix; sinuosity

Unit – IV

a) Spatial patterns of flow

b) Gravity model: basic model and its modifications related to traffic and commodity flow
c) Allocation model: transportation problem and optimum solution
d) Flow in a capacitated network

Unit – V

a) Negative impacts of transportation: social, accidents and other impairments
b) Economic and environmental aspects of urban transport problems and their control
c) Alternative transport systems in mega cities; transport systems in the developing countries
d) Development of the Indian surface transport system

References:

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3. Hagget, P. et al, Locational Analysis in Human Geography, Edward Arnold, London, 1977
4. Haggett, P. and R. J. Chorley, Network Analysis in Geography, Arnold, London, 1968
5. Hay, A. Transport Economy, Macmillan, London, 1973
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10. Hussain, M. et al, Transport Geography: Perspective in Economic Geography Series, Anmol Publications Pvt. Ltd., New Delhi
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12. Johnston, R. J., Multivariate Statistical Analysis in Geography: A Premier on The General Linear Model, Longman, London, 1978
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18. Raza, Moonis and Y. P. Agrawal, Transport Geography of India, Concept Publishing Company, New Delhi, 1985
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20. Taaffe, E. J. and et al, Geography, Prentice Hall Inc
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22. Taaffe, Edward James, Howard L. Gauthier, Morton E. O'Kelly, Geography of transportation, Prentice-Hall Foundations of Economic Geography Series, 2nd edition, Morton O'Kelly, 1996
23. Ullman, E. L., American Commodity Flow, University of Washington Press, 1957
24. White H. P. and M. L. Senior, Transport Geography, Longman, London, 1983
25. Woodcock, R. G. and M. J. Baily, Quantitative Geography, McDonald & Evans
26. Yeates, Maurice, An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill Book Company, New York

M.A. / M.Sc. Geography (Semester III) - Course – Practical – I (M3GEOG1-CP05): Advanced Cartography II (Techniques of Demographic Data Analysis and Projections (Mathematical))

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop a thorough understanding of various types and use of map projections.
CO 2. To learn the various techniques for cartographic representation of socio-economic and demographic phenomena.
CO 3. To understand the pre-conditions, suitability and limitations of various maps and diagrams.
CO 4. To cover basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Practical – I (M3GEOG1-CP05) Advanced Cartography II
Techniques of Demographic Data Analysis and Projections (Mathematical)

Unit – I

a) Quantitative & qualitative symbols.
b) Sources of geographic data (India)
c) Rules of constructing diagram & graphs
d) Special diagrams – star, triangular, scatter (3 exercises)

Unit – II

Map projections – classification, characteristics, use and mathematical constriction along with outline maps of the following projections (4 Exercises)

a) Bonne,s projection
b) Conical projection –two standard parallel
c) Gall's projection
d) Mollweide's projection

Unit – III

Demographic aspects - at least with 20 administrative units (4 Exercises)

a) Population distribution (Dot method)
a) Density of population (Choropleth maps)
b) Age and sex composition (Pyramid)
b) Urban and rural composition/population by religion

Unit – IV

Economic and social aspects (at least 20 administrative units):

a) Occupational structure.
b) Crop production and area.
c) SC and ST population distribution
d) Literacy rate

Unit – V

Transport and settlement aspects (at least with 20 administrative units)

a) Traffic flow cartogram
b) Isochronic cartogram (speed of travel)
c) Nearest neighbor analysis
d) Histogram – based on human settlement distribution

References:

1. Arthur G., Advance Practical Geography, Heinemann.
2. Campbell, J., Introductory Cartography, Prentice Hall Inc., New York.
3. Govt. of Rajasthan, District Census Handbooks, latest as well as of previous Census,
4. Keates, J. S., Cartographic Design and Production, Longman, London.
5. Loxton, J., Practical Map Production, John Wiley & Sons, New York.
6. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.
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8. Raisz, E., General Cartography , McGraw Hill Book Co., New York.
9. Robinson, A. H., Elements of Cartography, Chapman & Hall.
10. Sing, R. L., Elements of Practical Geography, Kalyani Publishing.
11. Singh, R. N., Map Work and Practical Geography, Central Book Depot.
12- शर्मा, जे. पी.: प्रयोगात्मक भूगोल (रस्तोगी पब्लिशर्स, मेरठ)

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. Test paper - 10 marks
2. Objective paper- 10 marks (10 objective question)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner Distribution of 80 marks will be as follows:

A. Test paper - 25 Marks
B. Lab exercise - 30 Marks
C. Record work - 15 Marks
D. Viva-voce - 10 Marks

A- Test Paper – 25 marks

The Practical test paper of two hours duration and candidates will be required another two question out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises.

C- Record work – 15 marks

Note: Record work will comprised of a minimum of 20 exercises drawn on one fourth of a full drawing sheet and with methodological and analytical interpretation of each one.

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester III) - Course – Practical – II (M3GEOG2-CP06): Basics of Geographical Information System

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To train the students in state-of-the-art geospatial technology.
CO 2. To introduce the fundamental concepts of GIS, methods of geospatial data generation and visualization and the vast repository of data available on web-geoportals.
CO 3. To develop working skills in open source and proprietary GIS softwares.
CO 4. To create awareness regarding the potential of GIS in decision making and planning.
CO 5. To foster technical skills for employment opportunities as GIS consultant/analyst/project associates/entrepreneurs across private and public sector.

Practical – II (M3GEOG2-CP06) Basics of Geographical Information System

UNIT I: Introduction to GIS

a) Definition, evolution and components of GIS
b) Representation of geographical data in GIS
c) Geospatial data structure and formats
d) Data models: raster and vector data models

UNIT II: Coordinate Systems and Transformation

a) Datums, ellipsoid , geoid
b) Projected and Geographic Coordinate Systems, UTM coordinate system
c) Geometric transformation: map to map, image to map
d) Resampling, Root Mean Square Error

UNIT III: Data Generation and Database Management

a) Data Input, Spatial data editing
b) Topology
c) Attribute data input and management: data types, data entry, joining and relating tables
d) Attribute data manipulation

UNIT IV: Data Exploration

a) Descriptive statistics
b) Spatial data query, attribute data query, raster data query
c) Data generalization; data classification; zonal statistics
d) Data visualization and map composition

UNIT V: Introduction to Web Data Sources

a) Google Earth
b) Bhuvan
c) Water Resources Information System (India-WRIS)

d) Open Street Maps (OSM)

Practical exercises will be done using available GIS software - QGIS & ArcGIS - any other GIS software available in the department. One computer per student will be provided. Students will be required to prepare a record work of the outputs of all exercises conducted in the lab. In addition the students will also be required to submit the outputs in soft copy in a CD.

Lab Exercises (No. of exercises):

1. Familiarization with the software (1)
2. Importing raster data in GIS (1)
3. Geo-referencing and projecting a toposheet (1)
4. Geo-referencing and projecting a scanned map (1)
5. Generation of vector- point, line & polygon data - generating attribute data - GIS software (3)
6. Generation of vector- point, line & polygon data - generating attribute data - Google Earth (3)
7. Linking spatial and aspatial data- Table join (Excel file) (1)
8. Data visualization (2)
9. Computation of descriptive statistics (2)
10. Attribute data query (1)
11. Spatial data query (1)
12. Raster data query (1)
13. Data generalization (1)
14. Data classification (1)
15. Map composition (1)
16. Use of web sources for data acquisition using Bhuvan/ Google Earth/ India-WRIS/ OSM (3)

Suggested Readings

1. Bernhardsen, Tor, 1992. *Geographic Information Systems: An Introduction*. Wiley India
2. Burrough, P.A. and McDonnell, R., 1998. *Principles of Geographic Information Systems*. Oxford University Press, Oxford
3. Chang, Kang-tsung, 2003. *Introduction to Geographical Information Systems*. Tata McGraw Hill Publ. Co., New Delhi
4. Chauniyal, D.D., 2004. *Remote Sensing and Geographical Information Systems* **(in Hindi)**, Sharda Pustak Bhawan, Allahabad
5. Clarke, Keith C., 2003. *Getting Started with Geographical Information Systems*. Prentice Hall
6. Demeers, Michael N., 2000. *Fundamentals of Geographical Information Systems*, John Wiley, Singapore
7. Heywood, Ian, 2003. *An Introduction to Geographical Information Systems*. 2nd Ed. Pearson Publ. Co., Singapore
8. Lo, C.P. and Yeung, Albert K. W. 2002. *Concepts and Techniques of Geographic Information Systems*. Prentice Hall of India, New Delhi.
9. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. 1999. *Geographic Information Systems. Principles, Techniques, Management, Applications*. John Wiley, New York.

10. Reddy, M. Anji 2001. *Textbook of Remote Sensing and Geographic Information Systems*. B. S. Publs., Hyderabad.
11. Vyas P.R.,Remote Sensing and Geographical Information System and Remote Sensing : Basics and Applications, Rawat Publications, Jaipur, New Delhi-2014

WEB RESOURCES

1. www.qgistutorials.com
2. http://www.pasda.psu.edu/tutorials/gisbasics.asp
3. https://earth.google.com
4. bhuvan.nrsc.gov.in
5. india-wris.nrsc.gov.in
6. https://openstreetmap.org
7. http://openstreetmap.in

Practical Exam Scheme

Practical exercise will be done using GIS software – QGIS, ArcGIS, Arc View, TNTMips, ERDAS or any other GIS Software available in the department. One computer per student will be provided.

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. One assignment based on computer – 10 marks
2. Objective paper- 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner

The distribution of 80 marks will be as follows:

A- Test paper	-	25 Marks
B- Lab exercise	-	30 Marks
C- Record work	-	15 Marks
D- Viva-voce	-	10 Marks

A- Test paper – 25 marks

The Practical test paper of two hours duration and candidates will be required another two question out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on different GIS Software.

C- Record work – 15 marks

Student will be required to prepare a record work of the output of all exercise conducted in the lab. In addition the students will also be required to submit the output in soft copy in a CD.

D- Viva-Voce - 10 marks

The practical exercise, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester IV) - Course – P (I) (M4GEOG1-CT13) Industrial Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To impart sound understanding of factors, theories and models of industrial location.
CO 2. To learn about the distribution of major industries and industrial regions in the world with special reference to India.
CO 3. To develop proficiency in use of various quantitative techniques in the field.
CO 4. To develop understanding of various environmental issues related to industrialization.
CO 5. Basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Paper – I (M4GEOG1-CT13) Industrial Geography

Unit – I

a) Nature and scope of industrial geography, recent development in industrial geography
b) Classification of industries: bases and characteristics
c) Elements and factors of industrial localization, centralization and decentralization of industrial enterprises
d) Horizontal, vertical and diagonal linkages of industries

Unit – II

Basic economic concepts, theories and models of industrial locations:

a) Demand, supply and price; marginal cost and average cost
b) Economies of scale and agglomeration and related concepts
c) A. Weber, E. M. Hoover, August Losch, A. Fetter, G. T. Renner
d) A. Pred, Palander Tord, D. M. Smith, E. M. Rawstron, Bos H. C. & Hamilton

Unit – III

Geographical analysis of selected industries in the world with reference to India:

a) Copper, aluminum and iron and steel
b) Pulp and paper, textile
c) Oil refining, shipbuilding and software industries
d) Locational analysis of zinc and cement industries of Rajasthan

Unit – IV

a) Industrial location and spatial distribution analysis and measures: coefficients of localisation, specialisation, geographic association and index of diversification
b) Delimitation of industrial regions: indices and methods
c) Study of major industrial regions of the world: Great Lakes region and Lancashire region
d) Major industrial regions of India

Unit – V

a) Environmental degradation and hazards caused by manufacturing industries
b) Impact of industries on economic development
c) Role of globalization on manufacturing sector in less developed countries
d) Shifting of industries and its impact on the urban fringe

References:

1. Adam, Watter, Structure of American Industry, Macmillan & Co., New York
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4. Bengston, N. A. and V. L. Royen, Fundamental of Economic Geography, Prentice Hall, New York
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9. Hoover, E. M., The Location of Economic Activity, McGraw Hill, New York, 1948
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11. Lloyd, P. and P. Dicken, Location in Space: A Theoretical Approach to Economic Geography, Harper and Row, New York, 1978
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14. Miller, E. W., A Geography of Manufacturing, Prentice Hall, New York, 1962
15. Renner, G. T., Geography of Industrial Localisation, Economic Geography, Vol. 23, 1947
16. Riley, R. C., Industrial Geography, Chatto and Windus, London, 1973
17. Saushkin, Yu. G., Economic Geography: Theory and methods, Progress Publishers, Moscow, 1980
18. Smith, D. M., Industrial Location: An Economic Geographical Analysis, Wiley, New York, 1971
19. Weber, Alfred, Alfred Weber's Theory of Location of Industries, Chicago University Press, Chicago, 1929
20. Yaseen, Leonard, Plant Location, American Research Council, New York
21. कुमार, प्रमिला एवं शर्मा, श्रीकमल : औद्योगिक भूगोल, मध्यप्रदेश हिन्दी ग्रन्थ अकादमी
22. लोढा, राजमल : औद्योगिक भूगोल, राजस्थान हिन्दी ग्रन्थ अकादमी

M.A. / M.Sc. Geography (Semester IV) - Course – P (II) (M4GEOG2-CT14) Population and Settlement Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand the world distribution of population, demographic dividend and demography attributes and population policy with special reference to India.
CO 2. To foster knowledge of trends of population growth and migration patterns.
CO 3. To understand the development, typology, structure, models and theories of rural and urban settlements.
CO 4. Basic contents for various competitive examinations for lecturership, school education, UGC NET-JRF and so on.

Paper – II (M4GEOG2-CT14) Population and Settlement Geography

Unit – I

a) Meaning, scope and development of population geography
b) Sources of data: population counts and census; sample data; reliability of data and problems of mapping population data; data errors and their detection and correction
c) Measures of population distribution; world pattern of population distribution; determinants of population distribution

d) Population distribution in India: patterns and determinants

Unit – II

a) Population growth since prehistoric period; demographic transition theory and population growth models
b) Mortality analysis, patterns and its determinants
c) Fertility analysis, fertility patterns and its determinants
d) Growth of population in India: patterns, components and determinants

Unit – III

a) Age structure and sex composition
b) Educational composition; urbanization
c) Economic characteristics and occupational structure
d) Population composition of India: characteristics and problems

Unit – IV

a) Migration: types and determinants
b) Population and development; population-resource regions
c) Population and environment
d) Population policies in developed and less developed countries; population policy of India

Unit – V

a) Evolution, size and spatial distribution pattern of human settlements and related theories and models
b) Physical structure of settlements; internal characteristics and external forms
c) Functional structure of settlements; functional classification of towns and functional typology of villages; functional landscape of settlements
d) Settlement hierarchy: concept and contributing factors

References:

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2. Bilasborrow, Richard E. and Daniel Hogan, Population and Deforestation in the Humid Tropics, International Union for the Scientific Study of Population, Belgium, 1999
3. Bogue, D. J., Principles in Demography, John Wiley and Sons, New York, 1969
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5. Census of India, India: A State Profile, 1991
6. Chandana, R. C., Introduction to Population Geography, Kalyani Publishers, Ludhiana, 2000
7. Chisholm, M. (1962): 'Rural Settlements and Land use', London
8. Clarke, John I., Population Geography and the Developing Countries, Pergamon Press Inc., Oxford, 1971
9. Clarke, John I., Population Geography, Pergamon Press Inc., Oxford, 1973
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17. Mitra, Asok, India's Population: Aspects of Quality and Control, Volume I & II, Abhinav Publications, New Delhi, 1978

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20. Premi, M. K., India's Population: Heading Towards a Billion, S. R. Publishing Corporation, New Delhi, 1991
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25. Trewartha, G. T., A Geography of Population: World Patterns, John Wiley & Sons, New York, 1973
26. Trewartha, Glenn T. (ed.), The More Developed Realm, A Geography of its Population, Pergamon Press, Oxford, 1978
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28. United Nations, Methods for Projections of Urban and Rural Populations, No VIII, New York 1974
29. United Nations, The Determinants and Consequences of Population Trends, Volume I, Population Studies No 50
30. Woods, Robert, Population Analysis in Geography, Longman, London, 1979
31. Zelinsky, Wilbur, A Prologue to Population Geography, Prentice Hall, 1966

M.A. / M.Sc. Geography (Semester IV) - Course – P (III - A) (M4GEOG3-ET15 – A) Geographical Research Methodology

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To prepare sound theoretical background for scientific research in the field of Geography.
CO 2. To introduce the concepts of research problem, hypotheses, research design and methodology.
CO 3. To impart knowledge regarding various sources of data, methods of data collection, sampling techniques, processing, qualitative and quantitative analysis of data.
CO 4. To master the skills of literature review and thesis/report writing.
CO 5. To develop aptitude for applied research with due awareness of research ethics.

