GOVERNMENT OF MANIPUR
NAMBOL L. SANOI COLLEGE

PROGRAMME OUTCOME
&
COURSE OUTCOME

Principal
Nambol L. Sanoi College
Nambol

Prof. W. Jyotirmoy Singh
Principal
Nambol L. Sanoi College, Nambol

CONTENT

10/4/22

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DEPARTMENT OF BOTANY

NAMBOL L. SANOI COLLEGECOLLEGE, NAMBOL

COURSES OFFERED:

B. Sc. I - SEMESTER

Botany, Zoology, Chemistry

Programme Outcome

PO1: The curriculum for the B. Sc. Programme in Botany is designed to equip students with subject domain knowledge and technical skills pertaining to plants in a holistic manner, providing an environment that encourages, promotes and stimulates the intellectual, professional and personal development of the student.

PO2: Knowledge and understanding of the range of plant diversity in terms of structure, function and environmental relationships.

PO3: Function as an individual, as a member or a leader to perform a task in class room situation or during field study.

PO4: Students are made aware about the social and environmental issues, significance of plants and their relevance to the national economy. Insist the significance of conserving a clean environment for perpetuation and sustainable development

PO5: Practical skills in the field and laboratory experiments. Apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitation.

PO6: Student can do their Master's degree in Botany, Environmental Science, Biotechnology and other related fields. Study incessantly by self to cope with growing competition for higher studies and employment.

PO7: Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Programme Specific Outcome

PSO1: The curriculum is well conceived for botany students to have knowledge about various plant groups from lower to higher groups

PSO2: Understand the knowledge of life sciences and fundamental process of plant to study and analyse plant form.

PSO3: Apply the acquired conceptual knowledge of biodiversity conservation and sustainable use of plants.

PSO4: Develop skill in handling scientific instruments and laboratory techniques in anatomy, physiology, biochemistry, biotechnology, ecology and utilization of plants.

PSO5: Promote students for taking up and shaping a successful career in Botany.

COURSE OUTCOME

B. Sc.1- SEMESTER

After the completion of this course students are able

Code: BOT 1O1: VIRUS, BACTERIA AND CRYPTOGAMS

CO1: VIRUS

- to understand the basic concepts of virus
- to recognise about viral component and viral replication.
- to comprehend the classification, reproduction and genetic recombination in bacteria.
- to understand the life cycle pattern of Bacteria and Viruses
- to have the idea of the useful and harmful activities of Bacteria and Viruses

CO2: FUNGI

- to understand the basic concepts of Fungi.
- to understand the structure and reproduction of certain fungi.
- to learn the classification, structure, role and infectious cycle of Fungi.
- to understand the features and economic Importance of Lichen.
- to have the idea on plant diseases with special reference to the causative agents, symptoms, and different methods of plant disease management .

CO3: ALGAE

- to understand the basic concepts of Algae
- to recognise the different habitats and reproductive structure of different classes

- to know the structure, pigmentation, food reserves , methods of reproduction and the life cycle pattern of Algae(*Oedogonium, Vaucheria, Ectocarpus* and *Polysiphonia*)
- to understand the knowledge of useful and harmful activities of Algae.
- to have the idea that algae is a great human food supplement, also aware about commercial utilization of algae.

CO4: BRYOPHTES

- to understand the basic concepts of Byrophtes
- to learn the classification, structure and reproduction of Bryophytes (*Marchantia, Anthoceros, pellia, porella, Sphagnum* and *Funaria)*
- to understand the range of structural organisation of gametophytes and sporophytes
- to acquire the knowledge of life cycle and economic importance of Bryophytes

CO5: PTERIDOPHYTES

- to understand the morphological diversity of Pteridophytes.
- To know the classification and anatomy of sporophytes
- to learn about the structure and reproduction of certain selected species of Pteridophytes *(Lycopodium, Selaginella, Equisetum, Isoetes* and *Marsilea*)
- to Know the economic importance and the evolution of Pteridophytes

BOT-101 PRACTICAL

- Gram staining of bacteria
- Microscopic study of vegetative and reproductive structures of Algae, Fungi, Byrophtes and Pteridophytes
- Study of lichens thalli-Crustose, Foliose and Fructicose

COURSE OUTCOME

B. SC II- SEMESTER

After the completion of this course students are able

CODE: BOT 2O2: GYMNOSPERM, ANGIOSPERM, APPLIED BOTANY AND EMBRYOLOGY

CO1: GYMNOSPERM AND PALAEOBOTANY

- to understand the basic concepts of Gymnosperm and Palaeobotany
- to learn detail knowledge on classification, morphology , reproduction and life cycle of *Cycas, Pinus* and *Gnetum*

- to understand Gymnosperms with respect to Paleobotany distinguishing characters, comparison with Angiosperms and economic importance
- to know the scope of Paleobotany, types of fossils and geological time scale and dominant fossil flora of different fossil groups

CO2: **ANGIOSPERM**

- to understand the basic concepts of plant taxonomy and classification of Angiosperms
- to recognise the importance of field work and methods of herbarium preparation
- to learn about various rules, principles and recommendations of plant nomenclature
- to learn about various vegetative and reproductive structural features of Angiosperm families and its economic value
- to have the idea on different characteristic of plants like *Ranunculaceae, Malvaceae, Apiaceae, Asteraceae, Solanaceae , Lamiaceae* etc *including monocotyledoneae families*

CO3: APPLIED BOTANY&ETHNOBOTANY

- to understand the basic concepts of Vavilov's centre of origin
- to recognize the different process of cultivation and improvement of cash crops (Rice, Potato, Tea)
- to know the importance and uses of medicinal plants like *Cinchona, Rauwolfia* and *Adhatoda*
- to understand the concepts, classification and interdisciplinary approaches of ethnobotany
- to have the idea that ethnobotany has become an important thrust area of research for the documentation preservation of historical traditional knowledge as well as to develop resource management, conservation of biological diversity.

CO4: PLANT ANATOMY

- to understand the basic concepts of plant cells , tissues and their functions
- to learn the the various tissue systems such as meristems, epidermis, permanent tissues, complex tissue systems and structure of plant organs.
- to understand the normal and anomalous secondary growth in plants and their causes

CO5: EMBRYOLOGY & PALYNOLOGY

- to understand the scope and importance of Embryology
- to know the structure and development in microsporangium and megasporangium
- to learn complete details about the structures, development of monocot and dicot embryos at different stages.
- to describe and illustrate modern fossil spores and pollen grains.
- to acquire knowledge on aerobiology and pollen energy

BOT-202 PRACTICAL

- Study of different types of fossils.
- Study of different groups of angiosperms families w.r.t systematic position, morphological characters, floral formula and floral diagram.
- Collection and identification of cash crops and medicinal plants
- Study of anomalous secondary growth in plants
- Field observation of local vegetation

COURSE OUTCOME

B. SC III- SEMESTER

After the completion of this course students are able

CODE: BOT303: PLANT GEOGRAPHY, ECOLOGY, PLANT PHYSIOLOGY & MOLECULAR BIOLOGY

CO1: PLANT GEOGRAPHY

- to understand the basic concepts of plant geography
- to understand how different types of plants are distributed to different climatic condition ,soil condition, altitudes etc and how they adapt themselves
- to recognized the different phytogeographical regions of India
- to comprehend how plants are migrating from one place to another in accordance to the changing environment situations
- to understand what is endemism? Why such endemic organism are found restricted to a particular region? Should we protect them, so as to save them

from extinction?

CO2: PLANT ECOLOGY

- to understand the basic concepts of plant ecology
- to recognise how the growing plants (small or large) are trying to adapt themselves to their surrounding environment for existence
- to comprehend the knowledge of how the hydrophytes, mesophytes and xerophytic plants modify their body forms structurally morphologically and anatomically with soil types, availability of sunlight, Intensity of heat
- to recognise how food- chain occurs in different trophic levels from autotrophic herbivores –carnivores omnivores etc
- to have the idea that how ecological succession occurs in course of time with changing environmental conditions from hydrosere to xerosere.

CO3: PLANT PHYSIOLOGY

- to understand the basic concepts of plant physiology and how the plants perform their life activities like animals.
- to know that plants are also having a close relationship with the surrounding environment for their existence.
- to recognise how plants get their food, how they respire, how we get our energy from plants, how flowering and fruiting occurs in plants, what are the external and internal factors in influencing such as activities of plants.
- to grasp the underlying ideas that all heterotrophic organisms (including we human beings) are solely dependent on autotrophic plants .

CO4: BIOCHEMISTRY

- to understand the basic concept of Biochemistry, which to the branch of science that explore the chemical processes within and related to living organism.
- to gain knowledge about the biomolecules- the substances that are produced by cells and/living organisms.
- to know the different types of biomolecules or biological compounds such as

carbhohydrates, lipids, proteins, nucleic acids, amino acids and vitamins.

- to know about the wide range of size, structure and performance of different types of functions.
- to know about the monomers, polymers of macromolecules helping in enzyme functions.
- to know about enzyme properties, enzymes acting its nomenclature & classification.
- to understand how the genetic information is stored and transferred through nucleic acid (DNA&RNA)
- to understand how the electron in transported during the process of respiration Kreb's cycle etc.

CO5: MOLECULAR BIOLOGY

- to understand the field of biology that describes the composition, structure and interactions of cellular molecules such as nucleic acids & proteins that carry out the biological processes essential for the cell's function & maintenance .
- to know about the gene organization of prokaryote (like E. coli bacteria & Archaea-bacteria) & eukaryotes (higher organisms)
- to learn that Eukaryotes are considered as higher organisms having true nucleus, well defined cell organelles bounded by membranes.
- to understand the Structure & physical properties of DNA&RNA, biosynthesis of nucleic acids (DNA&RNA)
- to learn How the genetic information is transferred from DNA to mRNA to protein which is known as "central dogma" proposed by Francis Crick in 1958.
- to understand the replication type of DNA – conservative, semi-conservative and dispersive.
- to know about the RNA translation- the process of proteins synthesis from the information contained in mRNA and the tRNA carrying the amino acid methionine (start codon, AUG) of mRNA sequences.
- to understand the four major steps of protein synthesis i.e. initiation, elongation, termination and ribosomes cycling.

BOT-303 PRACTICAL

- Determination of the minimum size of the quadrate by species area curve method
- Determination of frequency of vegetation in a community by quadrate method.
- Extraction of chlorophyll pigments from leafy plants by paper chromatographic technique.
- Study of rate of photosynthesis under different light intensities
- Simple tests for carbohydrate, protein, fats and nucleic acids
- Field observation of local vegetation

COURSE OUTCOME

B. SC IV- SEMESTER

After the completion of this course students are able

CODE: BOT 404: CYTOGENETICS, BIOTECHNOLOGY AND BIOMETRICS

CO1: CYTOlOGY

- to know about the concept of cytology that deals with the structure and function of plant and animal cells and its components.
- to learn about the different organelles like endoplasmic reticulum, golg bodies, ribosomes, mitochondria, plastids and nucleus.
- to understand the structure and function of chromosome in heredity.
- to learn how cells are divide by mitosis and meiosis in plant cells.
- to comprehend the significance of mitosis and meiosis in the organisms.

CO2: GENETICS

- to know about the concept of Genetics which is the branch of biology concerned with the study of genes, genetic variation and heredity in organisms.
- to understand about law of Mendel (Mendelism) -The law of segregation and the law of independent assortment.
- to learn about back cross, test cross, allelomorphic, alleles, genotype, phenotype, dominant, recessive.

- to comprehend about the characters of pea plants performed by Mendel, the father of Genetics**.**
- to know about gene interaction, gene expression, how the genetic information is transferred through transcription, translation.
- to know the role of t- RNA in protein synthesis.
- to understand about the linkage, crossing over, mutation and mutagens(the substances that can cause mutation)
- to learn about the alteration of chromosomes like deletion, duplication, translocation, inversion etc. along with the variation in chromosome no. like polyploidy, aneuploidy.
- to know about the extranuclear inheritance i.e. the characters transferred through genes located outside the nucleus (through chloroplast and mitochondria).
- to learn about the sex chromosome (xx,xy) and sex determination in plants.

CO3: PLANT BREEDING

- to learn about the concept of plant breeding- the science of changing the traits of plants in order to produce the desired characteristics useful for humans and animals by improving the genetic makeup of the crop plants.
- to understand the objectives of plant breeding to improve yield, quality, disease resistance, drought and frost tolerance and improvement of crop plants.
- to know about the techniques of plant breeding by selection of desirable character & elimination of less desirable character and hybridization to create desired genotypes and phenotypes for specific purposes.
- to understand the conventional/ traditional method of plant breeding in self and cross pollinated crops.
- to comprehend the sexual & asexual method of reproduction; the definition of apomixis which is a form of asexual reproduction that occurs via seeds, in which embryos develop without fertilization producing genetically identical mother cells and significance of plant breeding.
- to learn the knowledge of hybrid vigour i.e. the heterosis and its importance in plant breeding.