Paper – III A (M4GEOG3-ET15 A) Geographical Research Methodology

Unit – I Research Methodology: An Overview

a) Research methodology- an overview; procedure of scientific research
b) Some methodological controversies and explanation in geography
c) Selection and relevance of research theme, defining research problem
d) Formulation of hypothesis, objectives, nature, type and characteristics of hypothesis

Unit II : Research Design

a) Research design, methodology and data base, outline of the research; research design.
b) Sources and types of data: primary and secondary data, published and unpublished sources, toposheet, satellite imageries

c) Methods of data collection: observation, questionnaire, schedule and interview
d) Sampling: need for sampling methods, size of sampling

Unit III: Measurement

a) Measurement in research, measurement scales
b) Scales of measurement: nominal, ordinal, interval and ratio
c) Sources of error in measurement; scaling: meaning of scaling
d) Scale of classification bases, important scaling techniques

Unit-IV: Processing and Analysis of Data

a) Processing-editing, coding
b) Classification and tabulation
c) Significance of quantitative techniques
d) Descriptive and inferential statistics - overview

Unit-V: Interpretation and Preparation of Research Reports

a) Meaning and techniques of interpretation, steps & layout
b) Types of reports
c) Appendices, notes, references, citation and bibliography
d) Writing of the dissertation/ thesis & defense of the thesis at viva voce

References:

1. Chou, Ya-Lun, Statistical Analysis: With Business and Economic Applications, Holt, Rinehart and Winston, New York, 1975
2. Cole, J. P. and C. M. A. King, Quantitative Geography: Techniques and Theories in Geography, John Wiley and Sons Ltd., London, 1970
3. Gregory, S., Statistical Methods and the Geographer, Longman Group Ltd. London, 1978
4. Hammond, Robert and Patrick McCullagh, Quantitative Techniques in Geography: An Introduction, Oxford University Press, London, 1978
5. Hebden, Julia, Statistics for Economists, Heritage Publishers, London, 1990
6. Johnston, R. J. , Multivariate Statistical Analysis in Geography, Longman Group Ltd. London, 1978
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8. Silk, J., Statistical Concepts in Geography, George Allen and Unwin, London, 1980
9. Wilson, A. H. and M. J. Kirkby, Mathematics for Geographers and Planners, Oxford University Press London 1982

M.A. / M.Sc. Geography (Semester IV) - Course – P (III - B) (M4GEOG3 – ET15 – B)
Social Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To understand social structure and their spatial attributes.
CO 2. To understand socio-cultural trends of various tribes and human races of the world.
CO 3. To understand about social relations, identities and inequalities from geographical perspective.

CO 4. Basic contents for various competitive examinations for lecturership, UGC NET-JRF and so on.

Paper – III B (M4GEOG3-ET15 B) Social Geography

Unit – I

a) Nature, scope and development of social geography, philosophical bases of social geography
b) Positivist, structuralist and radical
c) Humanist, post-modern, and post-structuralist
d) Social geography in the realm of social sciences

Unit – II

a) Space and society
b) Understanding society and its structure and processes
c) Geographical bases of social formations; power relations and space
d) Contribution of social geography to social theory

Unit – III

a) Towards a social geography of India; nature and problems of social geographic data
b) Social differentiation and region formation; evolution of socio-cultural regions in India
c) Bases of social region formation; role of caste, ethnicity, religion, dialect and languages
d) Indian unity and diversity; social transformation and change in India.

Unit IV

a) Concepts of social well-being and physical quality of life
b) Human development: concept, components, indices and measurement
c) Patterns and bases of rural and urban society; rural-urban deprivation with respect to shelter, health and education
d) Social exclusion, deprivation and discrimination issues relating to women and underprivileged groups

Unit – V

a) Spatial distribution of social groups: tribes, castes, religious and language groups
b) Social groups and power relations in India
c) Review of five-year plans and area plans towards social policy in India
d) Strategies to improve social well-being in tribal, hill and drought prone areas; social and environmental impact assessment of development projects

References:

1. Ahmad, Aijazuddin, Social Geography, Rawat Publication, New Delhi, 1999
2. Casino, Vincent J. Del, Social Geography: A Critical Introduction, Wiley-Blackwell, 2009
3. Churye, B. S., Caste and Class in India, Popular Prakashan
4. Davis, K., Population of India and Pakistan, Princeton University Press
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7. Dubey, S. C., Indian Society, National Book Trust, New Delhi, 1991
8. Geddes, A. and A. T. A. Learmonth (eds.), Man and Land in South Asia, Concept Publishing Co., New Delhi

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10. Government of India, Report on Development of Tribal Areas, Planning Commission, 1981
11. Gregory, D and J. Larry, (eds.) Social Relations and Spatial Structures, McMillan, 1985
12. Guha, B. S., Racial Elements in India's Population, Oxford University Press, London
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14. Jones, E. (ed.), Readings in Social Geography, Oxford University Press, London
15. Jones, E. and J. Eyles, An Introduction to Social Geography, Oxford University Press, London
16. Maloney, Clarence, People of South Asia, Winston, New York, 1974
17. Rao, M. S. A., Urban Sociology in India, Orient longman, 1970
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24. Smith, David, Geography: A Welfare Approach, Edward Arnold, London, 1977
25. Sopher, David: An Exploration of India, Cornell University Press, 1980

M.A. / M.Sc. Geography (Semester IV) - Course – P (IV-A) (M4GEOG4-ET16-A)
Quantitative Methods in Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of basic and advanced quantitative methods of data analysis and interpretation.
CO 2. To provide a thorough understanding of the use, applicability and interpretation of various descriptive and inferential statistical techniques relevant to geographical research.
CO 3. To implement quantitative analysis in statistical softwares.
CO 4. To develop statistical skills with software expertise providing an edge for various employment opportunities - UGC NET-JRF, lecturership, research consultants, project associates, public service examinations and avenues for self-employment.

Paper – IV A (M4GEOG4-ET16 A) Quantitative Methods in Geography

Unit –I

a) Definition & history of Quantitative Geography
b) Significance & utilization of quantitative methods in geography
c) Nature & levels of measurement – qualitative and quantitative
d) Graphical presentation of data –bar, pie, ogive (cumulative histogram), frequency curve

Unit –II

a) Measure of central tendency – mode, median & mean
b) Skewness and kurtosis
c) Measures of deviation – types

d) Mean deviation, standard deviation, Coefficient of variation, Z-scores

Unit –III

a) Gini coefficient of concentration and Lorenz Curve
b) Geographic relationship- correlation
c) Carl Pearson correlation; Spearman's rank correlation
d) Regression analysis – linear regression

Unit –IV

a) Assessment of probability –Z Score
b) Tests of statistical significance : T-test ,Chi-Square test , ANOVA
c) Composite indices analysis
d) Matrices – types and inversion of matrices

Unit –V

a) Advantages of using software for quantitative analysis; Interface
b) Data entry and manipulation, generation of graphs
c) Data analysis in statistical software – computation of descriptive statistics
d) Regression and Correlation using software

**Available statistical software with introduction to SPSS*

Suggested Readings

1. Chou, Ya-Lun, Statistical Analysis: With Business and Economics Application, Holt, Rinehart and Winston, New York, 1975.
2. Cole, J. P. And C. M. A. King, Quantitative Geography: Techniques and Theories in Geography, John Willey and Sons Ltd., London, 1970.
3. Gregory, S., Statistical Method and the Geographer, Longman Group Ltd. London, 1978.
4. Hammond, Robert and Patrick McCullagh, Quantitative Techniques in Geography: An Introduction, Oxford University Press, London, 1978.
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9. Wilson, A. H. And M. J. Kirkby, Mathematics for Geographers and Planners, Oxford University Press London 1982.
10. Nagar, Kailashnath: Basic Elements of Statistical, Meenaxi Publications.

M.A. / M.Sc. Geography (Semester IV) - Course – P (IV-B) (M4GEOG4-ET16-B)
World Geography

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop an understanding of terrain, climate, natural vegetation and soil of continents.
CO 2. To gain knowledge about demographic and economic of all continents of the world.
CO 3. To enrich the knowledge of regional geography of various continents.
CO 4. Basic contents for various competitive examinations for civil services, lecturership, school education, UGC NET-JRF and so on.

Paper – IV B (M4GEOG4-ET16 B) World Geography

Unit – I: Asia

a) Asia in the context of the world
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Spatial distribution of population and economic base of the continent in general; regional study - West Asia

Unit- II: Europe

a) Europe in the contest of Asia and Africa
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; regional study -Western Europe

Unit- III: Africa

a) Africa in the context of Europe and North America
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; regional study -Southern Africa

Unit- IV: North and South America

a) North and South America in the context of the Atlantic and Pacific Rim states
b) Terrain and drainage
c) Climate, natural vegetation and Soils
d) Demographic and economic characteristics; regional study of Middle America

Unit- V: Oceania; Global issues

a) Australia & New Zealand in the context of Polynesia, Micronesia and South Asia
b) Terrain and drainage
c) Climate, natural vegetation and soils
d) Demographic and economic characteristics; globalization and W. T. O.; population, environment and sustainable development

Reference:

1. Cole, J., A Geography of the World's Major Regions, Routledge, London, 1996
2. Cole. M.M. , South Africa, Dutton, New York, 1961
3. Blij, H.J. , Geography: Regions and Concepts, John Wiley & Sons Inc., New York, 1994
4. Dickenson, J.P. et al, The Geography of the Third World Routledge, London, 1996
5. Jackson, R.H. and L. E. Hudman, World Regional Geography: Issues for Today, John
6. Kolb, A., East Asia : Geography of a Cultural Region, Methuen, London, 1977
7. Minshull, G. N., Western Europe, Hoddard & Stoughton, New York, 1984
8. Patterson, J. H., Geography of Canada and the United States, Oxford University Press, 1985
9. Songquiao, A., Geography of China, John Wiley & Sons Inc., New York, 1994
10. Ward, R. W. and A. Miller, World Regional Geography; A Question of Place, John Wiley & Sons Inc. , New York, 1989

M.A. / M.Sc. Geography (Semester IV) - Course – Practical – I (M4GEOG1-CP07): Geospatial Techniques for Applied Geographical Research

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To learn the various steps of image processing and information extraction workflow from satellite imageries.

CO 2. To learn the various advanced techniques of GIS based analysis for applied research, decision making and planning.

CO 3. To develop working skills in various open source and proprietary image processing and GIS softwares - ArcGIS, Erdas Imagine, ENVI, ILWIS, QGIS, SAGA, etc.

CO 4. To produce professionals with an edge as researchers trained in state-of-the-art technology with sound theoretical base; planners and decision makers with thorough understanding of the capabilities and tools of geospatial technology; and avenues for self-employment as technical/geo-spatial consultants.

Practical - I (M4GEOG1-CP07)

GEOSPATIAL TECHNIQUES FOR APPLIED GEOGRAPHICAL RESEARCH

UNIT I: Digital Image Processing: Data Preparation

a) Data preparation: geometric corrections, reprojection
b) Radiometric errors & corrections - image normalization, Dark Object Subtraction
c) Contrast enhancement - linear stretching techniques, non-linear -histogram equalization
d) Band ratioing- NDVI & NDWI

UNIT II: Thematic Map Generation

a) Image statistics, feature space
b) Unsupervised classification- Minimum distance
c) Supervised classification - training, signature evaluation, parametric (Maximum Likelihood) and non-parametric classifiers (Parallelepiped, Minimum Distance)
d) Accuracy assessment - overall, user's & producer's accuracy, Kappa

UNIT III: Spatial Analysis in GIS

a) Types of spatial analytical functions in GIS
b) Buffer, clip, update, union, intersection
c) Map overlay
d) Remote sensing and GIS data integration; sources of error

UNIT IV: Statistical Surfaces

a) Generation of statistical surfaces

b) Methods of spatial interpolation: linear, nonlinear- IDW

c) DEM, TIN and their derivatives

d) Terrain analysis

UNIT V: Spatial Pattern Analysis

a) Point pattern analysis: Nearest Neighbour analysis

b) Spatial auto-correlation

c) Global indices (Geary's *c*, Global Moran's I & Getis-Ord General G Index)

d) Local indices (Local Moran's I & Getis- Ord Gi * index)

*** Laboratory Practical Exercises (No. of exercises)**

1 Introduction to Bhuvan/NASA portal (2)
2 Acquisition of satellite data and DEM (2)
3 Geo-referencing of toposheets (1)
4 Image to map rectification (1)
5 Radiometric correction of satellite images- DOS (1)
6 Contrast enhancement (2)
7 Image ratioing - generation and interpretation of NDVI image (1)
8 Thematic map generation using supervised classification (1)
9 Thematic map generation using unsupervised classification (1)
10 Extraction of topographic attributes and landscape features using DEM (3)
11 Spatial interpolation of point data using IDW and evaluation of results (4)
12 Settlement pattern analysis- Nearest Neighbor technique (1)
13 Computation of Geary's *c*, Global Moran's I & Getis-Ord General G Index and interpretation of results - population data (3)
14 Computation of Local Moran's I & Getis- Ord Gi * index and interpretation of results - population data (2)

Exercises will be implemented in ERDAS, ENVI, Illwis, QGIS, TNT Mips, Arc View, ArcGIS or any other DIP and GIS Software as per availability. One computer per student will be provided.

Suggested Readings

1. Chang, Kang-tsung, 2003: Introduction to Geographical Information Systems. Tata McGraw Hill Publ. Co., New Delhi
2. Chauniyal, D.D., 2004. *Remote Sensing and Geographical Information Systems* **(in Hindi)**, Sharda Pustak Bhawan, Allahabad
3. Dobesch Hartwig, Dumolard Pierre & Dyras Izabela, 2007. *Spatial Interpolation for Climate Data* (Ed.), Geographical Information Systems Series, ISTE Ltd., USA
4. Goodchild, M.F., Park, B.O. and Steyaert, L.T. (Ed.) 1993, Environmental Modelling with GIS. Oxford University Press, Oxford.
5. Jenson J.R., 1996. *Introductory Digital Image Processing: A Remote Sensing Perspective*, Prentice Hall, New Jersey

6. Jenson, J.R., 2000. *Remote Sensing of the Environment: An Earth Resource Perspective.* Perason Education
7. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. *Remote Sensing and Image Interpretation*, John Wiley & Sons, New Delhi
8. Lloyd, Christopher D., 2010. *Spatial Data Analysis: An Introduction for GIS Users,* Oxford University Press
9. Longley, P. And Batty, M. (eds.) 1996. Spatial Analysis: Modelling in a GIS Environment. Geo-Information International, Cambridge
10. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. 1999. Geographic Information Systems. Principles, Techniques, Management, Applications. John Wiley, New York.
11. Maguirre, David J.; Michael F. Goodchild and David W. Rhind 1999. Geographical Information Systems: Principles and Application. Geo Information International, Vol.2, Longman Pub., N.Y.
12. Martin, D. 1996, Geographic Information Systems: Socio-economic Applications. Routledge, London
13. Mitchell Andy, 1999. *The ESRI Guide to GIS Analysis (Volume I) Geographic Patterns and Relationships*. ESRI Press, California.
14. Mitchell Andy, 2009. *The ESRI Guide to GIS Analysis (Volume II) Spatial Measurements and Statistics*. ESRI Press, California.
15. American Society of Photogrammetry, 1983. *Manual of Remote Sensing*, ASP, Falls Church, VA
16. Barrett, E. C. and L. F. Curtis, 1992. *Fundamentals of Remote Sensing and Air Photo Interpretation*, Macmillan, New York
17. Campbell, J., 1989. *Introduction to Remote Sensing*, Guilford, New York
18. Chauniyal, D.D., 2004. *Remote Sensing and Geographical Information Systems* **(in Hindi),** Sharda Pustak Bhawan, Allahabad
19. Curran, Paul J., 1985. *Principles of Remote Sensing*, Longman, London
20. Jenson J.R., 1996. *Introductory Digital Image Processing: A Remote Sensing Perspective*, Prentice Hall, New Jersey
21. Jenson, J.R., 2000. *Remote Sensing of the Environment: An Earth Resource Perspective.* Perason Education
22. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. *Remote Sensing and Image Interpretation*. John Wiley & Sons, New Delhi
23. Pratt W.K., 1978. *Digital Image Processing*. Wiley, New York

WEB RESOURCES

1. *Ebook on Remote Sensing Applications,* www.**nrsc**.gov.in/Learning_Centre_**EBook**.html
2. *E-Tutorial on Fundamentals of Remote Sensing*, Canada Centre for Mapping and Earth Observation, Natural Resources Canada, accessible at http://www.nrcan.gc.ca/earth-sciences/geomatics

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

1. One assignment based on computer - 10 marks
2. Objective paper - 10 marks (10 objective questions)

External marks-80

Candidates will be examined by an external examiner in consultation with the internal examiner

The distribution of 80 marks will be as follows:

A- Test paper	-	25 Marks
B- Lab exercise	-	30 Marks
C- Record work	-	15 Marks
D- Viva-Voce	-	10 Marks

A- Test paper – 25 marks

The practical test paper of two hours duration and candidates will be required answer two questions out of four questions.

B- Lab exercise – 30 marks

Practical exercise shall be of three hours duration and candidates will be required to attempt any 2 exercises out of 4 exercises based on different GIS Software.

C- Record work – 15 marks

Student will be required to prepare a record work of the outputs of all exercises conducted in the lab. In addition the students will also be required to submit the output in soft copy in a CD.

D- Viva-Voce - 10 marks

The practical exercises, record work and viva-voce examination shall be conducted by external examiner in consultation with the internal examiner.

M.A. / M.Sc. Geography (Semester IV) - Course – Practical – II (M4GEOG2-CP08): Project Work on Natural Resource Management Using RS-GIS

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To impart practical experience of using geospatial technology for solving real world problems related to various fields viz. natural resource management, urban planning, land-use planning, water resource, agriculture and health management.

CO 2. To develop an understanding of the work flow of project conceptualization, planning and implementation using geospatial techniques.

CO 3. To develop presentation skills and defending the work in open viva.

CO 4. To impart research experience enabling the students to carry out small projects and present their work on various platforms such as conferences/seminars.

Practical - II (M4GEOG2-CP08)

PROJECT WORK ON NATURAL RESOURCE MANAGEMENT USING RS-GIS

UNIT I: Overview of Applications of Remote Sensing and GIS

a) Natural resource evaluation and management
b) Urban planning and management
c) Land use planning and management
d) Environmental management & hazard mapping

UNIT II: Overview of Applications of Remote Sensing and GIS

a) Socio-economic applications
b) Health GIS
c) Water resource management

d) Agricultural studies

UNIT III-V: Project Planning, Execution and Writing of Project Report

Theme of project may be selected from any of the fields outlined in Unit I & II or any other problem of student's/ supervisor's choice with a geographical perspective analysed using geo-spatial methodology. The theme may range from methodological issues to real world geographical applications. Students will be required to get the selected theme approved by the concerned supervising faculty by way of presentation of synopsis in a class seminar.

The paper is divided into two parts. Part 1 (Unit I & II) comprises class room teaching. The students will be introduced to applications of RSGIS technology for applied geographical research. Subsequently, students will be required to take up a small case study as Part 2 (Unit III -V), essentially applying the geospatial tools for decision making and analysis. The case study will be carried out under supervision of internal faculty of the department. The project report will be of approximately 30-50 pages.

References

1. *Ebook on Remote Sensing Applications,* www.**nrsc**.gov.in/Learning_Centre_**EBook**.html
2. Chauniyal, D.D., 2004. *Remote Sensing and Geographical Information Systems* **(in Hindi)**, Sharda Pustak Bhawan, Allahabad
3. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. *Remote Sensing and Image Interpretation*. John Wiley & Sons, New Delhi
4. Vyas P.R.,Remote Sensing and Geographical Information System and Remote Sensing : Basics and Applications, Rawat Publications, Jaipur, New Delhi-2014

Practical Exam Scheme

Distribution of Marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

Seminar presentation: 20 marks

External marks-80

The project will be based and analysed by using RS data in any of the GIS Software.

Project report will be examined by external examiner.

Project report: 80 marks

M.A. / M.Sc. Geography (Semester IV) - Course – Skill – II (M4GEOG1-Skill-02): Statistical Analysis Using Software

Course outcomes: On the completion of this course students will be able to learn the following:

CO 1. To develop professional skills of using statistical softwares such as SPSS, MS Excel for quantitative analysis.

CO 2. To make students learn analysing geographical data using robust statistical tools provided by these softwares.

CO 3. To develop skills of data handling and manipulation in softwares.

CO 4. To develop them as professionals capable of working as data analysts across public and private sectors and also self-employment as technical consultants.

M.A./M.Sc. Geography
Fourth Semester
Skill -II (M4GEOG1-Skill-02) Statistical Analysis Using Software

UNIT I – Data

a) Measurement levels
b) Data types, database file formats
c) Cases and variables
d) Defining variables

UNIT II – Data Entry

a) Data import
b) Data entry
c) Data editing
d) Data manipulation

UNIT III – Data Distribution

a) Preparation of line graphs
b) Preparation of bar diagrams
c) Preparation of histograms
d) Preparation of pie diagrams

UNIT IV – Data Analysis: Computation of Fundamental Descriptive Statistics

a) Mean, median, mode
b) Measures of dispersion – standard deviation, Z-Scores, box plots
c) Measures of symmetry – skewness
d) Kurtosis

UNIT V – Analyzing Relationships

a) Preparation of scatter plot
b) Computation of correlation
c) Computation of regression
d) Output generation and export in different formats

**Exercises will be done in available statistical software – Microsoft Excel and SPSS*

Practical Exam Scheme

Distribution of marks: Total marks (100) = Internal marks (20) + External marks (80)

Internal marks- 20

3. One assignment based on statistical software using valid data – 10 marks.
4. Objective paper – 10 marks (10 objective questions)

External marks - 80

Candidates will be examined by an external examiner in consultation with the internal examiner.
The distribution of 80 marks will be as follow:

A. Test paper	-	25 Marks
B. Lab exercise	-	30 Marks
C. Record work	-	15 Marks
D. Viva-voce	-	10 Marks

DEPARTMENT OF GEOGRAPHY

Faculty of Earth Sciences
Mohanlal Sukhadia University, Udaipur

(Programme Specific Outcomes and Course Outcomes)

Programme Specific Outcomes: (Ph.D. Programme in Geography)

PSO 1. To identify domain specific research problems and finding solutions to the same through scientific research.

PSO 2. To develop expertise in doctoral candidates in conducting scientific research.

PSO 3. To develop expertise in use of tools and methods of geospatial technology in applied geographical research.

PSO 4. To encourage application of software based cartographic and quantitative analysis

PSO 5. To cater to regional needs with respect to resource management, policy, planning and governance.

PSO 6. To identify priority areas for planning and management with specific focus on western part of India.

PP-Geology
C-2

Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 upto 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in
Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned					Number of eligible applications received	Number of Students admitted				
		Gen	OBC	SC	ST	Others		Gen	OBC	SC	ST	Others
2020-21												
M.Sc. I Semester Geology		16	6	4	4	6	87	14	10	6	4	2
M.Sc. III Semester Geology		16	6	4	4	6		13	13	4	1	3
M.Sc. Tech. Applied Geology		Admission Under Process					—	5	5	3	1	3

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2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)

(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Dr. Ritesh Purohit	ABKPP2953N	Associate Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Mr. Akhil Kumar Dwivedi	APMPD4579G	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Dr. Ankush Shrivastava	GUUPS0786M	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Dr. Anjali Singh	ECCPS9315E	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Dr. Maya Chaudhary	AQBPC2044D	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Dr. Harish Kapasya	DIXPK8716F	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Mr. Subhash Chandra Janagal	AJZPJ9076F	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Mr. Niranjan Mohanty	BWEPM5935K	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Ms. Neha Rarh	DWFPR1465A	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes
Mr. Rajnikant Patidar	BQUPR2168F	Assistant Professor	Geology	Permanent	2018	3 years and 6 months	Yes

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2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &3.4.2 The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
N/A							

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

Annexure No 2.6.1.1—22

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Outcome of M. Sc. Geology Programme

After getting M.Sc. degree students get jobs in Central Government Department like Geological survey of India, Indian Bureau of Mines, Central Groundwater Board etc. Public enterprises and MNC like ONGC, Oil India, Cairn Energy etc. They also get jobs in state Government Department like Department of Mines and Geology, Groundwater Department, state government enterprises like RSMM. All mineral, cement and building stone industries employ them as geologist. Also working as private consultants.

Course/Paper Code	Course/Paper Name	Objective of Course	Outcome of Course
M1GEO01-CT01	Tectonics and Geomorphology	It is aimed to learn about the role of tectonics in landscape evolution, the coupling of tectonics and climate, tools and methods used in the investigation of landforms and landscape responses to deformation in different timescales	Outcomes are expected in terms of coupled knowledge of tectonics and geomorphology. It is expected that the students bear the knowledge to understand the processes of geomorphology with the role of tectonics.
M1GEO02-CT02	Mineralogy	The objective of the course is to understand the distribution of minerals in different Earth's spheres and evaluate different processes of the Physico-chemical environment of their formation. The course also includes minerals, which are of economic significance and learn the basic principles to identify them.	At the end of the course the successful students able to identify and characterize the common minerals based on their physical, chemical and optical properties. The students will also get the idea of preliminary knowledge on instrumentation techniques used for mineralogical studies.

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M1GEO03-CT03	Palaeontology -I	To explain the origin and evolution of life is intricately linked with the geological history of the Earth. Students explore knowledge about the evolutionary history of organism.	Through the fossil records students will explore topics such as evolutionary diversity, exceptional preservation and palaeoclimates. Through the key groups of invertebrate fossils students will come to know about the major concepts such as the origin of life, patterns of evolution and extinction, the importance of exceptional fossil assemblages, and the relationship between ecology and evolution.
M1GEO04-CT04	Precambrian Stratigraphy	It is aimed to make understand almost 90% of Earth's geological history through this paper by pertaining knowledge of lithology, crustal evolution and geochronology.	Students are expected to carry with them knowledge based upon geochronological sequence of rock layers formed in India and World all over during Precambrian time. The knowledge imparted will bear characterization of Precambrian rocks with respect to lithology, structure, extension, location, age & life preserved in them if any.
M2GEO01-CT05	Structural Geology	The objective of the course is to teach the students how does the Earth respond to applied forces. This course looks at how rocks deform and change shape, and how we can recognise and use structures within rocks to determine ancient magnitudes and orientations of stress fields. Basic concepts of the rheological properties of rocks and their control on the deformation processes.	At the conclusion of this class, students should be able to quantitatively describe the three-dimensional structure of rocks in the earth's crust, using geologic maps and/or outcrop data and reconstruct the deformation history of deformed rocks based on fabrics and geometric relationships.
M2GEO02-CT06	Sedimentary Petrology	Students will understand the nature of sediment formation, transport and deposition as well as different types of sedimentary rocks, their textures and structures in interpretation and reconstruction of sedimentary facies, paleogeography, paleoclimates and depositional histories.	After successful completion of this course the student will be able to classify different sedimentary rocks. Also this course will help them in interpreting different sedimentary depositional environment.

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M2GEO03-CT07	Palaeontology – II	Students come to know some important groups of fauna and flora keeping importance in the geologic history of the earth.	Through the key groups of invertebrate fossils students will come to know about the major concepts such as the origin of life, patterns of evolution and extinction, the importance of exceptional fossil assemblages, and the relationship between ecology and evolution. Through the vertebrate's evolution and Gondwana Plants study students will come to know their importance in geological history.
M2GEO04-CT08	Phanerozoic Stratigraphy	Phanerozoic periods exceptionally covers important geological history of evolution of life that stands buried in the rocks but need to be revealed through study of outcrops, fossils, rocks that includes distribution and age components.	It is expected that the outcomes from the study of paper will include stratigraphic sequencing during Phanerozoic time. The knowledge based outcome will include characterization, lithology, structure, extension, location, age and life preserved in these rocks.
M3GEO01-CT09	Economic Geology	The course educates the concepts of Economic Geology in general, starting with details of various ore forming processes, their controls and relation with tectonic processes. The course also enables students to learn about important metallic and non-metallic minerals, their ore, geologic and geographic distribution. The course further introduces students about fuel minerals including coal and petroleum.	The students upon successful completion of this course will be well versed with various processes involved in formation of ore deposits. It is expected that student will be able to better appreciate the potential of various mineral commodities across the country.
M3GEO02-CT10	Igneous Petrology	• To impart knowledge about the magmatic systems • To train the students about the dynamism of the earth in the field of igneous petrology. • To gain an appreciation for how the igneous rocks is controlled by chemical and physical properties of magmas.	Upon successful completion of course the students would be able to • Understand the mantle system and magmatic processes. • Understand the basic principles of phase rule and its relation with binary and ternary systems and origin of different igneous rocks.

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M4GEO01-CT11	Metamorphic Petrology	• To impart knowledge on Metamorphism and metasomatism process. • To train the students to understand the different processes of formations of metamorphic rocks and their significance.	Upon successful completion of course the students would be able to • Understand the factors and agents of metamorphism. • Understand the textures and mineral assemblages of different zones of metamorphism. • Understand the processes of metasomatism and their types. • Understand the representation of mineral paragenesis & graphical representation of metamorphic rock.
M4GEO02-CT12	Mineral Exploration & Mining Geology	• To impart knowledge of geological field survey. • To train the students to understand functioning of necessary instruments required during geological field survey. • To Understand various geological structures found at outcrops. • To Understand fundamentals of geological processes and stratigraphic correlation. • To Understanding observations and recording of important filed information and to classify various types of features procured from field study. • To Understand fundamentals of the geophysical methods of mineral exploration. • To Understand the principles of mineral economics and bore hole logging.	Upon successful completion of course the students would be able to:- • Understand the basic concept of geological field work and various instruments used in field work. • Learn about the geological processes that lead to the formation of mineral deposits in nature, and about which minerals and rocks represent important resources for society. At the end of the study period, will be in a position to contribute to the exploitation of known mineral deposits, and to contribute to exploration for new deposits. You will also learn how exploitation of mineral deposits can take place with minimal negative consequences for the environment, and how harmful emissions from mines and mineral deposits can be stopped or limited. • Field work including geological and structural mapping. • Preparation of field report based on the recorded data, mapping data as well as laboratory work on the rock samples collected

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			during the field work
M1GEO05-CP01	Practical – I : Tectonics and Geomorphology & Mineralogy	For Tectonics and Geomorphology To be able to recognize, analyze, and describe landforms, materials of which they are composed, and processes by which they form. Students come to know about to explain the concepts and theories of plate tectonics, mass balance, dynamics and hydrology and will be able to understand the processes by which transportation of earth material occurs through fluvial and gravitational processes. For Mineralogy The student will learn the basic principles behind the arrangement of atoms how these atoms are coordinated and bonded and how this is reflected in the external form and its link with chemical composition. The student will learn how to identify the most common minerals in hand specimen and, by using optical techniques, learn how to identify the common minerals in thin section	For Tectonics and Geomorphology Students will have knowledge of represent relief features of the plateaus, hills, foothills, valleys, plains and flood plains through superimposed, composite, serial or projected profiles. Will be able to demarcate basin with representation of basin relief through profiles and will draw interpretations. Will become able to express slope and gradients from a topographical map, draw longitudinal profiles of rivers from topographical maps, chalk out water discharge curve and calculate the sediment transport and erosion within a landscape. For Mineralogy At the completion of the course student will be able to • Explain why different minerals have distinctly different structures. • Demonstrate how the internal structure of minerals affects the external structureand physical properties of a minerals. • Identify minerals based on megascopic and microscopic observations.

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M1GEO06-CP02	Practical – II : Palaeontology I & Precambrian Stratigraphy	For Paleontology I To explore students knowledge with the basic practical approach through the hand specimens of mode of preservation and groups of Foraminifera, Trilobita and Echinodermata. For Precambrian Stratigraphy To make learn students about distribution of Precambrian Stratigraphic units of India along with the palaeogeographic conditions	For Paleontology I Students will be able identify to morphological features through hand specimens of types of fossils. Through specimens of Foraminifera, Trilobita and Echinodermata of organism, practically he/she will be able to study about palaeoenvironment, stratigraphic position, age and correlation with other organism. For Precambrian Stratigraphy Student is expected to come out with the knowledge of extension of lithostratigraphic units in relevance to chronostrtaigraphy with sum-toto knowledge of the Indian subcontinent specifically during Precambrian time.
M2GEO05-CP03	Practical – III : Structural Geology & Sedimentary Petrology	For Structural Geology Measurement of various orientation data from the structures, plotting them in suitable diagrams and make a quantitative analysis. For Sedimentary Petrology To give students hands-on practical classes aimed at 1. Developing skill for identifying the different types of sedimentary rocks in hands specimen as well as under microscope 2. Using graphic, mathematical calculations and other means for data analysis and interpretation	For Structural Geology To prepare the students for future research and teaching career in the field of Structural Geology. For Sedimentary Petrology After completion, students will learn 1. How to identify and differentiate between different sedimentary rocks in field as well as thin sections under microscope 2. How to represent data in different ways and to interpret data for paleocurrent analysis and other objectives

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M2GEO06-CP04	Practical – IV : Palaeontology II & Phanerozoic Stratigraphy	For Paleontology II To explore students knowledge for the study of fossil groups of Anthozoa, Gastropoda, Bivalvia, Chephalopoda, Brachiopoda, Gondwana plant and some vertebrate fauna. For Phanerozoic Stratigraphy It is intended for students to learn anout distribution of Phanerozoic Stratigraphic units of India along with the changing palaeogeographic conditions relevant to distribution of landmass, sea and fresh water provinces.	For Paleontology II Students will be able to identify all morphological features of the particular groups of fauna and flora. He/She will be able to find about palaeoenvironment, stratigraphic position, age and correlation with other organism. For Phanerozoic Stratigraphy With respect to outcome it is expected that student should bear the knowledge of Phanerozoic lithostratigraphic units in Indian subcontinent, palaeogeographic linkages with the surrounding landmasses and position of India within the various Supercontinents.
M3GEO05-CP05	Practical – V : Economic Geology & Igneous Petrology	For Economic Geology This practical course has following objectives: • To study ore minerals in hand specimen with special focus to its physical properties for identification • To study polished sections of ore specimens under reflected light. • To study the distribution of various important ore minerals across world and India For Igenous Petrology • To impart knowledge about the magmatic systems • To train the students to identify different igneous rocks in hand specimen and further by thin section through optical properties of different minerals.	For Economic Geology The students upon successful completion of this course will be well versed with: • Identification of ore minerals in hand specimen • Identify, describe and understand texture and structures in polished section of ore minerals and appreciate ore genesis. • Distribution of ore important ore minerals in India and World For Igneous Petrology Upon successful completion of course the students would be able to • Identify the common rock forming minerals of igneous rocks in both hand specimen and thin-section. • Identify key textural/micro structural features of igneous rocks appreciate the significance of such features with regard to geological processes that have operated.