CO4: BIOTECHNOLOGY

- to know the basic concepts of Biotechnology and its application
- to know how the scientific methods are applied to manipulate living organism for beneficial use
- to enhance their knowledge about this branch of science which is directly related to human health, environment, agriculture and industry

BOT404 PRACTICAL

- Determination of the minimum size of the quadrate by species area curve Method
- Determination of frequency of vegetation in a community by quadrate method.
- Extraction of chlorophyll pigments from leafy plants by paper chromatographic technique.
- Study of rate of photosynthesis under different light intensities
- Simple tests for carbohydrate, protein, fats and nucleic acids
- Field observation of local vegetation

COURSE OUTCOME

B. SC V- SEMESTER

After the completion of this course students are able

CODE: BOT505: MICROBIAL DIVERSITY, PLANT PATHOLOGY AND EMBRYOPHYTA

CO1: MICROBIAL DIVERSITY

- to know the basic knowledge about the diversity of microbes.
- to know that diversity of microbial diversity is critical in eco-system functions such as to maintain processes like a) decomposition of organic matter b)nutrient cycling c)soil aggregation d)controlling pathogen with eco-system.
- to enlightened about the role of microbes in ecological balancing of nature
- regarding human welfare, take part in bio-gas production, in making bread, cheese and wine , to kill harmful pests, discovery antibiotics and vaccines

CO2: MICROBES AND HUMAN WELFARE

- to know the role of microbes in industry, agricultural microbiology, food microbiology and medical microbiology.
- to learn the potentialities of microbes enhancing human welfare.
- to understand that it take part in bio-gas production, in making bread, cheese and wine, to kill harmful pests.
- to know that it has helped to treat and prevent diseases which are caused by viruses, bacteria, protozoa and fungi.
- to understand how microbiology led to the discovery and development of: Antibiotics, and Vaccines

CO3: PLANT PATHOLOGY

- to know about the history of plant pathology
- to learn the classification of plant diseases on the basis of casual organism and symptoms
- to identify the causative organism, symptoms and control measure of plant disease.
- to understand the economic and pathological importance of bacteria and fungi

CO4: PLANT DISEASE MANAGEMENT

- to know the basic concept of plant quarantine, Seed certification and Cultural practices of disease management
- to learn about fungicides classification based on chemical nature and mode of action
- to know about Biological control and Breeding for plant resistant varieties
- to understand the Concept of integrated pest disease management

CO5: BRYOLOGY AND PTERIDOPHYTE

- to learn basic concepts of about bryophytes and economic importance of bryophytes.
- to learn brief account on the development of bryology in India.
- to know about the origin and evolution of pteridophytes- vascular, spore

producing, non- flowering seedless plants. E.g. Marsilea, Lycopodium

- to understand about the relationship of Pteridophytes with bryophytes and gymnosperms.
- heterospory nature of Pteridophytes, stellar nature of evolution in Pteridophytes.
- to understand ecological and economic importance of Pteridophytes.

COURSE OUTCOME

B. SC V - SEMESTER

After the completion of this course students are able

CODE: BOT506: ADVANCED PLANT TAXONOMY, ANATOMY, EMBRYOLOGY AND PALYNOLOGY

CO1: PRIMITIVE SEED PLANTS AND PALAEOBOTANY

- to know the basic concept of progymnosperms.
- to learn more about diversity among gymnosperms and distribution in Indian sub-continent
- to recognised different fossils of algae, fungi ,gymnosperm and angiosperm
- to understand the importance of Palaeobotany in the exploration of fossils fuels

CO2: ADVANCED PLANT TAXONOMY

- to understand the aim and scope of taxonomy , Binomial system, chemotaxonomy, cytotaxonomy, numerical taxonomy and molecular taxonomy.
- to Know modern trends in taxonomy.
- to learn methods and techniques of herbarium preparation, how to press the collected plant specimen and mounted the dried specimen on herbarium sheets of standard size (41 x 29 cm).
- to recognised Bentham and hooker system of classification and their economic importance
- to study different floral characteristic of plants like Magnoliaceae, Asteraceae, Rutaceae Apiaceae, Rubiaceae, Ascclepidiaceae, Acanthaceae etc including monocotyledoneae families

CO3: PLANT RESOURCES

- to know the Classification of economic plants based on their uses
- to know the importance and uses of medicinal plants like *Ephedra,Carthamus, Aloe vera* and *Vinca.*
- to learn the process of cultivation and improvement of cash crops like Maize, Mustard, Pea and Banana
- to understand the importance of ethnobotany in genepool and germplasm conservation which makes possible to preserve entire genetic diversity of both cultivated species and their wild relatives at one place.

CO4: ANATOMYOF ANGIOSPERM

- to learn more about the apical Meristem and histological theories of shoot and root apices
- to know about Cambium and its origin, structure and function.
- to learn the formation of secondary xylem and Secondary phloem
- to understand Anomalous secondary growth in *Bauhinia*, *Bougainvillea* and *Nyctanthus.*

CO5: PLANT EMBRYOLOGY AND PALYNOLOGY

- to Understand Microsporangium and Megasporangium and its types
- to know Pre-fertilization and post fertilization process
- to understand the development, structure and function of endosperm
- to know more about the development of monocot and dicot embryos.
- to recognise apomixis and their role
- to have an idea of Pollen production and dispersion in time and space

BOT507 PRACTICAL

- Preparation of culture media for bacteria and fungi (nutrient agar and PDA)
- Microscopic study of Bacillus, Coccus,Staphyloccus,Nostoc etc
- Morphological and anatomical studies of different types of root nodules (Pea, Mimosa, Broad bean)
- Symptoms, Casual organism and microscopic studies of diseased plant

specimens included in theory syllabus

- Examination and classification of specimen/slides of the fossil plants as per syllabus
- Description and classification up to genus of a representative species from each of the angiosperm families mentioned in the theory.
- Preparation of permanent /semi-permanent slides for the study of anomalous secondary growth in plants included in the theory paper.
- Preparation of stained slides of endosperm and embryo.
- Identification and preparation of field notes of 50 plant species in the field.

COURSE OUTCOME

B. SC VI- SEMESTER

After the completion of this course students are able

CODE: BOT 608: ECOLOGY, PLANT PHYSIOLOGY AND MOLECULAR BIOLOGY

CO1: VEGETATION AND NATURAL RESOURCES

- to understand the different vegetation and floristic regions of India
- to learn about natural forest resources, conservation, aforestation, social forestry, agoforestry, timber extraction; dams and their effects.
- to recognise Mineral resources, Water resources-floods, drought.
- to understand Energy resources-renewable and non-renewable resources

CO2: ECOSYSTEM AND POLLUTION

- to know the basic concept of physical environment, biotic environment, habitat and niche
- to learn about basic component of ecosystem, energy flow, trophic levels
- to understand Environmental pollution of air, water and solid with their control measure.
- to have an idea about climate change , global warming and biodiversity

CO3: PLANT PHYSIOLOGY

- to identify various physiological role of micro and macro elements and their deficiency symptoms
- to learn more about different Phases of growth and physiological functions of growth hormones like Auxin, Giberellins, Cytokinins, Ethylene and Abscisic acid
- to understand about Senescences, Photoperiodism ,Photomorphogenesis and Phytochromes
- to understand more about plant physiological process and their mechanism with significance of light reaction

CO4: BIOCHEMISTRY

- to know about Water as universal solvent
- to recognised different Principle of biophysical chemistry
- to know more about Bioenergetics ,Enzymes and and isozymes
- to understand glycolysis and Kreb's cycle

CO5: MOLECULAR BIOLOGY

- to know about Gene organization and Gene regulation in prokaryotes and eukaryotes
- to learn about Various techniques of gene mapping ,concept of DNA fingerprinting and PCR and its working principle and applications.
- to know about Composition of nucleic acids DNA structure,A,B and Z forms of DNA
- to have detailed knowledge of denaturation and renaturation of DNA and Different forms of RNA

COURSE OUTCOME

B. SC VI- SEMESTER

After the completion of this course students are able

CODE: BOT609: CELL BIOLOGY, GENETICS, PLANT BREEDING, BIOTECHNOLOGY AND COMPUTER APPLICATION

CO1: CELL BIOLOGY

- to know about historical background of cell, cell theory, kingdom-wise cell size and cell structure including prokaryotic and eukaryotic cell
- to learn characteristics of archaebacteria and mycoplasma
- to understand the origin ,structure and function of different cell organalles
- to have an idea about the roles of various membrane proteins, lipids and carbohydrates and ion channels and pumps in cellular transport and signaling.

CO2: GENETICS

- to know the basic concept of Mendel's experiment and principles of inheritance
- to understand the importance of Modified dihybrid ratios and Multiple allelism
- to learn Quantitative traits and quantitative genetics
- to have detailed knowledge of multiple factor hypotheses

CO3: PLANT BREEDING

- to know the different types of plant reproduction and their effect on generating and fixing genotypic variation
- to learn methods of plant improvement
- to understand plant introduction and acclimatization with Hybrid vigour.
- to understand mutation and polyploidy as methods of plant improvement

CO4: BIOTECHNOLOGY

- to know the basic concepts, tools and techniques related to in vitro propagation of plants and scope of biotechnology
- to learn Somatic hybridization and clonal propagation
- to understand basic principles of genetic engineering of plants
- to enlightened about methods of gene delivery and use of Agrobacterium as a

vector for plant transformation

- to recognised Salient achievements in crop biotechnology and prospects

CO5: COMPUTER APPLICATION AND BIOFORMATICS

- to know the basic principles of computer programming, internet and its applications.
- to learn about the Communication tools, word processing, spread sheet and presentation of software
- to enlightened about the need for computer applications in biological sciences
- to understand the fundamental concepts of biostatistics.
- to describe the content and properties of the most important bioinformatics d– asses of bioinformatics tools.

BOT610: PRACTICAL

- Determination of physical chatacteristics soil,temperature,moisture content.
- Estimation of starch ,protein
- Seperation of plant pigments and enzymes by paper chromotograph techniques
- Determination of chromosomes counts from dividing mother cells, root tips and pollen grains
- Determination of mean,standard deviation ,using MS EXCEL/SPSS
- Preparation of presentation of cells organelles using MS power point

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-I

COURSE	OUTCOME After completion of the course, the students should be able
CH-101 Section-A Inorganic Chemistry	- To Explain how the solution of the Schrodinger equation of the hydrogen atom yield the four quantum number and use these to identify degenerate state. - To Describe the arrangement, similarities in the properties of the element in the periodic table based on electronic configuration and which also helps to locate the position of the new elements to be discovered latter. - To understand that chemical bonding is totally based on the stability of the species to be formed and helps to describe the molecular geometry, physical and chemical characteristic. - To understand the principle of quantitative and qualitative inorganic analysis
CH-101 Section-B Organic Chemistry	- To understand the basic concept of organic chemistry. i.e.. hybridisation (sp, sp^2, sp^3), resonance, hyperconjugation, inductive effect, field effect etc and their application - To know the various types of reactive intermediate, factors affecting their stability and methods of determination of reaction mechanism. - To discuss the nomenclature, relative stability of cycloalkanes and its limitation - To discuss the formation, chemical reaction of alkene, alkyne, diene and identify the difference between diene and alkene

CH-101 Section-C Physical Chemistry	- To explain the gas law from kinetic gas equation. - To know derivation of real gases from ideal behaviour - To describe the physical concerning solid state structures, specific crystal structure by applying basic crystallographic concept. - To give an account of the generatoin of X-ray radiation and its effect on matter. - To describe the experimental use of the diffraction phenomenon. - To derive Bragg's equation and explain the different law of crystallography.
CH-101 P Inorganic Chemistry Practical	- To learn the identification of two acidic and two basic redicals by semimicro qualitative analysis techniques. - To ficilitate the learner to make solution of various molar concentration. This may include ; the concept of the mole ; converting moles to gram, converting grams of moles, defining concentration, dilution of solutions, making different molar concentration. - To estimate the actual amount of the inorganic substance present in a given sample of solution.

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-II

COURSE	OUTCOME After completion of the course, the students should be able
CH-202 Section-A Inorganic Chemistry	- To understand the fundamental theories, to define the various type of acids and bases found in inorganic compound. - To know the consequences due to the lost or gain of electron in a given direction. - To know the basic knowledge of non-aqueoun solution and application of non aqueoun of solvent in analytical chemistry. - To explain the properties of alkali and alkaline earth metals, phenomenon of photoelectric effect, diagonal relationship and its importance in the biological system.
CH-202 Section-B Organic Chemstry	- To know symmetry elements, chiral and achiral, enantiomers, diasteromers, Sterogenic centre, optical acivity. - To discuss relative and absolute configuration, geometrical isomerism, (E, Z) conformation. - To know and understand the requirements for aromaticity and be able to apply them in determining whether or not a molecule/ion is aromatic. - To recognise and write the mechanism of electrophilic aromatic substitution. - To understand the mechanism, reactivity and stereochemistry of SN^1 and SN^2 reaction of alkyl halides. Methods of formation of aryl halides and discuss nucleophilic, electrophilic and side chain reaction. - To learn about nomenclature, method of formation, chemical/ reaction of dihydric alcohol. - To know the nomenclature, chemical reaction of trihydric alcohol.