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		To train student to classified rocks based on the modal mineralogy.	Assign a name to igneous rocks on the basis of its mineralogical and textural characteristics, and appreciate the environment(s) of formation. Ability to interpret phase diagrams relevant to igneous systems. Ability to make detailed and annotated petrographic sketches from thin-section observation and to summarise the salient features and relate the chemistry of the system and environment of formation.
M4GEO05-CP06	Practical – VI : Metamorphic Petrology & Mineral Exploration and Mining Geology	For Metamorphic Petrology To impart knowledge about metamorphic processes. To train the students to identify different metamorphic rocks in hand specimen and further by thin section through optical properties of different minerals To train the students to understand the different processes of formations of metamorphic rocks and their significance in the geodynamic evolution. For Exploration and Mining Geology To understand the importance of surveying and Levelling in the field of Geology. To study the basics of linear/angular measurement methods like, compass and Plane table surveying. To study the significance of plane table surveying in plan making. To know the basics of levelling and	For Metamorphic Petrology Upon successful completion of course the students would be able to 1. Identify the common rock forming minerals of metamorphic rocks in hand specimen and thin-section. 2. Identify key textural/micro structural features of metamorphic rocks and appreciate the significance of such features with regard to geological processes that have operated. 3. Assign a name to metamorphic rock on the basis of its mineralogical and textural characteristics, and appreciate the environment(s) of formation. 4. Ability to interpret phase diagrams relevant petrogenic grids relevant to metamorphic systems on the basis of mineral assemblages recorded in the rock. For Exploration and Mining Geology Upon successful completion of course the students would be able to:- Calculate angles, distances and levels by Theodolite. Identify data collection methods and prepare

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		theodolite survey in elevation and angular measurements. - To understand measurement of horizontal, vertical angles and linear distance from Theodolite. - To Understand how to use and levelling of Theodolite in the field. - To understand process of core logging and its importance in exploration. - To understand applications of GPS and its use in field. - To know the methods of ore reserve estimation and how to calculate ore reserves of a stope and mine.	field notes. - Understand the working principles of survey instruments. - Estimate measurement errors and apply corrections. - Interpret survey data and compute areas and volumes. - Understand the procedures of plane table and compass survey. - Understand how to work Theodolite in field and its use in surveying and levelling. - Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. - Understand contouring and its importance. - Understand techniques and applications of GPS and its uses in field in mapping. - Understand how to do core logging and take visuals of grade from the core. - Understand the methods of ore reserve estimation of a ore body.

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Discipline Specific Electives

Course /Paper Code	Course /Paper Name	Objective of Course	Outcome of Course
M3GEO03-ET01	Ground Water Geology	To teach students • The importance of groundwater, its occurrence, distribution and quality • Various hydrological concepts, groundwater flow theories and their applications. • Basic groundwater problems related to different engineering structures.	After completing course, students will be able to • Define the significance of groundwater as an Earth resource • Understand the porous medium properties that control groundwater flow and transport, including porosity, hydraulic conductivity, and compressibility. • Apply groundwater flow equations to confined and unconfined aquifers.
M3GEO04-ET02	Photo geology and Remote Sensing	The objective of the present syllabus of Photo Geology and Remote Sensing is as follows: • To introduce students to concepts and geological applications in remote sensing with an emphasis on aerial photography although other airborne and satellite imagery are also included. • To familiarize students with the fundamentals of both the photo geological interpretation of air-photo stereo pairs and satellite imagery through laboratory practice. • To encourage the use of large-scale air-photo stereo pairs and satellite imagery in field surveying and site investigations	The outcome of the syllabus will be helpful for students in the following way: • The students will be able to understand the concepts, methodologies and applications of Remote Sensing Technology. • They will acquire skills in handling instruments, tools, techniques while using Remote Sensing Technology. • It empowers the students with confidence and leadership qualities.
M4GEO03-ET03	Environmental Geology & Disaster Management	• To impart knowledge of environmental geology, natural hazards and their management. • To understand the Earth's ecosystem and interrelations of various components of the Earth.	Upon successful completion of course the students would be able to:- • Know the basic fundamentals of earth science as applied to the interaction between human activity and the natural environment.

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		To understand geological aspects of various natural hazards and geo-engineering projects	Understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution. Understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.
M4GEO04-ET04	Geochemistry	The objective of the syllabus helps the students to understand the chemical principles which are used to explain the mechanisms that control the large geological systems. The course also helps to understand the distribution of elements in different Earth's spheres and evaluate different processes of element migration.	By attending the courses, the students able to understand the evolution of the early earth and its differentiation to the present-day state. The students also have an idea of the chemical composition of the geochemical reservoirs. The knowledge of the radiogenic isotope's signature helps to trace the source of mineral and rock separation from the magma.
M3GEO06-EP01	Elective Practical - I : Groundwater Geology & Photo-geology and Remote Sensing	For Groundwater geology To give students hands-on practical classes aimed at giving exercises on various topics covered in theory classes of the subject like water quality, groundwater exploration, yield etc. For Photo-Geology and remote sensing To introduce students with the interpretation of aerial photographs with the help of stereo pairs and satellite imageries through laboratory practice. To introduce students with the visual interpretation of satellite imageries. To introduce students with the various application of GIS software in different field of Earth Sciences viz. geomorphology, structural geology, lithological mapping,	For Groundwater geology After completion, students will be able to apply theoretical knowledge and concepts learned during lecture classes by using the data gathered in the field or other source(s). For Photo-Geology and remote sensing The students will be able to interpret aerial photographs and satellite imageries. The students will also be able to apply GIS software in various fields of Earth Sciences geomorphology, structural geology, lithological mapping, environmental geology, hydrogeology etc.

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		environmental geology, hydrogeology etc.	
M4GEO06-EP02	Elective Practical – II : Environmental Geology and Disaster Management & Geochemistry	For Environmental Geology and Disaster Management These are the objectives of this course. 1. To analysis of different parameters of air, water and noise. 2. To interpretation of air, water and noise data. 3. To prepare iso-concentration maps of water quality parameters according to WHO data and their limits. 4. To identify the seismic zones and plot them in maps of World, India and Rajasthan. 5. To know how to occur slope failure and landslide in landslide prone zones. For Geochemistry The students will learn how to present analytical data of geochemistry through various graphical diagrams viz. Multi-Elements spider diagrams and introduction to Geochemical Modelling for interpretation of the petrological processes.	For Environmental Geology and Disaster Management Upon successful completion of course the students would be able to:- 1. Understand the different parameters of air, water and noise. 2. Understand how to interpretation the air, water and noise data. 3. Understand to prepare iso concentration maps of water quality. 4. Understand the seismic zones of India, world and Rajasthan. 5. Understand some exercises of slope failure on sterionet and their field relation. For Geochemistry At the completion of the course, the student will, • learn to calculate mineral formulae based on mineral chemistry. • be able to do Bi-variate analysis of data (Regression & Correlation). • learn to present the geochemical data via different multi-elements spider diagrams for the interpretation of various petrological processes.

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Skill Papers

Course /Paper Code	Course /Paper Name	Objective of Course	Outcome of Course
M2GEO07-SE01	Application of GIS	The main objective of teaching skill course in M.Sc. is to gain a basic, practical understanding of GIS concepts, techniques and real world applications Class discussions, reading assignments, and class lectures prepare students to develop a mapping project based on the assumptions and interpretations of data selected by the student.	At the completion of the course, students will: • Have a basic, practical understanding of GIS concepts, techniques and real world applications. • Have an understanding of the technical language of GIS. • Know how GIS is utilized in the larger context of business needs and IT strategies. Understand basic GIS data concepts. Have an ability to perform basic GIS analysis of concepts. • Have demonstrated a practical application of GIS. • Have practical experience using basic GIS tools. • Have an understanding of GIS and its relationship to mapping software development. • Have an appreciation of GIS career options and how to pursue them.

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M4GEO07-SE02	Survey & Leveling	[To understand the importance of surveying and Levelling in the field of Geology. [To study the basics of linear/angular measurement methods like Tape, chain surveying, electronic distance, compass and Plane table surveying. [To study the significance of plane table surveying in plan making. [To know the basics of levelling and theodolite survey in elevation and angular measurements. [To understand measurement of horizontal,	Upon successful completion of course the students would be able to:- [Calculate angles, distances and levels from theodolite and other equipments. [Identify data collection methods and prepare field notes. [Understand the working principles of survey instruments. [Estimate measurement errors and apply corrections. [Interpret survey data and compute areas and volumes.
		vertical angles and linear distance from Theodolite. [To Understand how to use and levelling of Theodolite in the field. [To understand characterising and methods of contouring. [To understand applications of GPS and its use in field.	[Understand the procedures of plane table and compass survey. [Understand how to work Theodolite in field and its use in surveying and levelling. [Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. [Understand contouring and its importance. [Understand techniques and applications of GPS and its uses in field in mapping.

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Outcome of M. Sc. Tech Applied Geology Programe

After getting M.Sc. degree students study advance geology in M.Sc.Tech (Applied Geology) course. M.Sc. Tech students get privilege in jobs of all geological organization and industry specially for exploration work. Central Government Department like Geological survey of India, Indian Beauro of Mines, Central Groundwater Board etc. Public enterprises and MNCs like ONGC, Oil India, Cairn Energy etc. They also get jobs in state Government Department like Department of Mines and Geology, Groundwater Department, state government enterprises like RSMM. All mineral, cement and building stone industries employ them as geologist. Also get opportunities in consultancy work.

Course/Paper Code	Course/Paper Name	Objective of Course	Outcome of Course
MT1GEO01-CT01	Structural Geology and Tectonics	Accurate geometric description of the structures observed in natural deformed rocks. Understanding deformation mechanisms at micro- meso- and macroscopic scales.	Students is supposed to learn the techniques of recording and analysing structural data and taught how to map rock sequences in the field and interrogate a region to determine how it formed and what has happened to the area since formation. To come out with the application of structural geology in oil and petroleum sectors.
MT1GEO02-CT02	Micropalaeontology	To know the process/Basics of the study of micropalaeontology. It is aimed to give knowledge about the microfossils role in hydrocarbon exploration and basin analysis.	To explain the role of micropalaeontology in biostratigraphy and hydrocarbon exploration geology. To explain the role of microfossils in palaeoenvironmental interpretation. To describe the morphology and biology of organisms commonly found as microfossils.

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MT1GEO03-CT03	Mineral Exploration and Mining Geology	This course is designed to enable students to acquire understanding of the basic concept of mineral exploration, various exploration techniques including ground and aero geophysical surveys, geochemical exploration, etc., introduces the basic concepts of mining and gives knowledge of application of ore petrography.	The expected outcome of the course upon successful completion includes development of ability to apply knowledge based approach for mineral exploration and capacity to judge better use of specific tools for mineral targeting unique to the selected mineral under consideration.
MT1GEO04-CT04	Mineral Technology and Mineral Economics	☐ To acquire knowledge of basic concept of mineral processing and economics of mineral resources. ☐ To be able to understand how and why different types of mineral deposits are formed. ☐ To understand various government mineral policies, rules and regulations for conservation of minerals.	Upon successful completion of course the students would be able to ☐ Understand the technology of the minerals processing and implication of the mineral resources in different industries ☐ Students gain the knowledge about different government policies and regulations of minerals. ☐ Students able to know how economy generated by various type of minerals

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MT2GEO01-CT05	Advance Remote Sensing in Geosciences	The course is designed to fulfil the following objectives ☐ To provide exposure to students in gaining knowledge on concepts and applications leading to modelling of earth resources management using Remote Sensing ☐ To acquire skills in storing, managing digital data for planning and development. ☐ To acquire skills in advance techniques such as hyper spectral, thermal and microwave for mapping, modeling and monitoring. ☐ To inculcate practical skill for processing advance remote sensing datasets for various applications including natural resources management.	☐ The students will be able to gt understanding on various concepts and application of remote sensing in the modeling of earth resource management ☐ The student will be able to handle digital data for planning and development ☐ The students will be able to learn skill fr processing advance remote sensing datasets such as hyper spectral, thermal and microwave for various applications including natural resources management.

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MT2GEO02-CT06	Engineering and Groundwater Geology	The course aims at teaching the student ☐ Basic knowledge and understanding in the most central part of engineering geology, rock and soil. ☐ Detailed knowledge of groundwater and its exploration, exploitation, wells and salt-water intrusion.	After completion of course, the student ☐ Can give an account of engineering geological investigations, engineering, stability of slopes and protection of underground facilities ☐ Learn about hydrological properties of aquifers, their determination, groundwater occurrence in different rocks, water level fluctuations and their causative factors ☐ Can learn exploration methods, concept of well hydraulics as well as Hydrogeology of India and Rajasthan in detail.
MT2GEO03-CT07	Petroleum, Coal and Radioactive Minerals	The course is divided in three sections namely Petroleum, Coal and Radioactive Minerals which is spread over five units. In the Petroleum part, the course is designed to enable students to acquire understanding of the processes involved in formation of petroleum, its migration, maturation, its distribution, etc. In the second portion of course, the course enables students to learn details about formation of Coal, fundamental concept of coal	The students after completing this course are expected to have fundamental concepts of origin of energy minerals which includes petroleum, coal and radioactive minerals. The students will have knowledge based approach towards exploration and exploitation including background of their distribution across the globe with special focus in India

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		petrography, its classification and distribution across globe. In the last part, the course deals with radioactive minerals where student is exposed to processes of formation of various radioactive minerals, their classification and distribution in detail.	
MT2GEO04-CT08	Oceanography and Climatology	This course aims at introducing oceanography and climatology concepts dealing with the physical process and chemical behaviour of ocean and climate as a coupled system. Also this course includes the application of the various proxies for paleoceanographic and paleoclimatic interpretation.	After successful completion of this course student will be able to understand the process responsible for various oceanographic and climatological phenomenon. Also through this course student will be able to interpret and correlate various paleoceanographic and paleoclimatic events.
MT1GEO05-CP01	Practical-I: Structural Geology and Tectonics. Micropalaeontology	For Structural Geology and Tectonics To learn the practice of theoretical knowledge for applying at ground observation in field and to learn essential observational and practical skills. For Micropaleontology To explore students knowledge particularly in micro fossils.	For Structural Geology and Tectonics To train the students for adaptation in field work environment in certain professional and scientific organizations.Students will have knowledge and imparted through field trip. Students are expected to learn different deformational structures. For Micropaleontology Students will be able to identify all morphological features of microfossils by the help of microscope and will learn applications of microfossils in hydrocarbon exploration and correlation with the strata.
MT1GEO06-CP02	Practical-II: Mineral Exploration and Mining Geology. Mineral Technology and Mineral	The practical paper has following objectives: 1. To understand beneficiation of various ore minerals and use of	Upon successful completion of course the students would be able to:- 1. Use flow sheet and appreciate ore beneficiation methods specific to various

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	Economics	their flow sheets 2. To understand industrial specifications of various minerals specific to different industries 3. To describe and identify various hand specimen of important metallic and non-metallic minerals 4. To understand the importance of surveying and Levelling in the field of Geology. 5. To know the basics of levelling and theodolite survey in elevation and angular measurements. 6. To understand measurement of horizontal, vertical angles and linear distance from Theodolite. 7. To understand process of core logging and its importance in exploration. 8. To understand applications of GPS and its use in field. To understand the methods of ore reserve estimation and calculation of ore reserves	metals 2. Decide use of mineral specification data and categorise it according to various industry 3. Identify and describe various metallic and non-metallic minerals in hand specimen 4. Understand the working principles of survey instruments. 5. Calculate angles, distances and levels by Theodolite. 6. Estimate measurement errors and apply corrections. 7. Understand Theodolite survey takes vertical and horizontal angles in order to establish controls. 8. Understand techniques and applications of GPS and its uses in field in mapping. Understand the methods of ore reserve estimation in a mineral deposit.
MT2GEO05-CP03	Practical-III: Advance Remote Sensing in Geosciences & Engineering and Groundwater Geology	For Advance Remote Sensing in Geosciences To introduce students with the more understanding of the remote sensing with the practical knowledge of the subject.	For Advance Remote Sensing in Geosciences The students will be able to do various analysis viz. geomorphic mapping on aerial photographs, geological and structural mapping using aerial photographs, lineament analysis on satellite imageries as well as

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		To introduce students with the various analysis viz. geomorphic mapping on aerial photographs, geological and structural mapping using aerial photographs, lineament analysis on satellite imageries as well as Geological and Structural studies using satellite imageries. For Engineering and Groundwater Geology To give students hands-on practical classes aimed at 1. Giving numerical problems/exercises on various topics covered in theory classes of the subject like engineering properties of soil and rock 2. Making maps such as iso-hyetal and groundwater contouring as well as numerical problems on aquifer parameters and pumping tests.	Geological and Structural studies using satellite imageries by themselves. They will be able to use this practical knowledge in research purpose too. For Engineering and Groundwater Geology After completion, students will be able to understand and apply theoretical concepts of engineering and groundwater geology in practical aspects like deciding which soil or rock properties are essential for construction of various engineering structures and making maps and interpreting the conditions of an area using available data.
MT2GEO06-CP04	Practical-IV: Petroleum, coal and Radioactive Minerals. Oceanography and Climatology	For Petroleum Coal and Radioactive Minerals This practical course has following objectives: ☐ Study the distribution of Coal deposits in Rajasthan, India and World ☐ Study the distribution of Petroleum basins in Rajasthan, India and World ☐ Study the distribution of Radioactive Mineral deposits in Rajasthan, India and	For Petroleum Coal and Radioactive Minerals The students upon successful completion of this course will be well versed with: ☐ Distribution of Coal deposits in Rajasthan, India and World ☐ Distribution of Petroleum basins in Rajasthan, India and World ☐ Distribution of radioactive mineral deposits in Rajasthan, India and World ☐ Identify and describe coal and radioactive minerals in hand specimen. ☐ Calculate and able to solve problems in reservoir volume and yield calculations.

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		World ☐ Identification of Coal and Radioactive minerals in hand specimen ☐ Numerical exercises on reservoir volume and yield calculation. ☐ To study coal samples under microscope (Coal Petrography) For Oceanography and Climatology ☐ To emphasize on different climate regimes ☐ To introduce different ocean current and their role on global and regional climate ☐ To introduce major wind patterns on world map ☐ To make them understand use of different proxies for establishing chronology ☐ To introduce different proxies used for paleoceanographic and paleoclimatic interpretation	☐ To identify and describe various microlith types of the coal samples under microscope. For Oceanography and Climatology ☐ The students will be able to understand the role of ocean atmosphere coupling and their importance in global climate. ☐ The student will be able to solve numerical exercises related to proxy interpretation and proxy correlation ☐ The students will be able to establish chronology with the help of proxies.

Skill Papers

Course /Paper Code	Course /Paper Name	Outcome of Course
MT2GEO07-SE01	Geological and Mining Consultancy	Students learn about ore reserve estimation and planning of mine

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Data templates (Criteria 2) for filling NAAC-SSR for the session 2020-21 (From 1st July 2020 up to 31st December 2021)

(Please send all soft copies by email to iqac@mlsu.ac.in by 5PM on 10th Jan 2022 positively with cc to vcmlsu@mlsu.ac.in

Submit hardcopies with annexure to Director IQAC, Prof. N. Lakshmi, Physics Department, by 5 PM 15 Jan 2022)

Dept. - Pharmacy C-2

2.1. Demand Ratio

Programme name	Programme Code	Number of seats available/sanctioned						Number of eligible applications received	Number of Students admitted					
		Gen	OBC	SC	ST	EWS	J & K		Gen	OBC	SC	ST	EWS	J & K
2020-21														
B. Pharm		21	8	6	5	4	5	326	8	18	6	5	3	4
PhD		41						55	7	3	1			

2.4.1 Average percentage of full time teachers against sanctioned posts during the last five years (15) & 2.4.3 Average teaching experience of full time teachers in the same institution (Data for the latest completed academic year in number of years)

(10)

Name of the Full-time teacher	PAN	Designation	Name of the Department	Nature of appointment (Against Sanctioned post, temporary, permanent)	Year of appointment	Total years of Experience in the same institution	Is the teacher still serving the institution/If not last year of the service of Faculty to the Institution
Prof. P. K. Choudhury	AAUPC0740P	Professor	Pharmacy	Permanent	1993	30	No, 2020
Prof. C. P. Jain	ABAPJ3845P	Professor	Pharmacy	Permanent	1995	28	YES
Prof. Lalit Singh Chauhan	ADGPC0846H	Professor	Pharmacy	Permanent	2012	9	YES
Dr. Sunita Panchawat	AUIPP6012H	Assistant Professor	Pharmacy	Permanent	2012	9	YES
Dr. Joohee Pradhan	APFPP9486D	Assistant Professor	Pharmacy	Permanent	2012	9	YES
Dr. Mangilal Chouhan	AHBPC6486A	Assistant Professor	Pharmacy	Permanent	2014	6	YES
Dr. Garima Joshi	AHGPJ7646G	Assistant Professor	Pharmacy	Permanent	2014	6	YES
Dr. Saurabh k Sinha	CPWPS3317F	Assistant Professor	Pharmacy	Permanent	2014	6	YES
Dr. Deepak Choudhary	ALXPC5998H	Assistant Professor	Pharmacy	Permanent	2014	6	YES
Dr.Veenu Bala	AIYPB8401A	Assistant Professor	Pharmacy	Permanent	2014	6	No, 2021
Mr. Mukesh K.	ASCPM8962B	Assistant	Pharmacy	Permanent	2014	6	YES

Meena		Professor					
Dr. Vivek Jain	AFTPJ7487A	Assistant Professor	Pharmacy	Permanent	2018	3	YES

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2.4.4 Average percentage of full time teachers who received awards, recognition, fellowships at State, National, International level from Government/Govt. recognised bodies during the last five years (10) &**3.4.2** The institution provides incentives to teachers who receive state, national and international recognitions/awards

1.Commendation and monetary incentive at a University function
2.Commendation and medal at a University function
3. Certificate of honor
4.Announcement in the Newsletter / website
(5)

Name of full time teachers receiving awards from state level, national level, international level	Year of Award	PAN	Designation	Name of the award, fellowship, received from Government or Government recognised bodies	Name of the Awarding Agency	Incentives/Type of the incentive given by the HEI in recognition of the award	Link to the relevant documents
Prof. P. K. Choudhury	NIL	AAUPC0740P	Professor				
Prof. C. P. Jain	NIL	ABAPJ3845P	Professor				
Prof. Lalit Singh Chauhan	NIL	ADGPC0846H	Professor				
Dr. Sunita Panchawat	NIL	AUIPP6012H	Assistant Professor				
Dr. Joohee Pradhan	NIL	APFPP9486D	Assistant Professor				
Dr. Mangilal Chouhan	NIL	AHBPC6486A	Assistant Professor				
Dr. Garima Joshi	2021	AHGPJ7646G	Assistant Professor	Award for authoring a book on international women's day	MLSU, Udaipur		
Dr. Saurabh k Sinha	NIL	CPWPS3317F	Assistant Professor				
Dr. Deepak Choudhary	NIL	ALXPC5998H	Assistant Professor				
Dr.Veenu Bala	NIL	AIYPB8401A	Assistant Professor				

Mr. Mukesh K. Meena	NIL	ASCPM8962B	Assistant Professor				
Dr. Vivek Jain	NIL	AFTPJ7487A	Assistant Professor				

2.6.1: Provide Program Outcomes (PO), Program Specific Outcomes (PSO) & Course Outcomes (CO) for all the courses.

Program Name	Program outcome
B. Pharmacy (B. Pharm.)	On completion of the B. Pharm. program, a student will be able to: 1. Demonstrate knowledge of the basic pharmaceutical sciences and the ability to acquire, manage and use current information for problem solving. 2. Describe the synthesis, formulation, analysis and pharmacological aspects of drugs and pharmaceuticals. 3. Identify the rules and regulations involved in the drug discovery and development, manufacture, distribution and sale of medicines.

	4. Observe record, analyze, criticize, organize, improvise and manage documents, data and information related to pharmaceutical products and practices. 5. Develop problem-based learning approach and analytical thinking in his/her academic and professional life. 6. Demonstrate the ability to plan and implement professional activities. 7. Act efficiently as a leader in the diverse areas of the profession. 8. Write, interpret and communicate effectively and scientifically. 9. Apply the knowledge and skills gained through education to gain recognition in professional circle and society. 10. Partnering with other health care communities to provide innovative solutions. 11. Create awareness in society about the effective and safe use of medicines. 12. Demonstrate eco-friendly products and processes to maintain public health. 13. Imbibe ethical practices and moral values in personal and professional endeavors. 14. Tackle future challenges through lifelong learning.

Course Outcomes (CO)

B.Pharm 1 sem		
Subject with code	**Scope**	**Learning outcome**

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.	Upon completion of this course the student should be able to 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the various experiments related to special senses and nervous system. 5. Appreciate coordinated working pattern of different organs of each system
BP102T. PHARMACEUTICAL ANALYSIS (Theory)	This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs	Upon completion of the course student shall be able to · understand the principles of volumetric and electro chemical analysis · carryout various volumetric and electrochemical titrations · develop analytical skills

BP103T. PHARMACEUTICS- I (Theory)	This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.	Upon completion of this course the student should be able to: · Know the history of profession of pharmacy · Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations · Understand the professional way of handling the prescription · Preparation of various conventional dosage forms
BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)	This subject deals with the monographs of inorganic drugs and pharmaceuticals.	Upon completion of course student shall be able to · know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals · understand the medicinal and pharmaceutical importance of inorganic compounds
BP105T.COMMUNICATION SKILLS (Theory)	This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as	Upon completion of the course the student shall be able to 1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Communicate effectively (Verbal and Non Verbal) 3. Effectivelymanage the team as a team player 4. Develop interview skills 5. Develop Leadership qualities and essentials

	a team player and will add value to the pharmaceutical business.	
BP 106RBT.REMEDIAL BIOLOGY (Theory)	To learn and understand the components of living world, structure and functional system of plant and animal kingdom.	Upon completion of the course, the student shall be able to · know the classification and salient features of five kingdoms of life · understand the basic components of anatomy & physiology of plant · know understand the basic components of anatomy & physiology animal with special reference to human
BP 106RMT.REMEDIAL MATHEMATICS (Theory)	This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.	Upon completion of the course the student shall be able to:- 1. Know the theory and their application in Pharmacy 2. Solve the different types of problems by applying theory 3. Appreciate the important application of mathematics in Pharmacy

B.Pharm 2nd sem		
Subject with code	**Scope**	**Learning outcome**
BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.	Upon completion of this course the student should be able to: 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. 5. Appreciate coordinated working pattern of different organs of each system 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)	This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. identify/confirm the identification of organic compound
BP203 T. BIOCHEMISTRY (Theory)	Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization	Upon completion of course student shell able to 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

	of mammalian genome and hetero & autocatalytic functions of DNA.	

BP 204T.PATHOPHYSIOLOGY (THEORY)	Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.	Upon completion of the subject student shall be able to – 1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases; and 3. Mention the complications of the diseases.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)	This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.	Upon completion of the course the student shall be able to 1. know the various types of application of computers in pharmacy 2. know the various types of databases 3. know the various applications of databases in pharmacy
BP 206 T. ENVIRONMENTAL SCIENCES (Theory)	Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.	Upon completion of the course the student shall be able to: 1. Create the awareness about environmental problems among learners. 2. Impart basic knowledge about the environment and its allied problems. 3. Develop an attitude of concern for the environment. 4. Motivate learner to participate in environment protection and environment improvement. 5. Acquire skills to help the concerned individuals in identifying and solving environmental problems. 6. Strive to attain harmony with Nature.
B.Pharm 3 rd sem		
Subject with code	Scope	Learning outcome

BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)	This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. prepare organic compounds
BP302T. PHYSICAL PHARMACEUTICS-I (Theory)	The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms 2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)	Study of all categories of microorganisims especially for the production of alchol antibiotics, vaccines, vitamins enzymes etc..	Upon completion of the subject student shall be able to; 1. Understand methods of identification, cultivation and preservation of various microorganisms 2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry 3. Learn sterility testing of pharmaceutical products. 4. Carried out microbiological standardization of Pharmaceuticals. 5. Understand the cell culture technology and its applications in pharmaceutical industries.

BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)	This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.	Upon completion of the course student shall be able: 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process. 4. To carry out various test to prevent environmental pollution. 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources. 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
B.Pharm 4th sem		
Subject with code	Scope	Learning outcome
BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)	This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes	At the end of the course, the student shall be able to 1. understand the methods of preparation and properties of organic compounds 2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions 3. know the medicinal uses and other

	on medicinal and other uses of organic compounds.	applications of organic compounds
BP402T. MEDICINAL CHEMISTRY – I (Theory)	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.	Upon completion of the course the student shall be able to 1. understand the chemistry of drugs with respect to their pharmacological activity 2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. know the Structural Activity Relationship (SAR) of different class of drugs 4. write the chemical synthesis of some drugs

BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)	The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms 2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP 404 T. PHARMACOLOGY-I (Theory)	The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion	Upon completion of this course the student should be able to 1. Understand the pharmacological actions of different categories of drugs 2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. 4. Observe the effect of drugs on animals by simulated experiments 5. Appreciate correlation of pharmacology

	(pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.	with other bio medical sciences
BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)	The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.	Upon completion of the course, the student shall be able 1. to know the techniques in the cultivation and production of crude drugs 2. to know the crude drugs, their uses and chemical nature 3. know the evaluation techniques for the herbal drugs 4. to carry out the microscopic and morphological evaluation of crude drugs
B.Pharm 5th sem		
Subject with code	Scope	Learning outcome

BP501T. MEDICINAL CHEMISTRY – II (Theory)	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class	Upon completion of the course the student shall be able to 1. Understand the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. Know the Structural Activity Relationship of different class of drugs 4. Study the chemical synthesis of selected drugs
BP 502 T. Industrial Pharmacyl (Theory)	Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.	Upon completion of the course the student shall be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Know various considerations in development of pharmaceutical dosage forms 3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

BP503.T. PHARMACOLOGY-II (Theory)	This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition,emphasis on the basic concepts of bioassay	Upon completion of this course the student should be able to 1. Understand the mechanism of drug action and its relevance in the treatment of different diseases 2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments 3. Demonstrate the various receptor actions using isolated tissue preparation 4. Appreciate correlation of pharmacology with related medical sciences
BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)	The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine	Upon completion of the course, the student shall be able 1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents 2. to understand the preparation and development of herbal formulation. 3. to understand the herbal drug interactions 4. to carryout isolation and identification of phytoconstituents

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)	This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India	Upon completion of the course, the student shall be able to understand: 1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. 2. Various Indian pharmaceutical Acts and Laws 3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 4. The code of ethics during the pharmaceutical practice
B.Pharm 6th sem		
Subject with code	Scope	Learning outcome

BP601T. MEDICINAL CHEMISTRY – III (Theory)	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.	Upon completion of the course student shall be able to 1. Understand the importance of drug design and different techniques of drug design. 2. Understand the chemistry of drugs with respect to their biological activity. 3. Know the metabolism, adverse effects and therapeutic value of drugs. 4. Know the importance of SAR of drugs.

BP602 T. PHARMACOLOGY-III (Theory) 45	This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition,emphasis on the principles of toxicology and chronopharmacology	Upon completion of this course the student should be able to: 1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases 2. comprehend the principles of toxicology and treatment of various poisoningsand 3. appreciate correlation of pharmacology with related medical sciences.
BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)	This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on	Upon completion of this course the student should be able to: 1. understand raw material as source of herbal drugs from cultivation to herbal drug product 2. know the WHO and ICH guidelines for evaluation of herbal drugs 3. know the herbal cosmetics, natural sweeteners, nutraceuticals 4. appreciate patenting of herbal drugs, GMP .

	Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs	
BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)	This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.	Upon completion of the course student shall be able to: 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. 3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance. 4. Understand various pharmacokinetic parameters, their significance & applications.

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)	Biotechnology has a long promise to revolutionize the biological sciences and technology. · Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technologymakes the subject interesting. · Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. · Biotechnology has already produced transgenic crops and animals and the future promises lot more. · It is basically a research-based subject.	Upon completion of the subject student shall be able to; 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology
B.Pharm 7th sem		
Subject name with code	Scope	Objective/learning outcome

BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)	This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.	Upon completion of the course the student shall be able to 1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis 2. Understand the chromatographic separation and analysis of drugs. 3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.
BP 702 T. INDUSTRIAL PHARMACYII (Theory)	This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market	Upon completion of the course, the student shall be able to: 1. Know the process of pilot plant and scale up of pharmaceutical dosage forms 2. Understand the process of technology transfer from lab scale to commercial batch 3. Know different Laws and Acts that regulate pharmaceutical industry 4. Understand the approval process and regulatory requirements for drug products

BP 703T. PHARMACY PRACTICE (Theory)	In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.	Upon completion of the course, the student shall be able to 1. know various drug distribution methods in a hospital 2. appreciate the pharmacy stores management and inventory control 3. monitor drug therapy of patient through medication chart review and clinical review 4. obtain medication history interview and counsel the patients 5. identify drug related problems 6. detect and assess adverse drug reactions 7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states 8. know pharmaceutical care services 9. do patient counseling in community pharmacy; 10. appreciate the concept of Rational drug therapy.

BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)	This subject is designed to impart basic knowledge on the area of novel drug delivery systems.	Upon completion of the course student shall be able 1. To understand various approaches for development of novel drug delivery systems. 2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation
BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)	Practical aspect of analysis of chemistry	Very useful in pharmaceutical industry, chemical industry for purificaiton and synthesis of compund & testing them
B.Pharm 8th sem		
Subject name with code	**Scope**	**Objective/learning outcome**

BIOSTATISITCS AND RESEARCH METHODOLOGY (Theory) (BP801T.)	To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.	Upon completion of the course the student shall be able to • Know the operation of M.S. Excel, SPSS, R and MINITAB ® , DoE (Design of Experiment) • Know the various statistical techniques to solve statistical problems • Appreciate statistical techniques in solving the problems.
SOCIAL AND PREVENTIVE PHARMACY (BP 802T)	The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in	Objectives: After the successful completion of this course, the student shall be able to: · Acquire high consciousness/realization of current issuesrelated to health and pharmaceutical problems within the country and worldwide. · Have a critical way of thinking based on current healthcare development. · Evaluate alternative ways of solving problems

	these contexts are also discussed.	related tohealth and pharmaceutical issues
BP803ET. PHARMA MARKETING MANAGEMENT (Theory)	The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product	The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

	management.	
BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)	This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia,UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and	Upon completion of the subject student shall be able to; 1. Know about the process of drug discovery and development 2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 3. Know the regulatory approval process and their registration in Indian and international markets

	registration procedures for marketing the drug products.	