CH-202 Section-C Physical Chemistry	- To know different laws for ideal solution (Raoult's law and Henry's law), Discuss about non-ideal solution, azeotropes, partially miscible liquid systems (Phenol-water, water-triethylamine, water-nicotine) etc. - To study the behaviour of binary liquid mixture CST, azeotropes, colligative properties. - To discuss the various colligative properties and methods of determining them. - To classify colloids and discuss their methods of preparation and describe Freundlich adsorption and Langmuir theory of unilayer adsorption isotherm. - To state and apply 1st law of thermodynamics for closed and open system undergoing different thermodynamic process and calculate change in kinetic, potential, enthalpy and internal energy.
CH-202 P Organic Chemistry	- To know the purification or seperation of organic compounds. - To determine the physical constant , i.e., the determination of melting point and boiling point of different organic compounds.

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-III

COURSE	OUTCOME After completion of the course, the students should be able
CH-303 Section-A Inorganic Chemistry	- To understand the principle of extraction of metals from the respective ore. - To discuss the properties of non-transition elements (gr 13 to 18) of the periodic table. - To discuss the properties of transition elements (gr 3 to 12) of the periodic table. - To understand the constituent of the coordination compound , types of bonding, nomenclature and isomerism.
CH-303 Section-B Organic Chemistry	- To recognise the main differences between the acidities of alcohols and phenols, know the resonance stabilisation of phenoxide ion, discuss the chemical reactions of phenol and undrstand the mechanism involved in various reaction. - To write the mechanism for the preparation and resonable reaction for ethers and epoxides especially with nucleophilic reagents. - To understand and able to write an equation to illustrate the cleavage of an epoxide ring by acid and base. - To recognise and assign the name of aldehyde and ketones, write the mechanism for nucleophilic addition and nucleophilic addition-elimination of aldehydes and ketone and predict the product of such reaction. To predict the product of addition reaction to $\alpha-\beta$ unsaturated carbonyl compounds. - To describe the structures and properties of amines and amide, differentiate primary, Secondary and tertiary amines and discuss the physical properties of amines including their pasicity.

CH-303 Section-C Physical Chemistry	- To apply the thermochemical equation involving heat, specific heat and temperature change. - To write down the statement of 2nd laws of thermodynamics, Give the concept of entropy (s), from carnot cycle and the significance of helmholtz free energy (A) and G ibbs free energy (G). Explain the criteria of spontaneity in terms of S, A and G. - To derive the relation between the various equilibrium constants K_p, K_c and K_x, know about Le-Chatelier's principle. - To derive rate, rate constant, order and molecularity of reaction and derive the integrated rate equation for zero, first and second order reactions and discuss the effect of temperature on reaction rate and theories of reaction rate.
CH-303 P Physical Chemistry Practical	- To measure the surface tension and viscocity of a given liquid at room temperature. - To know the technique of pH measurement, Preparation of buffer solution.

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-IV

COURSE	OUTCOME After completion of the course, the students should be able
CH-404 Section-A Inorganic Chemistry	- To explain the position, oxidation state, physical properties regarding lanthanides and actinide, contraction and consequence. - To discuss the position, properties, bonding, stereochemistry and uses of noble gases. - To write down the concept of hard and soft acids and bases.
CH-404 Section-B Organic Chemistry	- To Explain the effects of substituents in acidic character of carboxylic acid and discuss chemical properties and its related mechanism. - To know the relative stability of acyl derivatives, its physical properties and interconversion of acid derivatives by nucleophilic acyl substitution. - To discuss the formation, structure and chemical reaction of organometallic compounds like organomagnesium compound, organo zinc compounds and organolithium compound. - To know the types of polymers, mechanism of polymerisation and about thermosetting and thermoplastic. - To have the experience to use polymer in the manufacture of fibres, rubber and plastic

CH-404 Section-C Physical Chemistry	- To get the elementary idea of catalysis including enzyme catalyst. Describe different types of catalysis and their kinetics study with special focus on enzyme catalysis and the mechanism of catalyst. - To know what electrolytes and non-electrolytes ionization and ionization constant, ionic product of water, concept of pH of different salts, common ion-effect, buffer solution and its application of buffer in analytical chemistry and biochemical processes in human body. - To understand the solubility product of sparingly soluble salt, acid-base titration curve, selection of indicator and their limitation. - To know the meaning of phase, component and degree of freedom. Explain the phase equilibrium of one-component and two-component system.
CH-404 P Analytical Chemistry Practical	- To learn about the estimation of total, permanent and temporary hardness of a given water sample by EDTA method.

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-V

COURSE	OUTCOME After completion of the course, the students should be able
CH-505 Inorganic Chemistry	- To Understand nature of radiation, disintegration process, nuclear reaction and its application. - To know the preparation, properties and the chemical/reactivity of the S and P-block elements and their comparision. - To know the physical charactristic of transition elements and their compounds variation in their properties of oxides and halides and role of some transition metal complexes (Fe, Cu, Zn, etc) in biological system. - Explain what alloys and intermettalic compounds are, and know the rules of formation of alloys. - To know the spectrophotometric analysis of substances based on theoritical laws, experimental analysis and its instrumentation. - Explain working principle of 1R spectroscopy devices and application to characterisation of groups like C = N, C = O, C = C, COOR, NH and $CONH_2$. - To Explain thermodynamics and kinetic aspects of metal complexes, Substitution reactions of square planar Complexes. - Apply basic chemical concepts to analyze chemical processes involved in different environmental problem (air, water and soil). Identified the source of toxic elements in the environment.
CH-506 Section-A Organic Chemistry	- To discuss the importance of carbohydrate, its classification, nomenclature, isomerism, chemical reaction of monosaccharides, disaccharides and polysaccharides. - To know the structure of ribose and deoxyribose. - To Identify the structure of aminoacids, its stereochemistry preparation and chemical reaction. - To classify protein with functions, structure and its denaturation and renaturation. - To discuss the structure and function of RNA and DNA and judge the denaturation of nucleic acid. - To analyse the material used in oils, fats and soap industry. - To understand the types and principles of pericyclic reactions, - electrolytic reaction, cycloaddition reaction, Diel -Alder reactions and photochemical [2+2] reactions. - To understand the FMO theory

	- To know the preparation of different types of dyes and understand the dying methods. - To learn witt's theory and Complementary colour theory. - To recall the botanical classification, Crude drug, isolation of the major components, Chemical structure and its determination, uses of those substances belonging to the group of alkaloid, terpenoid, steroid, their derivative and of their related compounds. - To explain relationship between the structure and functions of the enzymes. - To explain the various ways in which enzyme increases the rate of biological reaction and also how co-factors, prosthetic group and other aspects of the chemical environment affect enzyme activity.
CH-507 Physical Chemistry	- To decide what data are needed for uncertainty estimation. - To use de Broglie, wave equation to calculate the wavelength of a moving object. - To know how energy is quantized in blackbody. - To understand fundamentals of photochemistry and laws governing it such as Beer Lambert's law. - To determine how the change in Gibbs energy with temperature using Gibbs- Helmholtz equation. - To discuss the heat capacity and its various types and characteristic temperature of solids. - To know the concept and law of probabilities in statistical thermodynamics and concept and types of ensembles. - To expose the idea of electromagnetic waves and structure of transmission line. - To classify synthetic and biological polymer and amount for the concept of various molecular weight, know the preparation, properties and uses of some specific polymers like polyamide, polyster, PVC, synthetic rubber, polyalkene etc. - To know about conductance, types of conductance and variable with dilution and determination of transport number.
CH-508 P Inorganic and Physical Chemistry Practical	- To learn about the preparation of different inorganic complexes. - To know the process of estimation of two constituents from a binary mixture. - To perform a systematic semi-microqualitative analysis of the given inorganic mixture to detect the five radicals/ions containing at least one rear elements (V, Mo, W etc) excluding carbonate radicals present in it. - To find out the strength of the given strong acid solution by titrating it against strong base using pH meter.

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME
SEMESTER-VI

COURSE	OUTCOME After completion of the course, the students should be able
CH-608 Inorganic Chemistry	- To understand how crystal field theory explain the electronic structure and magnetic properties of metal complexes, identify molecular geometries associated with various d-orbital splitting pattern, factors influencing complex formation and stability constant. - To discuss the corelation between the electronic structure of a coordination complex and its magnetic properties, L-S, coupling and its application. - To know about the classification, structure, bonding and uses of different inorganic polymers like silicons, phosphazenes, triphosphazenes, zeolite and molecular sieves. - To discuss the principles and applications of thermogravimetry, differential thermal analysis and differential scanning calorimetry in soils, organic and inorganic compounds, analytic chemistry and factors affecting thermoanalytical technique. - To know the basic knowledge of organometallic compounds, 18 electron rule, bonding and structure of CO, NO and N_2 compounds. - To know the biological role of metal ion with special reference to haemoglobin and myoglobin. - To know about the structure, synthesis and properties of boronhydrides, diborane, Borazine, tetrasulphur, tetranitrides. - To understand the term lattice energy, use Born-Haber cycle to calculate lattice enthalpy and know the stoichiometric and non-stoichiometric defects and application.
CH-609 Organic Chemistry	- To explain the preparation and chemical reactions of sulphur containing organic compounds like thiol, Thioester, Sulphuric acid, Sulphanamides etc. - To compare between E_1 and E_2 reaction, Understand reaction and mechanism of various elimination and substitution reaction and factors affecting them.

	- To explain the acidity of alpha hydrogen of carbonyl Compounds. - To know what enolates are and to draw and assigned the configuration at the two possible enolates streoisomerism that can be formed from ethyl ketone. - To understand enamines are good nucleophile and good bases. - To identify the structure of various 5 and 6-membered Heterocycles and their derivatives. - To know the quantitative ideas about the synthesis, application and uses of heterocyclic compounds like pyrole, pyridine, quinoline etc. - To discuss the structure and synthesis of certain drugs and antibiotics. - To identify the various photochemical properties of drug molecules and their relationship with biological activity. - To explain the methods of chromatrographic seperation, application and uses of the different chromatographic technique in the isolation of active constituents from medicinal plants. - To monitor the use of instrument operation of gas chromatography. - To discuss the principles and instrumentation of different types of mass spectrometer. - To outline silent feature of fragmentation pattern of organic compound like 2-methylpentane, cyclohexanes. - To explain the principle of ^{1}HNMR spectrocopy, instrumentation, chemical shift, factors affecting them, signal integration, spin-spin coupling, coupling constant, and application of HNMR spectroscopy. - To assign peak in NMR spectrum to specify proton in a compound. - To discuss principles, instrumentation of electron spin resonance spectroscopy and its application. - To aware of fine structure of ESR absorption, hyperfine structure, double resonance in ESR and technique of ESR spectroscopy. - To explain the need and principles of green chemistry,, importance of green synthesis and green catalyst. - Explain microwave assisted reaction in organic solvent and Solvent free reaction, ultrasound assisted organic synthesis, Organic synthesis in aqueous phase and ionic liquid.

CH-610 Physical Chemistry	- To know about the fundamentals at computer application in chemistry and programming for the determination of molarity, normality and molarity of solution. - To know about the location of electron and electron distribution around the nucleus of atom as a consequence of solution of wave function ψ, from Schrodinger wave equation. - To calculate the bond length of a diatomic molecule from the value of rotational constant, Outline the selection rule for vibrational and rotational spectrum and rationalize the role of dipole moments in the selection rule. - To know about the product of symmetry operation with special reference to C_{2v} and C_{3v}. - To Recognize the different types of electrochemical cell. Use Nernst equation to calculate the cell potential/ or the concentration of a substance under non-standard condition. - To describe fully the relationship between free energy change, equilibrium constant, entropy, enthalpy of reaction and pH with cell potential. - To write down Debye – Huckel theory of electrolytic solution and derive Debye - Huckel - Onsager equation. - To identify the relationship between velocity distribution and temperature of a gas. - To know what are surfactants or surface active, agent. Know about the classification and formation of surfactants. - To learn about the theories of reaction rate, reaction mechanism and kinetics of complex reaction. - To learn about the phase equilibrium of two components system and solid solution.
CH-611P Organic and Physical Chemistry Practical	- To learn about the qualitative analysis of organic compounds which includes detection of elements, functional group and preparation of solid derivatives. - To know the preparation of organic compounds involving electrophilic substitution, diazotisation, oxidation, reduction reaction etc. - To study the change in conductance by titrating strong acid - strong base, weak acid - strong base and mixture of strong acid and weak acid - strong base.