BP 805T: PHARMACOVIGILANCE (Theory)	This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.	At completion of this paper it is expected that students will be able to (know, do, and appreciate): 1. Why drug safety monitoring is important? 2. History and development of pharmacovigilance 3. National and international scenario of pharmacovigilance 4. Dictionaries, coding and terminologies used in pharmacovigilance 5. Detection of new adverse drug reactions and their assessment 6. International standards for classification of diseases and drugs 7. Adverse drug reaction reporting systems and communication in pharmacovigilance 8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle 9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation 10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India 11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning 12. CIOMS requirements for ADR reporting 13. Writing case narratives of adverse events and their quality.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)	Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function. · This is done both on a microscopic and molecular level. · Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organismssuch as humans, plants, and sponges.	Upon completion of the subject student shall be able to; · Summarize cell and molecular biology history. · Summarize cellular functioning and composition. · Describe the chemical foundations of cell biology. · Summarize the DNA properties of cell biology. · Describe protein structure and function. · Describe cellular membrane structure and function. · Describe basic molecular genetic mechanisms. · Summarize the Cell Cycle
BP809ET. COSMETIC SCIENCE(Theory)	Cosmetic Industry	Science of cosmetics can be learn

BP810 ET. PHARMACOLOGICAL SCREENING METHODS	This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results	Upon completion of the course the student shall be able to, · Appreciate the applications of various commonly used laboratory animals. · Appreciate and demonstrate the various screening methods used in preclinical research · Appreciate and demonstrate the importance of biostatistics and researchmethodology · Design and execute a research hypothesis independently
BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES	This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that	:Upon completion of the course the student shall be able to · understand the advanced instruments used and its applications in drug analysis · understand the chromatographic separation and analysis of drugs. · understand the calibration of various analytical instruments · know analysis of drugs using various analytical instruments.

	are used for drug testing.	
Elective course on Pharmaceutical Product Development	Dosage form development	In Pharmaceutical industry how product is developed

NOTES

It is considered necessary to provide some exemplars for the different levels of learning outcomes at the higher education level. While no agency has defined the POs of General Higher Education three year degree programme in India, POs of all professional Programes in engineering and other areas are identified at the national level by the concerned accrediting agency. Given below is a set of POs of an engineering Programme identified by the National Board of Accreditation (NBA). In respect of PSOs and COs, examples from science and social science disciplines are given. These are not comprehensive or exhaustive. But, they point out the manner in which these outcomes can be stated for any educational

Programme/course. In case the HEI has these already stated, they may be submitted; however, if at any of these three levels, outcomes are not listed, they may be developed and uploaded in the Institutional website.

Ordered I
Sanskrit

Program outcomes

बी.ए. संस्कृत 2020-2021

1. आवश्यक संस्कृत व्याकरण का सूत्रात्मक एवं प्रायोगिक ज्ञान प्राप्त होना।
2. हिंदी से संस्कृत एवं संस्कृत से हिंदी भाषा के अनुवाद में दक्षता सिद्ध होना।
3. संस्कृत शब्दकोश के ज्ञान में अभिवृद्धि होना।
4. प्राचीन भारतीय संस्कृति एवं ग्रंथों का परिचय प्राप्त होना।
5. संस्कृत साहित्य के इतिहास से परिचित होना।
6. विश्व के प्राचीनतम ग्रंथ ऋग्वेद के कतिपय सूक्तों का अध्ययन-लाभ होना।
7. कठोपनिषद् एवं श्रीमद्भगवद्गीता का अल्प अध्ययन लाभ होना।
8. भारतीय दर्शन परंपरा का परिचय प्राप्त होना।
9. नीतिपद्यों एवं नीतिकथाओं से व्यवहार-ज्ञान में अभिवृद्धि होना।
10. संस्कृत साहित्य के प्रसिद्ध कवियों के अन्तर्गत महाकवि भास, महाकवि कालिदास, महाकवि भर्तृहरि, नारायण पंडित, महाकवि बाणभट्ट एवं महाकवि भारवि की रचनाओं के कतिपय भागों का मूलपाठ के साथ ज्ञानार्जन होना।
11. प्रमुख छंद एवं अलंकारों का ज्ञान प्राप्त होना।
12. संस्कृत विषय में उच्च अध्ययन करने हेतु प्रारंभिक एवं आवश्यक ज्ञान की प्राप्ति होना।

2.6.1.a

Course Outcomes

बी.ए. प्रथम वर्ष संस्कृत 200-2021

प्रश्नपत्र कूट संख्या - 1641

प्रथम प्रश्न पत्र: काव्य, नाटक एवं प्रायोगिक व्याकरण

1. संस्कृत सुभाषित परम्परा के उत्कृष्ट ग्रन्थ नीतिशतकम् का अधिगम।
2. संस्कृत साहित्य की नाटक परंपरा में महाकवि भास के प्रसिद्ध नाटक स्वप्नवासवदत्तम् का अधिगम।
3. संस्कृत व्याकरण का प्रायोगिक ज्ञान प्राप्त करना।

प्रश्नपत्र कूट संख्या - 1642

द्वितीय प्रश्न पत्र: गद्य, व्याकरण एवं अनुवाद

1. संस्कृत साहित्य के प्रसिद्ध कथा ग्रंथ नारायण पंडित विरचित हितोपदेश (मित्रलाभ) की कथाओं एवं शिक्षाओं का अधिगम।
2. वरदराज आचार्य विरचित लघुसिद्धांतकौमुदी के संज्ञाप्रकरण एवं संधिप्रकरण का सूत्रसहित अधिगम।
3. संस्कृत व्याकरण के मूलभूत बिंदुओं यथा- समास, कारक एवं शब्दरूपों का अध्ययनलाभ।
4. हिंदी से संस्कृत अनुवाद में दक्षता प्राप्त करना।

बी. ए. द्वितीय वर्ष संस्कृत परीक्षा 2020-2021

प्रश्नपत्र कूट संख्या - 2641

प्रथम प्रश्न पत्र: नाटक, छन्द एवं अलंकार

1. महाकवि कालिदास के विश्वप्रसिद्ध नाटक अभिज्ञानशाकुंतलम् का संपूर्ण अध्ययन।
2. अभिज्ञानशाकुंतलम् नाटक में प्रयुक्त मुख्य छंदों का अधिगम।
3. काव्यदीपिका (अष्टम शिखा) ग्रंथ के अनुसार प्रमुख अलंकारों के लक्षणों का सोदाहरण अधिगम।

प्रश्नपत्र कूट संख्या - 2642

द्वितीय प्रश्न पत्र: प्राचीन भारतीय संस्कृति, धर्मशास्त्र व्याकरण, अनुवाद एवं निबन्ध

1. प्राचीन भारतीय संस्कृति के प्रमुख बिंदुओं का अध्ययन।
2. संस्कृत धर्मशास्त्र परंपरा के प्रमुख ग्रंथ मनुस्मृति के द्वितीय अध्याय (श्लोक 1 से 150 तक) का अधिगम।

2616

3. वरदराज आचार्य विरचित लघुसिद्धांतकौमुदी ग्रंथ के अनुसार व्यंजन संधि एवं विसर्ग संधि के सूत्रों का सोदाहरण अध्ययन।
4. संस्कृत भाषा दक्षता में वृद्धि करने हेतु प्रमुख शब्दरूपों एवं धातुरूपों का अध्ययन।
5. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।
6. संस्कृत एवं अन्य विषयों पर निबंध लेखन में दक्षता प्राप्त करना।

बी. ए. तृतीय वर्ष संस्कृत परीक्षा 2020-2021

प्रश्नपत्र कूट संख्या - 3641

प्रथम प्रश्न पत्र: वैदिक व लौकिक काव्य एवं गद्य

1. ऋग्वेद के कतिपय प्रमुख सूक्तों एवं कठोपनिषद् का प्रारंभिक ज्ञानार्जन।
2. संस्कृत साहित्य की गद्य परंपरा के प्रतिनिधि ग्रंथ कादम्बरी के शुकनासोपदेश का अधिगम।
3. महाकवि भारविविरचित किरातार्जुनीयम् महाकाव्य के प्रथम सर्ग का अध्ययन।

प्रश्नपत्र कूट संख्या - 3642

द्वितीय प्रश्न पत्र: इतिहास, दर्शन, अनुवाद, व्याकरण एवं निबन्ध

1. संस्कृत साहित्य का ऐतिहासिक परिचय प्राप्त करना।
2. भारतीय दर्शन के प्रतिनिधि ग्रंथ श्रीमद्भगवद्गीता के द्वितीय अध्याय का अधिगम।
3. प्रमुख भारतीय दर्शनों के प्रमुख सिद्धांतों का अधिगम।
4. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।
5. संस्कृत व्याकरण के प्रचलित प्रत्ययों का अध्ययन।
6. संस्कृत माध्यम से निबंध लेखन में दक्षता प्राप्त करना।

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2.61c

Program outcomes
बी. ए. ऑनर्स (संस्कृत) 2020-2021

1. आवश्यक संस्कृत व्याकरण का सूत्रात्मक एवं प्रायोगिक ज्ञान प्राप्त होना।
2. संस्कृत व्याकरण के अन्तर्गत सन्धि (हल् एवं विसर्ग), समास (अव्ययीभाव, तत्पुरुष, बहुव्रीहि, कर्मधारय, द्विगु तथा द्वन्द्व), कारक (प्रमुख सूत्र), प्रत्यय (प्रमुख कृदन्त, तद्धित एवं स्त्रीप्रत्यय), शब्दरूप एवं धातुरूप का विशिष्ट ज्ञान होना।
3. हिंदी से संस्कृत एवं संस्कृत से हिंदी भाषा के अनुवाद में दक्षता सिद्ध होना।
4. संस्कृत शब्दकोश के ज्ञान में अभिवृद्धि होना।
5. संस्कृत भाषा में निबंध लेखन की दक्षता सिद्ध होना।
6. भाषा विज्ञान का सामान्य अध्ययन-लाभ होना।
7. प्राचीन भारतीय संस्कृति एवं ग्रंथों का परिचय प्राप्त होना।
8. संस्कृत साहित्य एव वैदिक साहित्य के इतिहास एवं विशिष्टताओं से परिचित होना।
9. विश्व के प्राचीनतम ग्रंथ ऋग्वेद एवं यजुर्वेद तथा अथर्ववेद के कतिपय सूक्तों का अध्ययन-लाभ होना।
10. सम्पूर्ण कठोपनिषद् एवं श्रीमद्भगवद्गीता के प्रथम एवं द्वितीय अध्याय का अधिगम होना।
11. भारतीय दर्शन परंपरा का परिचय एवं मूल अवधारणाओं का अध्ययन-लाभ प्राप्त होना।
12. दर्शनशास्त्र में तर्कसंग्रह ग्रन्थ का मूलपाठ के साथ अधिगम होना।
13. नीतिपद्यों एवं नीतिकथाओं से व्यवहार-ज्ञान में अभिवृद्धि होना।
14. संस्कृत साहित्य के प्रसिद्ध कवियों के अन्तर्गत महाकवि अश्वघोष, महाकवि भास, महाकवि कालिदास, महाकवि भर्तृहरि, महाकवि बाणभट्ट, महाकवि भारवि, पं. विष्णु शर्मा एवं पं. अम्बिकादत्त व्यास की रचनाओं के कतिपय भागों का मूलपाठ के साथ ज्ञानार्जन होना।
15. प्रमुख छंद एवं अलंकारों का ज्ञान प्राप्त होना।
16. काव्यशास्त्र के सरल ग्रंथ काव्यदीपिका का अधिगम होना।
17. भरतमुनिविरचित नाट्यशास्त्र के प्रथम एवं द्वितीय अध्याय का अधिगम होना।
18. संस्कृत विषय में उच्च अध्ययन करने हेतु विशिष्ट ज्ञान की प्राप्ति होना।
19. संस्कृत विषय की विभिन्न प्रतियोगी परीक्षाओं हेतु पूर्वसज्जता सिद्ध होना।
20. भारतवर्ष की प्रतिष्ठास्वरूप संस्कृत एवं संस्कृति का सम्यक् ज्ञान होना।

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Course outcomes

बी. ए. ऑनर्स (संस्कृत) पार्ट-1 परीक्षा 2020-2021

प्रश्नपत्र कूट संख्या - 1651

प्रथम प्रश्न पत्र - संस्कृत काव्य

1. संस्कृत साहित्य के प्राचीन कवियों के अंतर्गत महाकवि अश्वघोष, महाकवि कालिदास तथा महाकवि भर्तृहरि के कवित्व का परिचय।
2. महाकवि अश्वघोषविरचित बुद्धचरितम् (प्रथम सर्ग), महाकवि कालिदासविरचित कुमारसंभवम् (पंचम सर्ग) तथा महाकवि भर्तृहरिविरचित सम्पूर्ण नीतिशतक का अधिगम।
3. संधि, समास एवं प्रकृति-प्रत्ययविवेक आधारित प्रायोगिक व्याकरण का ज्ञानार्जन।

प्रश्नपत्र कूट संख्या - 1652

द्वितीय प्रश्न पत्र - संस्कृत नाटक

1. महाकवि भासविरचित स्वप्नवासवदत्तम् तथा दूतवाक्यम् रूपकों का अधिगम।
2. उपर्युक्त रूपकों के आधार पर संधि, समास एवं प्रकृति-प्रत्ययविवेक आधारित प्रायोगिक व्याकरण का ज्ञानार्जन।

प्रश्नपत्र कूट संख्या - 1653

तृतीय प्रश्न पत्र - संस्कृत गद्य

1. संस्कृत साहित्य के विश्वप्रसिद्ध कथाग्रंथ पंचतंत्र (मित्रभेद) का अधिगम।
2. संस्कृत साहित्य के प्रसिद्ध ऐतिहासिक उपन्यास शिवराजविजयम् (प्रथम विराम के दो निःश्वास) का अधिगम।
3. उपर्युक्त पुस्तकों के आधार पर संधि, समास एवं प्रकृति-प्रत्ययविवेक आधारित प्रायोगिक व्याकरण का ज्ञानार्जन।

प्रश्नपत्र कूट संख्या - 1654

चतुर्थ प्रश्न पत्र - व्याकरण अनुवाद एवं निबंध

1. लघुसिद्धांतकौमुदी के आधार पर हल् संधि एवं विसर्ग संधि का सूत्रोदाहरण सहित अधिगम।
2. संस्कृत व्याकरण के प्रमुख प्रत्ययों का सूत्रोदाहरण सहित अधिगम।
3. अव्ययीभाव, तत्पुरुष, बहुव्रीहि, कर्मधारय, द्विगु तथा द्वन्द्व समास का अधिगम।
4. प्रमुख शब्दरूपों एवं धातुरूपों का अधिगम।
5. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।

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6. संस्कृत भाषा में निबंध लेखन की दक्षता प्राप्त करना।

बी. ए. ऑनर्स संस्कृत पार्ट-2 परीक्षा 2020-2021

प्रश्नपत्र कूट संख्या - 2651

प्रथम प्रश्न पत्र - संस्कृत काव्य (गद्य एवं पद्य)

1. महाकवि कालिदास, महाकवि भारवि एवं महाकवि बाणभट्ट के कवित्व का परिचय।
2. रघुवंशम् (13वाँ सर्ग), किरातार्जुनीयम् (प्रथम सर्ग) तथा शुकनासोपदेश का अधिगम।

प्रश्नपत्र कूट संख्या - 2652

द्वितीय प्रश्न पत्र - नाटक, छन्द एवं अलंकार

1. महाकवि कालिदास के विश्वप्रसिद्ध नाटक अभिज्ञानशाकुंतलम् का संपूर्ण अध्ययन।
2. अभिज्ञानशाकुंतलम् नाटक में प्रयुक्त मुख्य छंदों का अधिगम।
3. काव्यदीपिका (अष्टम शिखा) ग्रंथ के अनुसार प्रमुख अलंकारों के लक्षणों का सोदाहरण अधिगम।

प्रश्नपत्र कूट संख्या - 2653

तृतीय प्रश्न पत्र - प्राचीन भारतीय संस्कृति एवं संस्कृत साहित्य का इतिहास

1. प्राचीन भारतीय संस्कृति के विविध बिंदुओं का अधिगम।
2. रामायण एवं महाभारत महाकाव्य का परिचयात्मक अध्ययन-लाभ।
3. संस्कृत साहित्य के इतिहास के अंतर्गत महाकाव्य, नाटक, गद्यकाव्य, कथा साहित्य, गीतिकाव्य, सुभाषित एवं अलंकार शास्त्र का परिचयात्मक अध्ययन-लाभ।

प्रश्नपत्र कूट संख्या - 2654

चतुर्थ प्रश्न पत्र - भाषाविज्ञान, व्याकरण, अनुवाद एवं निबंध

1. भाषाविज्ञान का सामान्य अधिगम।
2. लघुसिद्धांतकौमुदी के अन्तर्गत अजन्त पुलिंग प्रकरण (राम तथा सर्व शब्द), अजन्त स्त्रीलिंग प्रकरण (रमा एवं मति शब्द) तथा अजन्त नपुंसकलिंग प्रकरण (ज्ञान एवं वारि) का सूत्र एवं सिद्धियों सहित अधिगम।
3. कारक प्रकरण के प्रमुख सूत्रों एवं वार्त्तिकों का सोदाहरण अधिगम।
4. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।
5. संस्कृत माध्यम से निबंध लेखन में दक्षता प्राप्त करना।

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बी. ए. ऑनर्स संस्कृत पार्ट-3 परीक्षा 2020-2021

प्रश्नपत्र कूट संख्या - 3651

प्रथम प्रश्न पत्र - वैदिक साहित्य

1. ऋग्वेद, यजुर्वेद एवं अथर्ववेद के कतिपय सूक्तों का अधिगम।
2. संपूर्ण कठोपनिषद् का अधिगम।
3. वैदिक साहित्य का परिचयात्मक अधिगम।

प्रश्नपत्र कूट संख्या - 3652

द्वितीय प्रश्न पत्र - भारतीय दर्शन

1. सम्पूर्ण तर्कसंग्रह ग्रन्थ के मूलपाठ का अधिगम।
2. भगवद्गीता के प्रथम एवं द्वितीय अध्याय का अधिगम।
3. भारतीय दर्शन की मूल अवधारणाओं का परिचयात्मक अधिगम।

प्रश्नपत्र कूट संख्या - 3653

तृतीय प्रश्न पत्र - काव्यशास्त्र एवं नाट्यशास्त्र

1. काव्यशास्त्र के अंतर्गत काव्यदीपिका (अष्टम शिखा एवं परिशिष्ट अंश को छोड़कर) ग्रंथ का अधिगम।
2. भरतमुनिविरचित नाट्यशास्त्र के प्रथम एवं द्वितीय अध्याय का अधिगम।

प्रश्नपत्र कूट संख्या - 3654

चतुर्थ प्रश्नपत्र - व्याकरण, अनुवाद एवं निबन्ध

1. लघुसिद्धान्तकौमुदी के तिङन्त प्रकरण के अन्तर्गत भ्वादिगण की भू धातु की सभी लकारों में रूप सिद्धि का अधिगम।
2. लघुसिद्धान्तकौमुदी के तद्धित प्रकरण के प्रमुख प्रत्ययों का सूत्रोदाहरणसहित अधिगम।
3. लघुसिद्धान्तकौमुदी के स्त्रीप्रत्ययों के अन्तर्गत टाप्, ङीप्, ङीष् एवं ङीन् प्रत्ययों का सोदाहरण अधिगम।
4. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।
5. संस्कृत माध्यम से निबंध लेखन में दक्षता प्राप्त करना।

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Program outcomes

एम.ए. संस्कृत (सी.बी.सी.एस.), 2020-2021

1. वैदिक साहित्य के इतिहास एवं विशेषताओं से परिचय के साथ ऋग्वेद एवं अथर्ववेद के कतिपय सूक्तों, निरुक्त (प्रथम अध्याय), ईशावास्योपनिषद् तथा बृहदारण्यकोपनिषद् (तृतीय अध्याय) का अधिगम।
2. प्राचीन भारतीय संस्कृति के विविध बिन्दुओं, विशेषताओं एवं संस्कृत शास्त्रों के इतिहास का अधिगम।
3. रामायण एवं महाभारत के परिचयात्मक अध्ययन के साथ श्रीमद्भगवद्गीता (द्वितीय अध्याय) तथा याज्ञवल्क्यस्मृति (आचाराध्याय) का अधिगम।
4. संस्कृत विषय में निबंधलेखन दक्षता प्राप्त करना।
5. हिंदी से संस्कृत अनुवाद करने में दक्षता प्राप्त करना।
6. संस्कृत शब्दकोश एवं भाषाज्ञान में वृद्धि होना।
7. भाषाविज्ञान का विशिष्ट अधिगम होना।
8. कारकप्रकरण (सिद्धान्तकौमुदी का), समासप्रकरण (लघुसिद्धान्तकौमुदी का) तथा तद्धित प्रकरण (लघुसिद्धान्तकौमुदी में शैषिक पर्यन्त) का विशेष अधिगम।
9. संस्कृत साहित्य के प्रसिद्ध कवियों एवं संस्कृत साहित्य के इतिहास का विशिष्ट अधिगम।
10. महाकवि कालिदास के व्यक्तित्व एवं कृतित्व का विशेष अध्ययन-लाभ।
11. संस्कृत काव्यशास्त्र के आचार्यों एवं संप्रदायों का अधिगम।
12. भारतीय नाट्यशास्त्र परंपरा में नाट्यशास्त्र (प्रथम, द्वितीय एवं षष्ठ अध्याय) तथा दशरूपक (प्रथम एवं तृतीय प्रकाश) का अधिगम।
13. काव्यशास्त्र के प्रमुख ग्रंथों में साहित्यदर्पण (प्रथम, द्वितीय एवं तृतीय परिच्छेद), काव्यप्रकाश (प्रथम से अष्टम उल्लास पर्यन्त), रसगंगाधर (प्रथम आनन), ध्वन्यालोक (प्रथम उद्योत) एवं वक्रोक्तिजीवितम् (प्रथम उन्मेष) का विशिष्ट अधिगम।
14. संस्कृत महाकाव्यों के अन्तर्गत रघुवंशम् (सर्ग 1,2,6 एवं 13), कुमारसंभवम् (सर्ग 1 से 5), शिशुपालवधम् (प्रथम सर्ग) तथा नैषधीयचरितम् (प्रथम सर्ग) का अधिगम।
15. अन्य पद्य साहित्य में मेघदूतम्, ऋतुसंहारम् (बसन्त ऋतु) तथा नीतिशतकम् का अधिगम।
16. संस्कृत रूपक साहित्य के अन्तर्गत कर्णभारम्, मृच्छकटिकम्, उत्तररामचरितम् एवं वेणीसंहारम् का सम्पूर्ण मूलपाठ सहित अधिगम।
17. संस्कृत गद्य साहित्य के अन्तर्गत कादम्बरी (कथामुख तक) तथा शिवराजविजयम् (प्रथम विराम के प्रथम एवं द्वितीय निःश्वास) का अधिगम।
18. भारतीय दर्शनशास्त्र परम्परा के अन्तर्गत सांख्यकारिका, वेदान्तसार, तर्कभाषा (प्रामाण्यवाद पर्यन्त), सर्वदर्शनसंग्रह (चार्वाक, जैन एवं बौद्ध मत), ब्रह्मसूत्र शांकरभाष्य (चतुःसूत्री एवं द्वितीय अध्याय में द्वितीय पाद के 1-45 सूत्र), सांख्यतत्त्वकौमुदी (1 से 72 कारिका तक), न्यायसिद्धान्तमुक्तावली (78 वीं कारिका तक), अर्थसंग्रह, योगसूत्र (समाधिपाद, साधनपाद और

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विभूतिपाद के 1 से 6 सूत्र), विवेकचूडामणि, आचार्य शंकर का व्यक्तित्व-कृतित्व और वेदान्त दर्शन एवं उसके प्रमुख आचार्यों का अधिगम।

19. संस्कृत विषय में उच्च अध्ययन एवं शोधकार्य करने हेतु विशिष्ट ज्ञान की प्राप्ति होना।
20. संस्कृत विषय की विभिन्न प्रतियोगी परीक्षाओं हेतु पूर्वसज्जता सिद्ध होना।
21. भारतवर्ष की प्रतिष्ठास्वरूप संस्कृत एवं संस्कृति का सम्यक् ज्ञान होना।
22. व्यावहारिक रूप से संस्कृतनिष्ठ सदाचार, विद्या एवं विनय की प्राप्ति होना।

Course outcomes
एम.ए. संस्कृत (सी.बी.सी.एस.)

एम.ए. सेमेस्टर I (संस्कृत) 2020-2021

प्रश्न पत्र कूट संख्या M1 SAN 01 CT01

प्रश्न-पत्र - I वैदिक साहित्य

1. वैदिक साहित्य के इतिहास ज्ञानसहित कतिपय संहिता सूक्तों के अध्ययन में निपुणता ।

प्रश्न पत्र कूट संख्या M1 SAN 01 CT02

प्रश्न-पत्र - II सांख्य दर्शन

1. भारतीय दर्शन शास्त्र की सांख्य दर्शन परंपरा का परिचय एवं प्रमुख ग्रन्थ सांख्यकारिका का अधिगम।

प्रश्न पत्र कूट संख्या M1 SAN 01 CT03

प्रश्न-पत्र - III वेदान्त दर्शन

1.भारतीय दर्शन शास्त्र की वेदान्त दर्शन परंपरा का परिचय एवं प्रमुख ग्रन्थ वेदान्तसार का अधिगम ।

प्रश्न पत्र कूट संख्या M1 SAN 01 CT04

प्रश्न-पत्र - IV - नाटक एवं नाट्य शास्त्र

1.संस्कृत की काव्यशास्त्रपरंपरा में नाट्यशास्त्र तथा नाटक साहित्य का अधिगम ।

प्रश्न पत्र कूट संख्या M1 SAN 01 CT05

प्रश्न-पत्र V - व्याकरण एवं अनुवाद

1.संस्कृत की व्याकरणशास्त्रपरंपरा में लघुसिद्धान्तकौमुदी का अधिगम ।

प्रश्न पत्र कूट संख्या M1 SAN 01 CT06

प्रश्न-पत्र VI - संस्कृत शास्त्रों का इतिहास, संस्कृति एवं निबन्ध

1.संस्कृत के शास्त्रीय इतिहास एवं भारतीय संस्कृति का अधिगम तथा निबंधलेखन में निपुणता ।

2.6.11

DEPARTMENT OF ECONOMICS

UNIVERSITY COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

MOHANLAL SUKHADIA UNIVERSITY : UDAIPUR

Programme Specific Outcomes of MA Economics (CBCS)

PSO1: This programme will develop conceptual clarity of economic phenomena among students.

PSO2: The students will be able to discuss and explain theories related to Economics.

PSO3: This programme is designed to develop critical thinking skills among students. They will be able to correlate economic theory with everyday problems in real world.

PSO4: This programme will enable the students to apply the mathematical and statistical techniques to evaluate the validity of an economic argument.

PSO5: The students will be able to discuss the current economic issues and problems with the clear understanding of theoretical framework.

PSO6: This programme will provide the students a well structured learning framework and environment for Economics.

PSO7: Through this programme students will be well acquainted with the core branches of Economics.

PSO8: This progrmme provides an opportunity to the students to be specialized in a particular branch of Economics.

PSO9: This programme opens job avenues for students especially in economic data analysis and jobs required understanding and application of Economics

PSO10: This programme gives a thorough exposure about Indian Economy and Economy of Rajasthan as well as Global Economic Scenario. So students will be able to compare the economic aggregates in national and international perspective.

Course Outcomes: SEMESTER I

CORE PAPER- I -MICRO ECONOMICS

CO1: This course develops the basic idea of fundamentals of Micro Economics and market mechanism.

CO2: It enhances the ability of students to discuss economic concepts in an articulate manner in a classroom.

CO3: It develops the reasoning ability of the students to understand the consumer behaviour and producers' behaviour in real market situation market.

CORE PAPER – II- MACRO ECONOMICS

CO1: This course enables the students to learn about the development of various theories and approaches of macro economics like classical, Keynesian, Monetarist, New classical theories and New Keynesian theory.

CO2: Macro economics deals with the study of economic aggregates like income, employment, interest rates and the price level. It analyses various theories of determination of National Income in greater detail.

CO3: It covers various theories related to consumption and investment.

CO4: It also introduces students to concept of inflation, its relationship with unemployment and some basic concepts related to it.

CORE PAPER-III-PUBLIC ECONOMICS

CO1: To make students understand the theories and concepts of Public Economics.

CO2: To understand the Government Economic Policy's Goals, Targets and Mechanism

CO3: To understand the Importance and Uses of Government Economic Policy Instruments and their Effects on Economy.

CO4: To understand the Interdependency between Public and Private sector.

CORE PAPER- IV -MATHEMATICAL METHODS FOR ECONOMICS

CO1: This course imparts the knowledge of various mathematical techniques used for economic analysis.

CO2: It train the students to apply these techniques to economic theory in general like, explaining the relationship among economics variables, calculating maxima and minima, explaning the time path of variables etc.

CO3: It also develops the skill of students to use matrix algebra in solution of economic models.

CORE PAPER- V-GROWTH AND DEVELOPMENT ECONOMICS

CO1: The students will be able to understand the theories of growth and development, difference between the two and importance of both in current scenario.

CO2: It explains the social and institutional aspects of development and infrastructure-linkages.

CO3: It helps them to understand the importance of domestic macroeconomic policies importance of agriculture and the rationale and pattern of industrialization for development in developing countries.

CORE PAPER-VI- HISTORY OF ECONOMIC THOUGHT

CO1: The course develops critical analytical skills and exposes students to understanding the historical perspective on the evolution and process of transformation of economic thought.

CO2: The students learn the major ideas associated with thinker studied, and there by better comprehend the origins of contemporary theory.

CO3: This course allows students to place the theories and ideas studied within the context of the times in which they developed.

SEMESTER II

CORE PAPER- I-ADVANCED MICRO ECONOMICS

CO1: This course will formed the theoretical foundation of the students about pricing in imperfect market conditions and enable them to apply in real market situations.

CO2: This paper enhanced the understanding of various concepts and theories of welfare economics.

CO3: The students will be able to demonstrate the theories related to factor market and its equilibrium .

CORE PAPER – II- ADVANCED MACRO ECONOMICS

CO1: The present course is designed to acquaint the students with the functioning of the monetary and financial sector in India.

CO2: It covers different approaches and theories related to demand for and supply of money and rate of interest.

CO3: It also deals with the Concept and various theories of business cycles..

CO4: The operation of financial markets and their regulation are to be studied to appreciate their key role in an economy, especially after the far-reaching financial sector reforms in India.

CORE PAPER-III- INDIAN PUBLIC FINANCE

CO1: To understand the Federal Economic System of Indian Government and its component.

CO2: To Understand the Economic Resource of Indian government institutions and Distribution's criteria.

CO3: To Understand the Taxation, Debt and Expenditure Policies and Problems of Indian Government Institutions.

CO4: To Understand the Budget, Finance Commission Report and Fiscal Policy their role in economy.

CORE PAPER – IV ELEMENTARY STATISTICS AND ECONOMETRICS

CO1: The basic aim of this course is to acquaint the students with various Statistical Methods (techniques) and basic econometrics.

C02: This Paper covers those statistical tools which are frequently used in social sciences research such as estimation, hypothesis testing, Regression & correlation, concept and use of probability theory

CO3: The Econometrics part covers the basic concept and estimation of ordinary least square method which is essential for practical understanding of economic relations and framing economic models

CORE PAPER- V- ECONOMICS OF DEVELOPMENT AND PLANNING

CO1: This course enables students to understand the models of economic development and their application for underdeveloped or developing economies.

CO2: It discuss important issues in the context of development such as, role of Population, International Trade, importance of domestic macroeconomic policies, investment criteria, and theory of economic planning.

CO3: It explains the project evaluation techniques, which will enable them to evaluate the

profitability of projects.

CORE PAPER –VI -INDIAN ECONOMY

CO1: The objective of the paper would be to sharpen the analytical faculty of the students by highlighting on broad overview of the Indian economy.

CO2: The paper also emphasis on social and economic infrastructure; Natural resources of India.

CO3: To get familiar with the issues related to agriculture, industry, foreign trade and Economic Planning in India.

CO4: The course is expected to enable the student to appreciate the evaluation of the economy, its institutional frame work and various problems associated with it, for analysing public policy.

SKILL COURSE PAPER-01 -BASIC ECONOMIC ANALYSIS WITH SPSS

CO1: A Student of Economics must have knowledge of data analysis through software. This course aims at giving the exposure of data analysis package SPSS and make

students familiar with its applications .

CO2: This paper aims to skill them in analysing the data with the help of SPSS by providing hands on experience.

SEMESTER III

CORE PAPER I- INTERNATIONAL ECONOMICS

CO1: The paper presents clear comprehensive exposition of the theories of international economics.

CO2: The paper aims at developing the understanding and analytical skill of the students of international trade in real and complex situations.

CO3: It will greatly help the students to examine the impact of the trade policies on gains from trade and terms of trade of a country.

CORE PAPER-II- RESEARCH METHODOLOGY

CO1: This course has an objective of explaining the theoretical framework and concepts of research to students.

CO2: It make them understand and use the various data collection and analysis tools for research.

CO3: Students will be skilled to frame a good research proposal and write its report.

Group A: Elective Paper – A1- BASIC ECONOMETRICS

CO1 : Econometrics is a very powerful tool for understanding of applied economic relationships and for meaningful research in economics.

CO2: This paper is designed to equip the students with the basic theories and assumptions of econometrics.

CO3: Student will learn how to construct econometric models, estimate the parameters of these models (in case of quantitative and qualitative data) and interpret the parameters estimates

GROUP A: Elective Paper –A2- MATHEMATICAL APPROACH TO MICRO ECONOMICS

CO1: This course is designed to equip students to apply mathematical tools and techniques to

understand and elaborate the concepts and theories related to Micro Economics.