DEPARTMENT OF ECONOMICS

NAMBOL L. SANOI COLLEGE, NAMBOL

PROGRAMME OUTCOME AND COURSE-SPECIFIC OUTCOMES

Objectives:

- To foster the student's intellectual development by encouraging the study of Economics.
- To enhance the student's critical and analytical skills in Econometrics and Economics.
- To motivate students to pursue higher studies and research and help them in all-round development.

Programme outcomes:

The programme offered insight to the study of Economics and emphasised its different aspects thereby developing the students' skills to prepare themselves to participate successfully in the global trend.

COURSE-SPECIFIC OUTCOMES:

B.A SEMESTER I

Course code:

Title of paper: Indian Economic Problem

After the completion of the course the students are able

- To understand the basic features of the economy of India and its natural resources.
- To recognise the various issues and interrelationship between economic development and population.
- To create an insight into the basic features of agricultural development in India.
- To familiarise the various problems and policies of the Indian Industrial sector including MSMEs
- To understand the concepts of planning and development and its related issues.

B.A. SEMESTER II

Course Code: ECO

Title of Paper- Microeconomics I

After the completion of the course, the students are able

- To understand the basic concepts of microeconomics.
- To recognise the ideas of the market and its various forms.
- To understand the concepts of Demand and its various theories.
- To develop an understanding of the Theory of Production and its applications.
- To familiarise the concepts of Perfect Competition and Monopoly and its equilibrium conditions.
- To develop an overall understanding of Price Discrimination.

ECONOMICS (SEM III)

Paper- Microeconomics II

After the completion of the course the students are able

- To understand the concepts of Demand and Supply in factor markets.
- To recognise the ideas of the General Equilibrium System.
- To understand the concepts of Social Welfare.
- To familiarise the concepts of Public Goods and Private Goods, Common Properties Resources, and Market Failure.
- To develop an understanding of the issues in Markets with Asymmetric Information, Moral Hazard.
- To develop an overall understanding of Microeconomics.

B.A SEMESTER IV

Course code:

Title of paper: Macro Economics

After the completion of the course, the students are able

- To familiarise the theories and concepts of income and employment.
- To get knowledge about the benefits of saving, and investment.
- To develop an overall understanding of the various theories of growth.

B.A SEMESTER V

Course code:

Title of paper: Public Finance

After the completion of the course, the students are able

- To understand the theoretical aspect of various Governmental activities and their rationality.
- To create an insight into the various concepts of budgeting, taxation and public expenditure.
- To understand in-depth knowledge about the Centre-State financial relations.

B.A SEMESTER V

Course code:

Title of paper: Political Economy of Development

After the completion of the course, the students are able

- To get knowledge about the genesis of economics and its modern scenario.
- To ensure the various aspects of the evolution of society.
- To understand the political-economic development of India in the pre and post-independence eras.

B.A SEMESTER IV

Course code:

Title of paper: Quantitative Methods of Economic Analysis

After the completion of the course, the students are able

- To get an idea about the importance of statistics and mathematics in Economics.
- To develop the mathematical approach in the analysis of economic problems.
- To understand the theoretical and empirical aspects of index numbers and its uses.

B.A SEMESTER IV

Course code:

Title of paper: Development Economics

After the completion of the course, the students are able

- To understand the concepts of Economic Growth and Development and its various approaches.
- To develop an understanding of the Strategies of Development, Balanced and Unbalanced Growth.
- To appraise the Policy initiatives taken for Economic Development.
- To comprehend the need for Deficit Financing and its limitations.
- To recognise the ideas of Technology Transfer and Trade Policy.
- To develop an overall understanding of Planning- its role and various types.

B.A. SEMESTER VI

Course code:

Title of Paper- Environmental Economics

COURSE OUTCOME:

After the completion of the course, the students are able

- To understand the concepts of Environmental and Natural Resource Economics and their origin.
- To develop an understanding of the interdependence between the Economy and the Environment.
- To develop an understanding of the issues relating to the Environment and its solutions and Climate Change.
- To appraise the concepts of Renewable and Non-Renewable Resource Extraction under different Market forms.
- To comprehend the need of Sustainable Development.

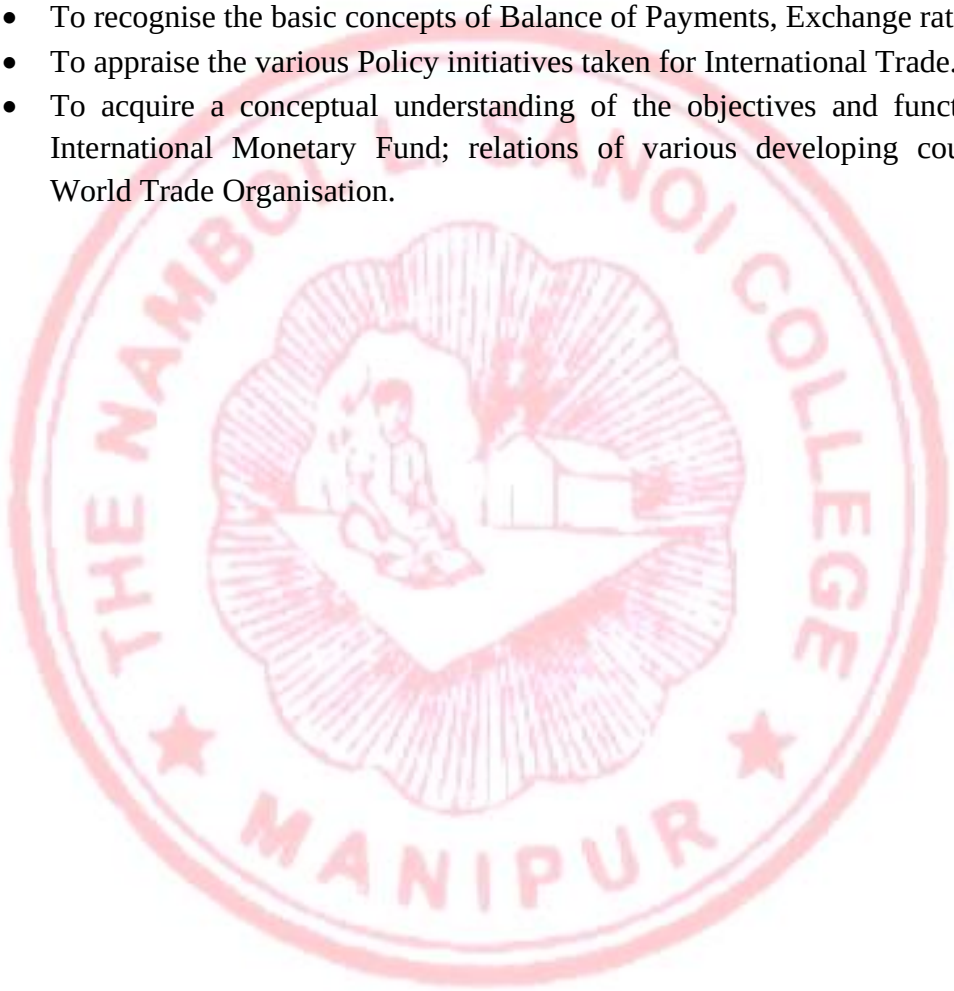
B.A. SEMESTER VI

Course code:

Title of Paper- International Economics

After the completion of the course, the students are able

- To understand the nature and significance of International Economics.
- To develop an understanding of the various theories of International Economics.
- To recognise the basic concepts of Balance of Payments, Exchange rate.
- To appraise the various Policy initiatives taken for International Trade.
- To acquire a conceptual understanding of the objectives and functions of the International Monetary Fund; relations of various developing countries with World Trade Organisation.



DEPARTMENT OF EDUCATION

Nambol L. Sanoi College, Nambol

PROGRAMME OUTCOME AND COURSE-SPECIFIC OUTCOMES.

Objectives: -

- To foster the student's intellectual development by encouraging the study of education.
- To enhance the student's critical and analytical skills in education.
- To motivate the students to pursue higher studies and research and help them in all-around development.

Programme outcomes:

The program offered insight into the study of Education. It emphasized the different aspects of educational studies, thereby developing the students' skills to prepare themselves to participate successfully in the global trend.

COURSE-SPECIFIC OUTCOMES:

B.A. Semester – I

(Course Code)

Title of Paper: Philosophical and Sociological Foundation of Education.

After the completion of the course, the students are able

- To understand the concepts and nature of the following important scope of the philosophical and sociological foundation of education.
- To recognize the important roles of philosophy in education.
- Have full knowledge of freedom and discipline in social life.
- To understand the concepts of sociological approach in education and social change.
- To acquire the basic concepts of a social group, culture and social problems.

B.A. Semester – II

Title of paper: Educational Psychology and Pedagogy

After the end of the course, the students are able.

- To understand the basic concepts of educational psychology and pedagogy.
- To acquire the basic meaning and nature of the personality.
- To recognize different theories of learning and develop knowledge of how to develop learning.
- To familiarize the basic characteristic of a good teacher and micro and macro teaching.

B.A. Semester-III

Title of paper: - Development of education in India

After the completion of the course, the students are able.

- To familiarize the basic concepts of education in ancient Indian Vedic Education.
- To get full knowledge about Education in Medieval India's Islamic Education system.
- To understand the whole education in British India and different education commissions.
- To understand Education in British India and the different recommendations of the Education Commission.
- To recognize the development of Education in Manipur.

B.A. Semester – IV

Course Code –EDN

Title of paper: Issues and Trends in Contemporary Indian Education.

After the completion of one course, the students are able.

- To understand the basic concepts of elementary education.
- To acquire full comprehensive knowledge and functions of DIETS, NCERT, SCERT, OBB, DPEP and SSA.
- To recognize the basic concepts of Secondary Education and the role of NCERT, SCERT, NUEPA, CBSE, Board of Secondary Education and Council of Higher Secondary Education, Manipur.
- To get full knowledge about Alternative Schooling and National Literacy Mission.
- To recognize the basic idea of the post-literacy campaign and Janashiksha Nilayam.
- To recognize complete knowledge Continuing Education System.
- To comprehend a complete knowledge of Population Education Value Education and Work Experiences.

B.A. Semester – V

Paper-V

Title of the paper: Education Evaluation and Statistics in Education.

After the successful completion of the course, students would be able to learn.

- To understand the basic concepts and scope of Educational measurement and evaluation.
- To recognize complete knowledge of different types of evaluation and Formative and Summative evaluation.
- To get a complete knowledge of the importance of Measuring instruments and their classifications.
- To get an idea about the basic concepts of different types of data and bivariate distribution.

B.A. SEMESTER - V

Paper-VI

Educational Management and Education Technology.

After the successful completion of the course students will be able to learn:

- To recognize the important idea of types of Educational Management, Centralized and decentralized.
- To get full knowledge about the importance of the financial management and managerial behaviour plan and non-plan expenditure.
- To comprehend the basic concept and meaning, need and significance of Educational planning.
- To understand about concepts and scope of Educational technology and communication process.
- To develop the main system approach to instruction and physical and human resources steps.

B.A. Semester – V

Paper-VII

Educational guidance and curriculum construction

After the completion of the course, students are able.

- To understand the basic concepts and scope of Educational guidance.
- To recognize vocational guidance and work education.
- To get full ideas of the meaning and scope of counselling.
- To acquire basic concepts and the nature of curriculum construction.
- To recognize curriculum development and its process.

B.A. Semester – VI

Paper-VIII

Educational Thought and Practices.

After the successful completion of the course the students will be able to learn the following:

- To understand team Jean Jacques Rosseau's their educational ideas and contribution to the field of Education.
- To recognize John Deway's his philosophy, aims of education & importance of democracy and contributions to Education.
- To develop Rabindranath Tagore's philosophy of education and the teacher-student relationship.
- To acquire Swami Vivekananda's views on educational philosophy and views about the curriculum.
- Mahatma Gandhi's views on the philosophy of Education.

B.A. Semester – VI

Paper – IX

Child psychology

After the completion of the course, students are able

- To understand the basic concepts nature and scope of Child Psychology.
- To recognize the basic concept of the General nature of Growth and development during the pre-natal, post-natal, and neo-natal stages.
- To develop about development up to Pre-Adolescence and social development.
- To get the Development of understanding and intelligence and their Educational Implications.
- To familiarize the development of self and personality and problems with social adjustment.

B.A. Semester –VI

(Paper -10 Practical)

Experimental Educational and Statistics

After completion of this course, students are able

- To understand full knowledge of experimental work and test administration.
- To recognize the basic concepts for mirror learning, part and whole learning.
- To develop full knowledge of how to conduct the difference test of experiments and preparation of an achievement test.
- To get/ analysis about test construction and standardization.
    - To develop their personality and performance with viva-voce.