CO2: It will enable students to elaborate Micro Economic theories and Models with mathematical derivations.

CO3: It develops the quantitative reasoning among the students regarding behavior of consumers and producers in market and market mechanism.

GROUP A: ELECTIVE PAPER- A3-AGRICULTURAL ECONOMICS

CO1: To understand the theories and Principles of Agriculture Economics.

CO2: To understand input–output of agriculture sector and their inter relationship with Economy.

CO3: To understanding the models of agricultural development.

CO4: To understand the farm management and agriculture marketing system.

GROUP –A ELECTIVE PAPER-A4 -LABOR ECONOMICS

CO1: To understand the main features, problems and mechanism of the labour market

CO2: To understand the theory and concept of productivity, unemployment and migration.

CO3: To understand man power planning and resources management.

CO4: To explain wage theory and related issues.

GROUP –B ELECIVE PAPER-B1-INDUSTRIAL ECONOMICS

CO1: To understand the concepts of industrialization and related issues.

CO2: To understand the theories and concepts related to firm and markets.

CO3: To understand the process of growth, merger and settlement of firm in different market conditions.

CO4: To understand the product pricing, balance sheet statements and related issues.

GROUP – B ELECTIVE PAPER-B2- FINANCIAL ECONOMICS

CO1: This course introduces students to the economics of finance.

CO2: This course enables students to know the operation of the Indian Financial System and activities in the financial markets.

CO3: The students will understand how the theoretical concepts learned in the class apply to the real world through interpretation of real world events.

Group B: Elective Paper –B3-MANAGERIAL ECONOMICS

CO1: This course introduces students to the role and importance of Managerial Economics.

CO2: The students will understand the internal and external decisions to be made by managers.

CO3: The students will understand the importance of economic approaches in managerial decision making.

CO4: The students will be able to use theoretical knowledge of economic theories to analyse real-world business problems.

GROUP –B ELECTIVE PAPER-B4-HUMAN RESOURCE MANAGEMENT (HRM)

CO1: The course is designed to make student understand the significance and problems of Human Resource Management in constituting economic growth.

CO2: This course will explain basic principles of strategic human resource management and the various aspects of human resource planning.

SEMESTER IV

CORE PAPER I- INTERNATIONAL TRADE AND COMMERCIAL POLICIES

CO1: This course enables students to understand how restrictions to international trade would be used for the nation's development and how it limits the same.

CO2: This course explains the importance of maintaining equilibrium in the balance of payments and suggests suitable measures to correct disequilibrium as well.

CO3 : It develops a complete understanding of role of international economic institutions in present global scenario.

CORE PAPER – IIA- PROJECT WORK- DISSERTATION

CO1: This course is introduced to develop the understanding of practical problems one has to face during research and how to overcome it.

CO2 : It will enhance the ability of students to conduct surveys and analysing the data collected. They will choose the topic of their interest under the guidance of faculty members which has some relevance to economic issues.

CO3: It aims to make student familiar with economic issues of local communities and surroundings and to study in depth with practical application on any economic phenomenon.

CORE PAPER – IIB-PUBLIC POLICY IN INDIA

CO1: To enable students to learn about the economic aspects of various public policies related to Indian Economy, which are directly and indirectly affecting the economic welfare of the people.

CO2: Student will have the knowledge about the formulation, implementation, monitoring, evaluation, analysis and limitations of public policies in India.

GROUP A: ELECTIVE PAPER – A1 -ADVANCED ECONOMETRICS

CO1: A primary objective of teaching this course is to engage students in active learning and critical thinking about econometrics using advanced tools.

CO2: This course introduces the theory and application of time series techniques which is crucial for the economic and financial research.

CO3: Another objective of this course is to relate economic questions to empirical observations and try to select those econometric models which are best suited.

GROUP A: ELECTIVE PAPER –A 2 - MATHEMATICAL ECONOMICS

CO1: This course aims to develop understanding of the economic concepts and theories using mathematical tools and techniques to refine the verbal logic.

CO2: It helps student to use modern algebraic tools which allow convenient handling of simultaneous equations in the context of linear programming, game theory and input-output analysis.

CO3: This course covers important aspects of microeconomics, macroeconomics and development theory to elaborate with mathematical explanation.

GROUP A: ELECTIVE PAPER- A3-ISSUES IN INDIAN AGRICULTURE

CO1: To understand the main features, trends and problems of indian agriculture.

CO2: To understand the agriculture finance, marketing, capital formation in india.

CO3: To understand the policies of government and other institutions in indian agriculture.

CO4: To understand the changes and new innovations in Indian Agriculture.

GROUP –A ELECTIVE PAPER-A4- ISSUES OF LABOUR IN INDIA

CO1: To understand the wage and bonus policies of industrial labour in India.

CO2: To understand the role trade union, collective bagging and industrial peace in India

CO3: To understand concept of social security, welfare policies and programmes for labour.

CO4: To understand the specific problem of social groups and effect of changing economic scenario.

GROUP –B ELECTIVE PAPER-B1-INDIAN INDUSTRIAL ECONOMICS

CO1: To understand the industrialization process in India and related issues.

CO2: To understand the role of public sector, effect of LPG policy, requirement to change in policies and measures taken by government for industrial development.

CO3: To understand the role of foreign capital and MNCs in industrial development.

CO4: To understand the sources of industrial finance and growth of main industries in india.

GROUP B: ELECTIVE PAPER – B2-DEMOGRAPHY

CO1: The basic aim of this paper is to understand the demographic trends and issues in India.

CO2: The study theories of population and structure of population in India.

CO3: Basic concepts related to demography like fertility, Mortality and Migration in population will be discussed.

CO4: Student will also be acquainted with the various methods related to population projections and implications of changing composition population on labour force.

GROUP B: ELECTIVE PAPER – B3-ECONOMY OF RAJASTHAN

CO1: The objective of the paper would be to make analytical study on Rajasthan Economy and its position and contribution in Indian economy.

CO2: The paper emphasis on major issues related to agriculture, industry and tourism sector of Rajasthan.

CO3: The course is expected to enable the student to appreciate the evaluation of the Rajasthan economy, its institutional frame work for analysing public policy, and to get familiar with the current issues and challenges of Rajasthan economy.

GROUP B–ELECTIVE PAPER – B4-ENVIRONMENTAL ECONOMICS

CO1: This course introduces students to concepts, methods and policy options in managing the environment using tools of economic analysis

CO2: This course intends to expose the student with practical applications of methods for valuation of environmental goods and services and quantification of environmental risk and damages.

CO3: Paper also discusses the various theories for managing the natural resources. It also highlights the concept and indicators for measuring sustainable development

CO4: Environment economics also brings insight the various issues and problems associated with the environment degradation in Indian and international context. Along with that, the policy measures adopted are also discussed.

SKILL COURSE PAPER-02-ADVANCE ECONOMIC ANALYSIS WITH SPSS

CO1: The paper will equipped students with practical applications of SPSS for advanced economic analysis**.**

CO2: The students will develop a strong theoretical framework of advanced statistical technique of data analysis with hands on training on SPSS

Programme Specific Outcome of BA Honours (Economics)

2019-20 Onwards

PSO1: This course will form the basic theoretical foundation of Economics.

PSO2: Through this programme students will be well acquainted with the core branches of Economics

PSO3: The objective of the course is to sharpen the analytical skills of the students.

PSO4: This programme will enable the students to apply the mathematical and statistical techniques to evaluate the validity of an economic argument.

PSO5: It will provide the students a well structured learning framework and environment for Economics.

PSO6: This programme will open the job avenues for students especially where the knowledge of Economics is a prerequisite.

PS07: This programme will help the students in their progression towards Higher Education in Economics.

Course Outcomes

FIRST YEAR HONOURS

Paper – I MICRO ECONOMICS

CO1: This course enables students to understand the basic concepts and principles of Micro

Economics and to apply them to the real world

CO2: It will develop the understanding of behaviours of consumers and producers in the market, price determination in commodity and factor market and criteria of welfare in Economics.

CO3: Theories and diagrammatical representations are the most important tools that will aid students to understand and grasp the subject.

Paper –II -PUBLIC ECONOMICS

CO1: The course will provide basic information to students on the scope of Public Economics.

CO2: The students will be able to understand the significance of government and its functions, governmental finance and its impacts on economic development.

Paper – III- QUANTITATIVE TECHNIQUES

CO1: This course provides basic knowledge of mathematical technique which are

frequently used in economic analysis.

CO2: This course will enable the students to use elementary statistical techniques for data

analysis in social researches.

CO2: Being combination of basic mathematical and statistical techniques, this course will enable students to use these techniques to understand the economic theories.

Paper – IV-HISTORY OF ECONOMIC THOUGHT

CO1: The paper will make students aware of the economic history.

CO2: It will also provide a historical perspective on the evolution and process of transformation of economic thought.

Paper – V MACRO ECONOMICS

CO1: This course will make the learners familiar with the economic aggregates and their role in economy.

CO2: It also covers various theories related to consumption and basic concept of investment.

CO3: Students will also get familiar with the Concept and various theories of business cycles.

SECOND YEAR HONOURS

PAPER – VI MONEY AND FINANCIAL MARKETS

CO1: The course will provide the basic information to students about the concepts, theories and scope of financial sector.

CO2: The students will understand the significance and functions of short term and long term financial markets, Exchange Rate and their impact on economic indicators.

Paper – VII MATHEMATICAL ECONOMICS

CO1: This course will equip students to understand the economic concepts and theories with the use of mathematical tools and techniques to refine the verbal logic.

CO2: The Modern algebraic tools will allow convenient handling of simultaneous equations in the context of linear programming and input-output analysis.

Paper – VIII INTERNATIONAL ECONOMICS

CO1: This paper will develop the understanding of theories of International Trade which explain the reasons, composition and impacts of international trade to students.

CO2: It will also build the understanding of trade policy and exchange rate system.

CO3: The students will have an idea about trends, composition and direction of international trade and trade policy of India.

THIRD YEAR HONOURS

Paper – IX- GROWTH AND DEVELOPMENT ECONOMICS

CO1: The Student will be able to understand the models of Economic Development and their applications for underdeveloped or developing economies.

CO2: This paper will help students to understand the important issues in the context of development.

Paper – X INDIAN ECONOMICS

CO1: The paper will help students to get familiarized with the broad overview of the Indian economy.

CO2: The students will also get familiar with the issues related to agriculture, industry, foreign trade and Economic Planning in India.

CO3: The students will have a broad idea regarding the social and economic infrastructure of India.

THIRD YEAR HONOURS

Paper – XI- ECONOMETRIC METHODS

CO1: This paper will equip the students with basic theories of econometrics.

CO2: Students will learn the construction of econometric models, estimation of parameters of these models and will be able to interpret the parameters estimates.

Paper – X INDIAN ECONOMICS

CO1: The paper will help students to get familiarized with the broad overview of the Indian economy.

CO2: The students will also get familiar with the issues related to agriculture, industry, foreign trade and Economic Planning in India.

CO3: The students will have a broad idea regarding the social and economic infrastructure of India.

Paper – XI- ECONOMETRIC METHODS

CO1: This paper will equip the students with basic theories of econometrics.

CO2: Students will learn the construction of econometric models, estimation of parameters of these models and will be able to interpret the parameters estimates.

Paper – XII COMPREHENSIVE ECONOMICS

CO1: This course will give a comprehensive basic knowledge of Labour, Industrial Agricultural and Environmental Economics to students.

CO2: It will build a theoretical foundation of these broad topics and enable students to discuss the contemporary issues related to them.

UG (Pass Course) –Economics (2019-20 Onwards)

Course Outcomes

First Year T.D.C. Arts

Paper – I-MICRO ECONOMICS

CO1: This course enables students to understand the basic concepts and principles of Micro

Economics and to apply them to the real world

CO2: The students will learn how consumers and producers behave in markets and how price is determined in commodity market.

CO3: This paper also enhanced the understanding of students about factor Pricing.

Paper – II- INDIAN ECONOMIC ENVIRONMENT

CO1: The objective of the course is to sharpen the analytical skills of the students by

highlighting on broad overview of the Indian economy.

CO2: To get familiar with the issues related to agriculture, industry, foreign trade, Economic

Planning and various problems in India.

CO3: Students will also acquaint with the broad overview of Rajasthan economy.

Second Year T.D.C. Arts

Paper – I-MACRO ECONOMICS

CO1 : Macro economics deals with the study of economic aggregates like income, employment, interest rates and the price level. This course will help students analyse and understand these concepts.

CO2: It covers basic concepts related to consumption and investment.

CO3: It also introduces students to the basic theories and concept related to business cycles, economic growth and development.

Paper – II- FINANCIAL ECONOMICS

CO1 : The present course is designed to acquaint the students with the functioning of the monetary and financial sector in India.

CO2 : It also deals with the concepts related to inflation and deflation. It will help students

to understand the causes and consequences of inflation and measures to control it.

CO3: It also covers elementary knowledge about the public finance related to the public expenditure and public revenue.

Third Year T.D.C. Arts

Paper –I- QUANTITATIVE TECHNIQUES IN ECONOMICS

CO1: The basic aim of this course is to acquaint the students with sampling techniques and

tools of collection.

CO2: This course covers elementary statistical techniques which are frequently used for data

analysis in social researches.

CO3: This course also provides basic knowledge of mathematical techniques -Differential

and Integration, which are frequently used in economic analysis.

Paper – II- INTERNATIONAL ECONOMICS

CO1: This course aims to develop understanding about basic concepts and theories related to

international trade.

CO2: This course will help students to analyse the problems related to the foreign trade and balance of payments and learn about the techniques to overcome them.

CO3: It will greatly help the students to examine the impact of the trade policies on gains

from trade and terms of trade of a country.

CO4: The students will have an idea about trends, composition and direction of international

trade and trade policy of India.

MASTER OF PHILOSOPHY PROGRAMME

ECONOMICS

Programme Specific Outcomes of M.Phil. Economics

PSO1: This programme is designed to develop critical thinking skills among students. They will be able to correlate economic theory with everyday problems in real world.

PSO2: This programme will enable the students to apply the mathematical and statistical techniques to evaluate the validity of an economic argument.

PSO3: The students will be able to discuss the current economic issues and problems with the clear understanding of theoretical framework.

PSO4: This course has an objective of explaining the theoretical framework and concepts of research to students.

PSO4: Students will be skilled to frame a good research proposal, to conduct research and write its report.

PSO5: This programme opens job avenues for students especially they can serve as project assistants and researchers in research institutes and companies dealing in conducting surveys and data analysis.

Course Outcomes

SEMESTER – I

Paper – I RESEARCH METHODOLOGY

CO1: This course has an objective of explaining the theoretical framework and concepts of research to students.

CO2: It make them understand and use the various data collection and analysis tools for research.

CO3: It imparts basic knowledge of Econometric and Statistical techniques to be used for research.

CO4: Students will be skilled to frame a good research proposal and write its report.

Paper – II - ISSUES IN INDIAN ECONOMY

CO1: The paper will help students to get familiarized with the broad overview of the Indian economy.

CO2: The students will also get familiar with the issues related to agriculture, industry, foreign trade and Economic Planning in India.

CO3: The objective of the course is to sharpen the analytical skills of the students by providing them the opportunity to discuss on the issues and problems related to the Indian economy.

SEMESTER – II

Paper – I A- ADVANCED STUDY OF EVOLUTION OF ECONOMIC DOCTRINES

CO1: The paper will make students aware of the economic history.

CO2: It will also provide a historical perspective on the evolution and process of transformation of economic thought.

Paper – I B- ECONOMICS OF ENVIRONMENT AND CLIMATE CHANGE

CO1: This course introduces students to concepts, methods and policy options in managing the environment using tools of economic analysis

CO2: This course intends to expose the student with practical applications of methods for valuation of environmental goods and services and quantification of environmental risk and damages.

CO3: It also discusses the various theories for managing the natural resources. It also highlights the concept and indicators for measuring sustainable development

CO4: Environment economics also brings insight the various issues and problems associated with the environment degradation in Indian and international context. Along with that, the policy measures adopted are also discussed.

Paper – II A-ADVANCED ECONOMIC THEORY

CO1: This course will formed the theoretical foundation of the students about pricing in imperfect market conditions, general equilibrium theory and enable them to apply in real market situations.

CO2: This paper enhanced the understanding of various concepts and theories of welfare economics.

CO3: It gives exposure to Advanced Macro Economic Theories related to income, employment, inflation and Busines cycles.

CO3: It makes students aquainted with new growth models and trade theories.

Paper – II B- ECONOMICS OF HEALTH SECTOR

CO1: This course will help students to understand the interlinkages of health and economic development.

CO2: It will give exposure to status of health and health facilities in India.

CO3: Research in Health Economics is in demand and this course will help students to seek opportunities in this field.

Paper III- Information and Communication Technologies in Research

CO1: This qualifying course is designed to make students well acquainted with Information and Communication Technologies.

CO1: Students will be able to use Information and Communication Technologies in their Research.

SEMESTER – II

Paper I- Dissertation

CO1: This course is introduced to develop the understanding of practical problems one has to face during research and how to overcome it.

CO2 : It will enhance the ability of students to conduct surveys and analysing the data collected. They will choose the topic of their interest under the guidance of faculty members which has some relevance to economic issues.