DEPARMENT OF ENGLISH
NAMBOL L. SANOI COLLEGE,NAMBOL

Programme outcome and course specific outcomes

Objectives:

- To foster the students' intellectual,personal and professional development by encouraging the studying of English language and literature.
- To enhance students' critical ,creative and analytical skills and proficiency in English language by developing their linguistic competence .
- To motivate students to pursue higher studies and research and keep them in all-round development .
- To ensure high standard of behaviour attitude through literary subjects to shape the students socially responsible citizens.

Programme outcomes:

The programme offered a unique access to to the study of english language and literature .Made aware of the different cultural aspects of the world and phenology of English thereby developed students's communication skills to prepare themselves to successfully participate in the Global trend .

COURSE SPECIFIC OUTCOMES:

B.A SEMESTER I
Course Code: GENERAL ENGLISH :GEN:FC-101
Title of Paper: A Language component

Unit 1: Grammar
Unit 2:Unseen Part
Unit 3:Short Stories

After completion of the course ,the students are able :

- to understand the rules/forms of English grammar .
- toimprove the use of correct english in writing.

- understand the technical aspects of writing English Language.

B.A. SEMESTER I
Course Code:ELECTIVE ENGLISH:E1-101
Title of Paper :English Literature:History,Poetry and Drama (Old English-the 19th Century)

Unit 1-History of English Literature :A Survey of the Major Periods from (Old Engish-the 19th Century)
Unit 2-Poetry Section
Unit 3:Drama Section

After completion of the course ,the students are able

- to survey the major aspects of the periods from old english to the 19th Century poetry.
- to enhance the knowledge of the themes ,styles,techniques of 5the poets of different periods .
- to recognise and appreciate the themes and style of plays of William Shakespeare and Christopher Marlowe of the Elizabethan period.

B.A. SEMESTER II
Course Code: GENERAL ENGLISH GEN:FC-101
Title of Paper:Drama (Merchant Of Venice), Poetry

Unit 1:Drama-Merchant Of Venice
Unit 2:Poetry

After completion of the course ,the students are able :

- to appreciate the thematic messages/expressions of

Shakespeare .

- to create an insight into the scenario of literary advancement of the 16th century play written by the dramatist
- to recognise the literary qualities in terms of thmes ,styles and techniques and Shakespeare's imaginative expressions.

B.A. SEMESTER II
Cours Code:ELECTIVE ENGLISH:E2-202
Title of Paper: British Fiction

Unit 1:Lectures on Trends in British Fiction-Age-wise
Unit 2- Henry Fielding:*Joseph Andrew*
Jan Austen:Sense and Sensibility
George Eliot:Silas *Marner*
Charlotte Bronte:*Jane Eyre*
Charles Dickens:*A Tale of Two Cities*
Thomas Hardy:*Far from the madding Crowd*

After completion of the course ,the students are able :

- to appreciate the varried themes of Shakespeare .
- to create an insight into the scenario o literary advancement .
- to recognise the literary qualities in terms of thmes ,styles and techniques and imaginative expressions.
- to recognise the trends of British Fiction age-wise.
- to appreciate great classics and it relevance.

B.A. SEMESTER III
Course Code:ELECTIVE ENGLISH:E3-303
Title of Course:Western Criticism:

Unit 1:

1. Aristotle's Poetics.
2. Tragedy and Comedy
3. Classicism and Romanticism.
4. Samuel Johnson:*Preface to the plays of Shakespeare*
5. William Wordsworth:Preface to Lyrical Ballads
6. S.T. Coleridge:*Biographic Literial (Books:Xii-111)*
7. Mattew Arnold:*The Study of Poetry*
8. T.S. Elliot:*The Function of Criticism*
9. D.H. Lawrence:*Why the Novel Matters*

Unit 2:Practical Criticism

After completion of the course ,the students are able :

- to understand the different ways of evaluation of literature.
- understand major critical theories in literature .
- identify literary criticism aand its functions.
- to enhance the knowledge of the 20th Century criticism with new standardrs and techniques of criticism i.e practical criticism.

B.A. SEMESTER IV
Course Code: ELECTIVE ENGLISH: E1-404
Title of Paper:Linguistics and English Language

Unit 1:Linguistics
Unit 2:English Language

After completion of the course ,the students are able :

- understand in-depth knowledge of selected areas of linguistics .
- understand what is phonetics,phonology,morphology.
- apply linguistic knowledge and skills in other work contexts

such as language teaching,language consultancy or translation .

- understand human language and animal communication.
- know the use of English Language.
- apply their gained knowledge of linguistics in other academic contexts .

Linguistics and english Language

i. Nature of study:Phonetics,Phonology,Morphology.
ii. Scope and branches of of linguistics
iii. Human language and animal language
iv. Origin of history of English Language
v. Changes and influences (Greek,Latin,French etc.)

B.A. SEMESTER V
ENGLISH HONOURS
(Poetry,drama and fiction)

Unit 1:EnH-505: 20th CENTURY BRITISH LITERATURE
Unit 2:EnH-506:INDIAN WRITING IN ENGLISH
Unit 3:EnH-507:LITERARY THEORY

1:EnH-505: 20th CENTURY BRITISH LITERATURE

After completion of the course,the students are abe to:

- to survey the basic trends of English Poetry in the 20th Century British English Literature.
- to enhance the knowledge of the themes,styles and techniques of the poets.
- to appreciate the thematic expresions of the poets.
- to recognise the fictional arts of Virginia Woolf and George

Orwell

- to appreciate the dramatic techniques,styles of GB Shaw,John Galsworthy and Harold Pinter.
- to survey the art of characterisation and plot construction of the dramatists.

EnH-506:INDIAN WRITING IN ENGLISH

After the completion of the course,the students are able:

- to survey the characteristics of Indian Writing in English.
- to recognise the styles,techniques and arts of major Indian English poets.
- to appreciate the themes of Indian English Poetry .
- to understand the fictional arts and techniques of Mulk Raj Anand ,Arun Joshi and Geeta Hariharan.
- to recognise and appreciate the dramatic techniques and thematic patterns in the writings of Girish Karnard and Mahesh Dattani.

EnH-507:LITERARY THEORY

After the completion of the course,the students are able:

- to survey different literary theories
- to understand basic concepts of linguistics.
- to recognise the nature of linguistics.
- to understand the basics of structuralism and Post-Structuralism.
- to understand the ideas of Post-modernism,Post-Colonialism and Post-Modernism,Post-Colonialism and Feminism in detail.

- to analyse and appreciate Marxism and marxist literary criticism.

B.A. SEMESTER VI
ENGLISH HONOURS
POETRY SECTION AND SHORT STORIES

Unit 1:NORTH EAST LITERATURE :EnH-608
Unit 2:COMMONWEALTH AMERICAN LITERATURE:EnH-609
Unit 3:EUROPEAN LITERATURE IN TRANSLATION:EnH-610

EnH-608NORTH EAST LITERATURE

After completion of the course ,the students are able :

- to understand the nature,fabric and approaches of North - east literature,the north-east poetry in particulars.
- to create an insight into the scenario of literary advancement in the north-east .
- to motivate themselves for further learning .
- to recognise and appreciate different forms of literature of the region.

EnH-609-COMMONWEALTH AND AMERICAN LITERATURE (POETRY AND FICTION)

After completion of the course ,the students are able :

- to understand the concept /characteristics of Commonwealth Literature.
- o examine the theme ,style and pattern of development of Commonwealth literature an American beliefs and traditions in their literature through its themes and styles .
- to motivate themselves for further learning.

ENH-610:EUROPEAN LITERATURE IN TRANSLATION (POETRY SECTION/FICTION/SHORT STORIES AND DRAMA)

After completion of the course ,the students are able :

- to understand/recognise the Greek epic poem concentrating on a single volume in English translation.
- to appreciate the naturalistic style of writing in Guy de Maupassant's poems,its themes and techniques.
- to understand the nature of writing of Russian playwright and short story writer,Anton Chekov.
- to understand the great classics and their relevance.
- to understand the essence of ancient Greek tragedy
- to understand the events that depicted in the Thebn civil war.

English Language Lab:

The Department established a language Lab comprising about components and segments .Classes are conducted in batches and the course duration is of 60 hours followed by tests to grade the students' performance .

After completion of the course ,the students are able :

- to improve communication skills and their overall personality.
- to enhance motivation for further learning of communicative English.
- to understand the origin and history of English language,its changes and influences.

DEPARTMENT OF GEOGRAPHY

NAMBOL L. SANOI COLLEGE, NAMBOL.

BA/BSc Geography, Manipur University

PROGRAMME OUTCOME

OBJECTIVES:

• To foster students' intellectual development by encouraging the study of Geography.

• To improve critical and analytical skills and proficiency in Geography by developing their geographic competence.

• To inspire the students to pursue higher studies and research and help them in their all-round development.

• To ensure a high standard of moral and spiritual attitude to shape the students' socially responsible citizens.

SPECIFIC OUTCOME:

The course offers a unique course to the study of Geography. It makes aware of the different aspects of geographical studies and theory thereby developing the student's full participation in the global trend and also to face global changes.

COURSE OUTCOME

First Year (1st Semester)

Introduction to Geography (Theory)

GG: E101 – 100 marks.

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

• understand the basic concept of this subject.

• know the basic knowledge of the scope, meaning and subject matter of this discipline.

• recognize the importance of the study of Geography and its significance as a unique discipline.

• comprehend fully the contributions made by many scholars since the ancient Greeks to the present-day world in the development of this discipline.

• understand the basic concept of environment, changing relationship between man and environment and the wanton exploitation of the environment by man.

• recognize the dualism and dichotomies between systematic and regional, physical and human and also the different branches of Geography.

- grasp the idea that Geography is the study of human ecology, the surrounding elements inside which man thrive and survive and also the relationship between different organized phenomenon and their planning for uniform and equal development.
- Know the quantification techniques in the study of Geography, application of remote sensing, GIS and field work in planning and development of a region and different types of surveys.

First Year (2nd Semester)

Physical Geography (Theory)

GG: E202 -- 100 marks.

After the completion of this course students are able to

- Comprehend the full knowledge about the formation of the universe as well as the solar system, rock formations and classifications, forces behind the formation of major landforms and landscaping processes through weathering and erosion, man induced landscape modification, changing pattern of lakes and islands and its implications on human habitation.
- Understand the complete dynamics and composition of the atmosphere; its relation to weather and climate, human intervention to the heat balance of the atmosphere and about global warming. Again, they are also able to understand global pressure system and resultant air movements cyclone and anti-cyclone dynamics, influence of climate on vegetation and shifting boundaries of the vegetation zones.
- Understand the complete knowledge about the ocean and its different features with special emphasis on the changing level of ocean water and its implication on human habitation and marine life. Again, they have understood human intervention on the ecosystem and its implications on plant, animal and the food chain.

Second Year (3rd Semester)

Human Geography (Theory)

GG : E303 (i) - 50 marks.

After the completion of this course students will be able to

- understand the meaning, scope, subject matter, different branches and their relationship with each other. They have also got the complete idea of the impact and influences of natural environment on the primitive lifestyle of man and it's subsequent migration.
- recognize different races and their world classifications, human adaptation on different natural environments, natural hazards, causes, impacts and human intervention in it, etc.
- familiarize themselves with the role of man in economic activities in a given environment both in primitive and modern societies; shifting cultivation in the N.E India, it's impact on economy and environment and it's remedial measures.

Second Year (3rd Semester)

Cartography (Practical)

GG: E303 (ii) P – 50 marks.

Practicals are done along with the theory classes so that the students have practical knowledge about the subject. From this course they will be able to

- familiarize themselves with the different types of scale and their uses in geographical studies. The students are also able to identify different types of rocks, minerals and crops, both fibrous and non- fibrous.
- grasp the idea of representation of landforms by means, hachures, shading, contour, layer tint, etc.
- understand drawing of profiles of different landforms and their relevance in landform mapping and analysis.
- familiarize with use of line and bar graphs to represent climatic data, Climograph, hythergraph, etc.
- familiarized with the use of different meteorological instruments and interpretation of Indian Daily Weather Map.

Second Year (4th Semester)

Population Settlement Geography (Theory)

GG: E404 (i) – 50 marks.

After the completion of this course, the students are able to

- understand the nature and scope of population geography; the trend of world population growth and its impact on the global economy; different population compositions and their uses in the planning strategy of a country; the impact of migration both internal and international in the population structure, economy and planning in a region; population problems and policies adopted by Indian Government.
- understand the meaning, scope and nature of settlement geography, the evolution of settlement and their spatial distribution and associated factors, the changing faces of rural and urban settlement and co-related factors, etc.
- understand types, patterns and distribution of rural settlement in India, increasing urbanization and its impact on the world economy and environment; functional classification of town for efficient administration and planning, etc.

Second Year (4th Semester)

Cartography- II (Practical)

GG : E404 (ii) P – 50 marks

From this course, students will be able to

- understand the different cartographic techniques and their uses while representing various geographical values and items, uses of line and bar graphs to represent the population, agriculture, industry and transport data.
- grasp the idea of quantification of various socio-economic data through different statistical methods such as Mean, Median, Mode, Standard Deviation, Correlation coefficient, etc.
- comprehend better and more complex cartographical techniques to represent the population, land-use pattern, industries and transport data, interpretation survey of India topo-sheet regarding relief, drainage, settlement, communication, land-use, etc.

Third Year (5th Semester)

Paper- I Geomorphology (Theory)

GG: H505 – 100 marks.

After the study of this course, the students are able to

- comprehend the meaning, nature, scope and different concepts of Geomorphology; the importance of its study in the fast-changing landscape both by man and nature; the relationship of geomorphology with other branches of study and the geological time scale.
- understand the different theories and hypotheses regarding the configuration of oceans and continents in the past, present and future.
- understood different earth movements which produce folds and faults, earthquakes, volcanoes, etc. They are also able to understand the types of mountains and the problems of Isostasy.
- understand the different aspects of rocks and minerals, the importance of rocks to soil, relief and mankind.
- explain different geomorphic processes for the transformation of the landscape, the concept of the cycle of erosion and its resultant landscape.
- acquaint with the application of geomorphic knowledge in human settlement, transport, land use, mining, resource evaluation and assessment.

Third Year (5th Semester)

Paper- II Geography of India (Theory)

GG: H506 – 100 marks.

After successful completion of the course students are able to

- conceptualize the idea of the predominance of India among the South and South-Asian countries since prehistoric times, unity in diversity, both physically and culturally and different aspects of the physical geography of this country.
- grasp the idea of agricultural development and planning, mineral and power resources and their need for conservation and the factors for the distribution and localization of different types of industries in India.
- acquire comprehensive knowledge about the importance of transport and communication in the development of trade and commerce in India, understanding of macro, meso and micro-regions and their ultimate planning for overall development.
- get the complete geographical knowledge of North East India, problems of backwardness and hints for development through proper planning and execution.
- get complete geographical knowledge of their mother state, problems and prospects and strategy for overall development.

Third Year (5th Semester)

Paper III – Cartography – III (Practical)

GG : H507P – 100 marks.

After the completion of this course, students are able to

- understand the whole ideas of maps and diagrams to represent the profile, frequency, shape and density of drainage; understanding the internal structure of the Earth through interpretation of geological maps, etc.
- understand the basic principle of surveying through chain and tape, prismatic compass, plane table, etc. which type is best suited for what type of landscape, etc.
- understand the entire concept of map projection, choosing of map projection, classification, properties and uses.

Third Year (6th Semester)

Paper I – Economic Geography (Theory)

GG : H608 – 100 marks.

From this course, students are able to

- conceptualize the nature, scope and changing trends of this subject, its relation with other disciplines, and different sectors of economy evolved. At the same time, the man tries to thrive viz. primary, secondary, tertiary, quaternary and its allied activities.
- understanding of the impact and implications of natural resources and the need for conserving it, application of science and technology in agriculture, the role of excellent entrepreneurship in industrial development, etc.
- explain the role transport plays in the overall development of a country, the choice of mode of transport for a particular type of goods or services, conflicts for control of world trade by the world's big economic and political powers and the role of the World Trade Organization (WTO).
- comprehend the causes of increasing quaternary activities such as education, health, tourism, entertainment, information technology, etc. causes of disparity between developed and developing countries and the impact of globalization.

Third Year (6th Semester)

Paper II – World Regional Geography (Theory)

GG : H609 – 100 marks.

After studying this course, students are able to

- get complete geographical knowledge of Asia, the rise of superpowers like India and China, conflicts between the SAARC countries and the role of ASEAN nations in the economic and political arena of the world.
- know the role of EU nations in world trade, the BREXIT plan of the United Kingdom and the physical, economic and demographic characteristics of this continent.
- know about the geographical aspects of these two continents especially the USA and Brazil, the rise of the USA in world trade, economy and politics and the role of resource-rich countries in world affairs with special reference to the USA.

- comprehend the full knowledge of exploration and discoveries by the Europeans in the Far East, Australia and the Pacific Island, the life of native peoples and the demographic and economic set up of these regions.
- knowledge of this most undeveloped continent in respect of political crisis, racial conflicts, insurgency, military uprisings, frequent change of rulers, etc. They have also understood the diversity of the people, rich natural resources and causes of less development.

Third Year (6th Semester)

Paper III - Cartography – IV (Practical)

GG : H610P – 100 marks.

From this course, students are able to

- know the importance of Dumpy level and Theodolite in engineering and surveying purposes, job opportunities by a student of surveying in the department of survey and allied fields.
- identify, prepare and interpret aerial photographs and satellite imagery, their application in drainage management and land use, knowledge of Geographic Information System (GIS) and Global Positioning System (GPS) and their application in the development and planning of a region.
- conduct a socio-economic survey of a region, prepare the report of the surveyed area, recommendations for future courses of action to be taken up by relevant authorities, etc. They have also gained knowledge of using aerial photographs and satellite imagery in their surveys.

RECORD BOOK:

7 marks

They have understood the importance of nature and tidiness in the geographic drawings and preparation.

VIVA VOCE:

8 marks

From this part of the study, the students will acquire the different techniques of facing interviews, overall personality development and the importance of having full Knowledge in the field.

DEPARMENT OF HISTORY

NAMBOL L. SANOI COLLEGE, NAMBOL

PROGRAMME SPECIFIC OUTCOMES

On completion of the BA with History, students will be able to...

1. Develop interests in the study of history and activities relating to history.
2. Understand the basic themes, concepts, chronology and the Scope of Indian History.
3. Acquaint with the social, economic, historical, geographical, political, ideological and philosophical tradition and thinking.
4. Think and argue historically and critically in writing and discussion.
5. Empower the graduates to appear for various competitive examinations or pursue higher education in the field of History.

COURSE SPECIFIC OUTCOMES:

B.A SEMESTER I
Course Code: HIS-101

Title of Paper: HISTORY OF ANCIENT INDIA FROM EARLY PERIOD TO 6TH CENTURY BC After successful completion of the course, students will be able to	
Unit-I Sources of Ancient Indian History Unit-II Archaeology- Its Definition, Methods and Prehistory Unit-III Harappan Culture Unit-IV Vedic Civilization – Early and Later Vedic Unit-V Indian religious movements in 6th century B.C.	✓ Perceive various sources to study of Ancient India. ✓ Know about the development and the achievements of man in the Stone Age. ✓ Understand the glory of Indian history in the age of Harappan civilization. ✓ Comprehend the history of Vedic period. ✓ Understand the philosophy of Jainism and Buddhism. ✓ Perceive influence of political support on religion.

B.A SEMESTER II
Course Code: HIS-202

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF DELHI SULTANATE (1200-1556)**	✓ Explain Sources of Medieval Indian History. ✓ Understand Arab invasion of Sind, Campaigns of Mahmud of Ghazni and Ghori. ✓ Describing Establishment and Territorial consolidation of the Delhi Sultanate. ✓ Know the Socio-economic and religious life in Delhi Sultanate. ✓ Discrimination Vijayanagar Empire and Bahmani Sultans Administration under the Sultanate - civil, judicial, revenue, fiscal and military. ✓ Generalising Sufi Movement , Bhakti Cult, Sikh Movement System of Education, Fine Arts and Literary Developments ,Indo-Persian and Indo-Turkish architecture

B.A SEMESTER III
Course Code: HIS-303

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF MODERN INDIA (1600-1857)**	✓ Acquaint himself with significant events leading to establishment of the rule of various European powers in India. ✓ Know the colonial policy adopted by the English East India Company to consolidate its rule in India. ✓ Understand the structural changes initiated by colonial rule in Indian economy. ✓ Explain the various revolts against rule of the East India Company including the Sepoy Mutiny of 1857.

B.A SEMESTER IV
Course Code: HIS-401

After successful completion of the course, students will be able to	
Title of Paper: HISTORY OF MODERN EUROPE (1789 -1945)	✓ Acquire knowledge how to rise renaissance in Europe after downfall of feudal Society in Europe and also learn how the European Society transformed from Feudalism to Capitalism. ✓ Describe French Revolution, Era of Napoleon ✓ Describe Unification of Italy, Unification of Germany ✓ Comprehend First World War, Treaty of Versailles, Russian Revolution ✓ Understand the Rise of Nazism, Fascism and the outbreak of the Second World War.

B.A SEMESTER V
Course Code: HIS-501

After successful completion of the course, students will be able to	
Title of Paper: HISTORY OF ANCIENT INDIA FROM THE 6™ CENTURY B.C. TO 12 CENTURY AD	✓ Familiarize with theories of state and types of governments of ancient India. ✓ Grasp the idea of contemporaries of Indian rulers and the corresponding Empires. ✓ Understand Asoka's Dhamma and his inscriptions Mauryan administration, Art and Architecture ✓ Explain Changes in political organisation of empire during the Post Mauryan period. ✓ Understand Arab invasion of Sind, Campaigns of Mahmud of Ghazni and Ghori.

B.A SEMESTER V
Course Code: HIS-502

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF MUGHAL INDIA (1526 AD – 1707 AD)**	✓ Describe Foundation of the Mughal empire by Babur Conquest and the Afghan despotism of Sher Shah ✓ Know Economic prosperity and cultural splendor under Mughals. ✓ Describe the Establishment and Territorial consolidation of the Mughal Empire. ✓ Acquaint the political set up and relationships established by the Mughals with the rest of its contemporaries in India. ✓ Comprehend the factors that led to the downfall of the Mughal Empire.

B.A SEMESTER V
Course Code: HIS-503

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF INDIAN NATIONAL MOVEMENT (1885 – 1947)**	✓ Understand the events which lead to the growth of nationalism in India. ✓ Acquaint themselves with major events of the freedom struggle under the leadership of Mahatma Gandhi. ✓ Explain the contribution of Revolutionaries, Left Movement and Indian National Army. ✓ Know the concept of Communalism and the causes and effects of the partition of India.

B.A SEMESTER VI
Course Code: HIS-601

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF MANIPUR FROM 33 AD TO 1891**	✓ Acquaint with various literary sources in understanding the History of Manipur. ✓ Explore and appreciate the prehistoric sites of Manipur. ✓ Understand the genesis of the rise of Salais and State formation of the Meiteis. ✓ Comprehend the Sanskritisation process in Manipur. ✓ Acquaint themselves with the Liberation of Manipur after the Seven years Devastation by Maharaja Gambhir Singh and onset of British colonial rule in 1891 subsequently.

B.A SEMESTER VI
Course Code: HIS-602

After successful completion of the course, students will be able to	
Title of Paper: **SOUTH-EAST ASIA, 1800- 1945**	✓ Familiarise with the South East Asian countries. ✓ Explain the European interests and patterns of settlements in South East Asia. ✓ Analyse the relations between colonialists and South East Asian countries. ✓ Understand the growth of political movements and subsequent nationalism in SE Asia.

B.A SEMESTER VI
Course Code: HIS-603

After successful completion of the course, students will be able to	
Title of Paper: **HISTORY OF AMERICA/USA 1776-1945**	✓ Learn political changes and agrarian transformation in the USA between 1776 and 1945. ✓ Acquaint with the history of growth of capitalism, business cycles and Depression. ✓ Know about the nature of resistance and reform with reference to labour movements and unionization in the USA during this period. ✓ Acquaint with religious, cultural and intellectual trends of the USA during this period. ✓ Learn the character of US imperialism with reference to US involvement in the First and Second

DEPARTMENT OF MANIPURI

Nambol L. Sanoi college, Nambol

PROGRAMME OUTCOME AND COURSE SPECIFIC OUTCOMES

OBJECTIVES:

. To foster the students' intellectual personal and professional development by encouraging the studying of Manipuri language and literature.

. To enhance students' critical creative and analytical skills and proficiency in the Manipurikhak language by developing their linguistic competence.

. To motivate students to pursue higher studies and research and keep them in all-around development.

. To ensure a high standard of behaviour attitude through literary subjects to shape the students' socially responsible citizens.

PROGRAMME OUTCOME:

The programme offered unique access to the study of the Manipuri language and literature. Made aware of cultural aspects of Manipuri.

COURSE SPECIFIC OUTCOME

Course code: B A
Semester: M I L Manipuri 101
Title of the paper: poetry, prose, and Grammar

Unit I: poetry.

Unit II: Prose

Unit III: Grammar

Phonology, morphology and syntax.

After the completion of the course the students are able:

- To enhance the knowledge of the themes and styles techniques of different Manipuri poets.
- To understand the philosophical thought of different Manipuri prose writers.
- To understand the rules of Manipuri grammar.

B. A. Semester I
Course code: MSL- 101
Title of the paper: poetry and Sabdha Alangkar

Unit:1 Manipuri poetry

Unit:2 Manipuri kabitagi sandha

Unit:3 Alangkar

After the completion of the course the students will be able:

- **To** survey the basic trends of Manipuri poetry and to know different styles techniques for different Manipuri poems.
- **To Understand** the basic knowledge of Manipuri poetry sandha.
- **To** recognize Alangkar in literature and to understand the difference between literary language and ordinary language.

B. A. Semester: II
Course code: MIL (202)
Titles of the paper: Drama novel and short story.

Unit: I Drama.

Unit: II Novel.

Unit III Short story

Unit iv translation literature.

After the collection of the course the students are able:

- To recognize the literary qualities in terms of themes, Styles, and techniques of Manipuri writer G C Tongbra.
- To recognize the literary qualities in terms of themes, styles and techniques of Manipuri novelist Hijam Guna.

- To understand the themes styles and techniques of different Manipuri story writers.

B.A. II Semester
Course code: MSL-202
Titles of the paper: Novel and short story

Unit-I novel

Unit-I short story

After the completion of the course, the students are able:

- **To** recognize Manipuri novelists Chaoba, Angahal and Pacha Meitei and to understand their themes, styles and techniques in the novel.
- **To** understand different story writers for Manipuri literature and to know their themes styles and techniques of short stories.

B. A semester III.
Course code: 303
Titles of the paper: Introduction to linguistic and Manipuri language.

Unit-I Language

Unit-II Linguistic

Unit- III phonology

Unit IV morphology

Unit V Manipuri linguistic

After the completion of the course student are able:

- Understand the key concepts of language and linguistic.
- Understand in-depth knowledge of selected areas of linguistics.
- Understand what is phonetics, phonology, morphology, and syntax.
- Apply linguistic knowledge and skills in other work contexts.

- Understand the human language and animal communication.
- Know the use of the Manipuri language.
- Understand the grammatical structure of the Manipuri language.

B A Semester-IV
Course code- MSL 404
Title of the paper- Literary criticism

Unit I Indian criticism

Unit II Western criticism

After the completion of the course the students are able:

- To understand the different ways of evaluating literature.
- Understand different opinions of literary criticism from Indian scholars
- To enhance the knowledge of Aristotle's politics
- Identify literary criticism and its functions.

B.A. Semester V
Manipuri Honours-505
Title of the paper- Kavya and Drama

After the completion of the course the students are able:

- To understand the work of Angahal in Manipuri literature.
- To understand the Manipuri epic Khamba Thoibi.
- To understand Khongjom tirtha is a khandakabya for Nikbir Sastri.
- To recognize and appreciate the themes and styles of plays of Arambam Samarendra and Haobam Tomba.

B.A. Semester V
MNH- 506
Title of the paper: Indian translation literature

After the completion of the course the students are able:

- To understand the role of translation and to give knowledge of different social systems of different communities of India.
- To recognize Bengali writer Sharatchandra Chadhyopaday and Hindi writer Mohon rakes and their places in Indian literature.
- To give knowledge about different regional language literature.
- To give knowledge translation from source language to target language.

B.A. Semester V
MNH- 507
Title of the paper: History of Manipuri literature.

After the completion of the course the students are able:

- To give knowledge about the origin and development of the Manipuri language.
- To recognise major literary periods for Manipuri literature i.e old Manipuri literature, medieval Manipuri literature and modern Manipuri literature.
- To understand Themes, styles and techniques of different periods for Manipuri literature.

B.A. Semester VI
MNH- 608
Title of the paper: Old Manipuri literature

After the completion of the course the students are able:

- To understand different topics about old Manipuri literature.
- To recognize “Numit Kappa” as old literature and understand the social system of the early period.

- To understand “Chothe thangwai Pakhangba “as a romantic theme for medieval Manipuri literature.
- To understand Chandrakiti jila changba as a travelogue in the medieval period.

B.A. Semester VI
MNH- 609
Title of the paper: Manipuri culture

After the completion of the course the students are able:

- To understand the geographical location of early Manipur.
- To enhance the knowledge of the early Manipuri administration system. Occupation and transport and communication system.
- To recognize pre–Hindu Manipuri faith and beliefs and cultural synchronized in Manipuri culture.
- To understand the 18th and 19th-century social system of Manipur.
- To understand indigenous games of Manipur like ka ng yubi lakpi sagol kangjei (polo) etc.

B.A. Semester VI
MNH- 610
Title of the paper: Folkloristic and Folklore.

After the completion of the course the students are able:

- To understand folk lore scope and function.
- To recognised different theory about folk lore.
- To get knowledge about field work for data collection for folk lore research.
- To understand Manipuri myth, legend, folktale, folksong proverb and riddle.
- To get knowledge about the role of folk literature to Manipuri society and folklore is a method of informal education to early Manipuri society. Before getting western education system in Manipur folk lore is a kind education system.

THE NAMBOL L. SANOI COLLEGE
MANIPUR

DEPARTMENT OF MATHEMATICS

NAMBOL L. SANOI COLLEGE, NAMBOL

PROGRAMME OUTCOME AND COURSE SPECIFIC OUTCOME

Objectives:

- To motivate the students' intellectual personal and professional development by encouraging the studying of mathematics.
- To enhance students' critical, creative and analytical skills and proficiency in Mathematics.
- To motivate students to pursue higher studies and research.

Programme outcomes:

The Programme offers a unique access to the study of Mathematics. Made aware of different aspects in higher & technical studies and scientific research.

COURSE-SPECIFIC OUTCOMES:

B.A./B.Sc. SEMESTER I

Course Code: Mathematics MM: 101

Tittle of the paper: Algebra I

Unit I : Inequalities & Theory of equations

Unit II : Convergence of series

Unit III : Abstract Algebra

Unit IV : Matrices

Unit V : Trigonometry

After completion of the course the students are able

- To understand the mathematical symbols and rules for manipulating the symbols in formulas such as arithmetic mean, geometric mean and related inequalities, theory of equations related theorems and its applications.
- To understand the concepts of convergence of series-related theorems and their application.

- To understand the concepts of algebraic structures such as group, ring, field related theorems and its application.
- To understand the concepts of matrices, trigonometry-related theorems and their application.

B.A./B.Sc. Semester II

Course Code: Mathematics MM: 202

Tittle of the paper: Calculus and Ordinary Differential Equations

Unit I : Differentiation, Rules of differentiation

Unit II : Partial differentiation, Application

Unit III : Integration ,Application

Unit IV : Double Integrals , Application

Unit V : Equations of first order and first degree, Equations of first order but not of first degree, Linear second order differential equations

After completion of the course, the students are able:

- To understand the concepts of limit, continuity and different theorems and formulas relating to differentiation.
- To understand the concepts of the partial differential function of two and three variables, related theorems and their application.
- To understand in-depth knowledge of integration, related theorem and its application.
- To understand the working knowledge of double integrals, related theorems & formulas and their application.
- To understand the concepts of the equation of first order and first degree which deals with what is the exact equation, integrating factor and different ways of solutions of several differential equation such as Equations of first order but not of first of first degree, Linear second order differential equation.

B.A./B.Sc. Semester III

Course Code: Mathematics B Math: 303

Tittle of the paper: Vector, Geometry, and Probability

Unit I : Vector Analysis

Unit II : Two dimensional geometry

Unit III: Three dimensional geometry

Unit IV : Theory of Probability

After completion of the course the students are able:

- To understand the concepts of Vector Analysis, related formulas and its application.
- To understand in depth knowledge of two dimensional and three dimensional geometry, its properties, related theorems, formulas and its application
- To understand the ideas of theory of probability which deals with finding out the likelihood of the occurrence of an event, related theorems, formulas and its application.

B.A./B.Sc. Semester IV

Course Code: Mathematics B Math: 404

Tittle of the paper: Mechanics

Unit I : Dynamics

Unit II : Statics

Unit III : Dynamics of rigid bodies

After completion of the course the students are able:

- To understand the concepts of dynamics which deals with its components of velocities and acceleration along radial and transversal, Simple Harmonic Motion, Dynamics of a particle, Kepler's law etc.
- To understand the concepts of Statics which deals with equilibrium conditions of coplanar forces, common catenary, force in three dimensions.
- To understand in depth knowledge of dynamics of rigid bodies which deals with moments and product of inertia, D'Alembert's Principle, motion about a fixed point, Compound Pendulum, conservation of energy, related theorems and its application.

DEPARTMENT OF PHILOSOPHY

NAMBOL L. SANOI COLLEGE, NAMBOL

PROGRAMME OUTCOME AND COURSE-SPECIFIC OUTCOMES

OBJECTIVES: This Programme would introduce the students to many philosophers and philosophical schools/thoughts and teach the students to think critically.

*Understanding of various philosophical theories of East and west given by the greatest philosophical minds

*Enhanced logical ability: A philosophy graduate would exhibit an increase in the ability to think logically about various issues of society.

*Enhanced students understanding of the ethical issues happening in the present-day world like terrorism euthanasia etc.

Programme-specific outcome:

After completing the B.A. Programme in philosophy, the students will be able to

*Develop an in-depth understanding of important philosophical schools and philosophers.

*Demonstrate their knowledge of profound philosophical problems in various branches of philosophy like ontology, epistemology and axiology (Ethics)

*Develop good logical ability in thinking and talking.

*Develop awareness about various issues-ethical-social-religious-political- human freedom and individual rights that concerns the present-day world.

*Develop and enable the students to apply their philosophical training in handling real-life issues.

COURSE SPECIFIC OUTCOME

B.A. Semester I
PH1:101
Title of the paper: Greek Philosophy

After completion of the course the students are able to:

*Understand how human speculation took place in the early Greek civilization and how they tried to explain the riddles of nature.

*Understand the different philosophical standpoints of Greek trio of Socrates, Plato and Aristotle.

*Have the knowledge of different branches of philosophy-like Metaphysics-Epistemology-Ethics of early Greek civilization.

B.A. Second Semester II
PHI: 202
Title: - INDIAN PHILOSOPHY I

After completion of the course the students are able to:

*Understand the main characters of the nine (9) schools of Indian Philosophy

*Understand and challenge the charges labelled against Indian philosophy like Indian philosophy is dogmatic in its approach and pessimistic in its outlook.

*Understand how the three Nastika schools of Indian philosophy (Carvaka -Buddhism-Jainism)challenge the authority of the Vedas and how these schools explain the universe.

*Understand how the Nastika schools explain or interprete darsan or Philosophy as a way life.

B.A. III Semester
PHI-303
Tittle: Logic

After completion of the course the students are able to:

*Demonstrate the knowledge of the basic skills and know-how of the discipline of deductive reasoning in pursuit of critical thinking.

*Understand the different logical concepts starting from Aristotlean Logic up to the symbolic Logic of the twentieth century.

*Demonstrate knowledge of the application of logical concepts in philosophical engagements.

B.A. IV Semester
PHI -404
Title –Moral Philosophy

After completion of the course, the students are able to

*Understand the basic theoretical aspects of the discipline of ethics:

*Understand the nature of moral judgments and how moral actions are to be differentiated from non-moral actions.

*Demonstrate and understand the ethical framework of western as well as Indian philosophy mainly emphasizing Gita ethics.

*Understand the debatable current issues like Suicide-Euthanasia and Terrorism.

*Understand the importance of man's moral attitude towards the environment and animals' vis-a-vis global warming and climate change.

NAMBOL L. SANOI COLLEGE, NAMBOL
Department of Physics

B. Sc. with PHYSICS
PROGRAMME SPECIFIC OUTCOMES:

This undergraduate course with Physics would provide the opportunity to the students

- To understand the core concept of Physics subject
- To acquire analytical and logical skill for higher Education
- To carry out experiments to understand the laws and concepts of Physics
- To apply the theories learnt and the skills acquired to solve real time problems
- To motivate the students to pursue PG courses in reputed institutions

Course Learning Objectives & Outcomes

Semester – I
PHY-101: MECHANICS **Marks: 75**

Course Objectives:

- To understand the basic concept of mechanics
- To acquaint about the concept of M.I.
- To develop the concept of gravitational field and potential
- To acquire the concept of the fundamentals of harmonic oscillator model, including damped and forced oscillators
- To impart fundamental knowledge of special relativistic effects

Course Learning Outcomes

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

- define the centre-of-mass ,relative coordinates and reduced mass.
- compare translational and rotational dynamics of a system of particles.
- solve problem related to work-energy theorem.
- distinguish between conservative and non-conservative forces.
- solve problems based on the principle of conservation of energy.
- interpret energy diagrams.
- derive and explain the problem of variable mass system-motion of rocket.
- compute gravitational intensity and potential due to spherical shell and solid sphere.
- solve problems under a central conservative force.
- determine the possible orbits under a given inverse square central conservative force.
- solve problems involving motion of two-body systems.
- derive and explain the physical significance of the expressions of linear and angular momentum, K.E. of a many-particle system.
- explain simple harmonic motion, including damped and forced oscillators.
- deduce Lorentz contraction ,time dilation and transformation of velocity, frequency and wave number etc.
- explain Relativistic Doppler effect, Transformation of energy and momentum.
- perform experiments related to mechanics - compound pendulum (bar with holes)and Kater's pendulum; moment of inertia, elastic properties (Young Modulus and Modulus of Rigidity), fluid dynamics etc

Syllabus:
Fundamentals of Dynamics:
Dynamics of a single particle, Dynamics of a system of particles, Centre of mass, Conservation of momentum, Idea of conservation of momentum from Newton's third law, Impulse, Momentum of variable mass system, Motion of rocket, Work-Energy theorem, Potential Energy, Energy diagram, Stable and Unstable equilibrium, Conservative and Non-conservative forces, Force as a gradient of potential energy. 10 Marks
Rotational Dynamics:

Angular momentum of a particle and system of particles, Torque, Conservation of angular momentum, Rotation about a fixed axis, Moment of inertia – its calculation for rectangular, spherical and cylindrical bodies, Kinetic energy of rotation. 15 Marks

Gravitational and Central Force Motion:

Law of gravitation, Inertial and Gravitational mass and their equivalence, Potential energy and field due to spherical shell and solid sphere, Self energy, Motion of a particle under central force field, Angular Momentum conservation, one body problem, two body problem and its reduction to one body problem and its solution, The energy equation and energy diagram. 15 Marks

Oscillatory Motion:

Motion of a simple and compound pendulum, Loaded spring, Energy considerations, Time average of energy, Damped Harmonic Oscillator, Resonance in a lightly damped system, Free oscillations of system with one degree of freedom, Linearity and superposition principle, Superposition principle, Superposition of (i) two and (ii) N collinear harmonic oscillations; beats. 15 Marks

Special theory of Relativity:

Michelson-Morley experiment and its outcome, Postulates of special theory of relativity, Lorentz transformations, Simultaneity and order of events, Lorentz contraction and time dilation, Relativistic transformation of velocity, frequency and wave number, Velocity dependence of mass and equivalence of mass and energy, Relativistic Doppler effect, Relativistic kinematics, Transformation of energy and momentum. 20 Marks

Suggested Books:

1. An introduction to Mechanics by Daniel Kleppner, Robert J. Kolenkow (McGrawHill,1973)
2. Berkeley Physics Course Vol 1 Mechanics: Charles Kittel, Walter Knight, Malvin Ruderman, Carl Helmholz.Burton Moyer. (Tata MvOraw-Hill, 2007)
4. Mechanics: D S Mathur (S. Chand & Company Limited, 2000)
5. The physics of waves and oscillations: N.K. Bajaj (Tata McGraw-Hill, 1988)
6. Berkeley Physics Course Vol 3Waves: Franks Crawford (Tata McGraw-Hill, 2007)

Laboratory: Marks: 25

1. Determination of ‘g’ by using a compound pendulum (bar with holes)
2. Determination of moment of inertia of a body using a torsion pendulum
3. Determination of frequency of a tuning fork by means of a sonometer
4. Determination of 'g' by Kater's pendulum
5. Determination of surface tension of a given liquid by capillary rise method and verification of the Jurin's law
6. Determination of coefficient of viscosity of water by Poiseuille's method
7. Verification of Stoke's Law and determination of coefficient of viscosity of a liquid
8. Determination of Young's modulus by Searle’s method
9. Determination of rigidity modulus by statical method

Semester – II

PHY-202: THERMAL PHYSICS AND OPTICS **Marks: 75**

Course Objectives:

- To understand the laws of thermodynamics, heat engine, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases, theory of radiation
- To develop the idea of interference, diffraction and polarization
- To impart basic concepts about different laser systems and its applications

Course Learning Outcomes:

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

- state the laws of thermodynamics
- state various thermodynamic process and deduce work done in each of these process
- explain working of a Carnot engine
- define the four thermodynamic potentials
- derive Maxwell relations
- explain the theory of Joule- Thomson effect and Magnetic cooling by adiabatic demagnetisation
- derive Maxwell’s law of distribution of velocities
- derive equation of state for real gases
- explain Wien's displacement law, Rayleigh-Jeans' law and ultraviolet catastrophe
- derive Planck’s radiation law

- compare interference and diffraction
- explain the theory of Newton's rings formation, Michelson's interferometer and Fabry-Perot interferometer and Plane diffraction grating
- describe the production and detection of elliptically and circularly polarized light, Babinet's compensator- theory and uses
- explain the working of He-Ne laser and Ruby laser

Syllabus:

Thermodynamics:

First and second laws of thermodynamics, Carnot theorem, Thermodynamic scale of temperature, Entropy, Entropy of a mixture. Third law of thermodynamics, Thermodynamic potentials: Enthalpy, Gibbs and Helmholtz functions, First- and second- order phase transitions, Chemical potential, Maxwell relations and their applications, Clausius Clapeyron's equation, Ehrenfest's equation, Joule- Thomson effect and its theory, Magnetic cooling by adiabatic demagnetization 15 Marks

Kinetic Theory of Gases and Radiation:

Derivation of Maxwell's law of distribution of velocities, Mean free path, Transport phenomena, viscosity, conduction, diffusion and Brownian motion Equation of state for 'ideal gases, Equation of state for real gases, Deviations from the ideal gas equation, The virial equation, Derivation of Van-der-Waal' s equation, Critical constants and law of corresponding states. Blackbody radiation, Wien's displacement law, Rayleigh-Jeans' law and ultraviolet catastrophe, derivation of Planck's radiation law 20 Marks

Interference and Diffraction:

Interference in thin films, Fringes of equal thickness and equal inclination, Theory of Newton's rings. Michelson's interferometer and Fabry-Perot interferometer, Difference between Interference and diffraction, Theory of Plane diffraction grating, Resolving power and dispersive power of a plane diffraction grating, Fresnel's integrals, Cornu's spiral, Fresnel diffraction pattern at a straight edge. 20 Marks

Polarization:

Polarization by reflection, Double refraction, wave surfaces at uniaxial crystal, production and detection of elliptically and circularly polarized light, Babinet's compensator- theory and uses, optical activity and polarimeter. 10 Marks

Elements of Quantum Optics:

Stimulated emission, population inversion, spontaneous and stimulated emission, Einstein's coefficients, Threshold condition for laser action, He-Ne laser, Ruby laser, Application of lasers, Elements of second harmonic generation 10 Marks

Suggested Books:

1. A Treatise on Heat: including kinetic theory of gases, thermodynamics and recent advances in statistical thermodynamics: Meghnad Saha, B. N. Srivastava (Indian Press, 1958)
3. Heat and Thermodynamics: an intermediate textbook: Mark Waldo Zemansky, Richard Dittman (McGraw- Hill, 1981)
4. Thermodynamics, Kinetic theory and statistical thermodynamics: Francis W. Sears & Gerhard L. Salinger (Narosa, 18986)
5. Fundamentals of optics: Francis Arthur Jenkins and Harvey Elliot White (McGraw-Hill, 1976)
6. Optics: Ajoy Ghatak (Tata McGraw Hill, 2008)
7. A Textbook of Light: B. Ghosh and K.G. Mazumdar (5th Edition), Sreedhar Publishers, Kolkata
8. Thermal Physics: P K Chakrabarti, New Central Book Agency, Kolkata

Laboratory: **Marks: 25**

1. To construct a thermocouple with the elements supplied and to determine the melting point of the given substance and the thermoelectric power.
2. Determination of 'J' by Callender and Barnes method.
3. Determination of co-efficient of linear expansion of a metallic rod by optical lever method.
4. Verification of Newton's law of cooling.
5. Determination of apparent expansion of a liquid by weight thermometer method.
6. Determination of frequency of a tuning fork by Melde's method.
7. Determination of thermal conductivity of a metallic rod by Searle's method.
8. Determination of the refractive index of the given liquid with the help of a plane mirror, convex lens and a spherometer.
9. Determination of the refractive index of a given liquid by travelling microscope method.

Semester – III

PHY-303: ELECTRICITY AND MAGNETISM **Marks: 75**

Course Objectives:

- To understand the magnetic effects of electric current.
- To study the unification of electric and magnetic phenomena
- To gain knowledge about Maxwell's equations and EM waves

Course Learning Outcomes:

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

- define and compute the directional derivative , gradient of a scalar field ,divergence and curl of a vector field
- state and apply - Gauss's theorem, Stoke's theorem and Green's theorem
- state Gauss's law of electrostatics and use it to solve a variety of problems
- find electrostatic energy for systems of point charges, system of continuous charge distribution, spherically symmetric charge distributions and charged capacitors
- explain the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics
- calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws
- describe the concepts of induction and self-induction to solve problems using Faraday's and Lenz's laws
- write and explain Maxwell's equations to articulate the relationship between electric and magnetic fields

Syllabus:

Vector and scalar fields:
Fields- scalar and vector, examples, directional derivative and gradient of a vector field, flux and divergence of a vector field, circulation and curl of vector field, algebra of the del operator and Laplacian operator, Gauss's theorem, Stoke's theorem and Green's theorem. 15 Marks

Electric Field:
Electric field and electric lines, Gauss's Law and applications, electrostatics of conductor, Electric potential, multipole moments and multipole expansion, force, torque and energy of a dipole in an external electric field, Poisson's and Laplace's equations, uniqueness theorem, solutions to Laplace 's equations in spherical coordinates, zonal harmonics, conducting sphere in uniform electric field.
Electrostatic energy, system of point charges, system of continuous charge distribution, spherically symmetric charge distributions, charged capacitors.
Dielectric properties of matter, polarization, electric field caused by polarised matter, Gauss's law in a dielectric, boundary conditions on **E** and **D**, capacitors filled with dielectric, dielectric sphere in a uniform electric field, Clausius- Mosseti equation. 20 Marks

Magnetic field:
Magnetic field, magnetic force between currents and definition of **B**, divergence and curl of **B**, Ampere's circuital law, magnetic scalar and vector potentials, calculation of B for a straight wire, a circular loop, and a solenoid, field of a dipole, force, torque and energy of a dipole in an external field, magnetic moment, Lorentz force, magnetic field energy.
Magnetic properties of matter, magnetization, magnetic field caused by magnetized matter, field equations in a magnetized matter, Ampere's law in a magnetized matter, boundary conditions on **B** and **H**, magnetic shell, magnetic circuits, hysteresis and **B-H** curve. 20 Marks

Electromagnetic induction:
Electromagnetic induction, Faraday's laws of induction, curl E, self and mutual inductance, reciprocity theorem, energy stored in a coil,
Alternating current and transient phenomena, AC circuit, mean value of current and voltage, skin effect, power factor, AC in L-R, C-R, L-C-R circuits, series and parallel resonance, transient growth and decay of currents in L-R, C-R, L-C-R circuits, and oscillatory discharge.
Maxwell's equations, the equations and their physical meanings and the respective laws, equation of continuity, wave equations for E and B, plane wave solutions, transverse nature of electromagnetic wave, flow of electromagnetic power and the Poynting theorem. 20 Marks

Suggested Books:
1. Introduction to Electrodynamics: David J. Griffiths, 3rd edition, (Benjamin Cummings, 1998).
2. Elements of Electromagnetics: Mathew N.O. Sadiku (Oxford University Press)
3. Electricity and magnetism: Edward M. Purcell (McGraw-Hill Education, 1986)
4. Electricity and magnetism: D C Tayal (Hirnalaya Publishing House, 1988)
5. Electricity and Magnetism: D Chattopadhyay and P Rakshit

Laboratory: Marks: 25
1. Determination of the horizontal component of earth's magnetic field and the magnetic moment of the magnet with the help of a deflection magnetometer.
2. Determination of self inductance by Rayleigh's method.
3. Determination of frequency of the A.C. mains with the help of sonometer.
4. Determination of capacitance by de Sauty's bridge.
5. Determination of refractive index of a prism by using a spectrometer.
6. Determination of capacitance by using ballistic galvanometer.

7. Determination of ECE of copper.
8. To convert the given galvanometer into an ammeter and calibrate it with the help of copper voltameter

Semester – IV
PRY-404: ATOMIC AND NUCLEAR PHYSICS **Marks: 75**

Course Objectives:

- To acquire knowledge of Mass spectrograph and X-ray diffraction
- To study atomic spectra
- To understand the properties of nucleus and nuclear reactions
- To gain knowledge on particle detectors and accelerators

Course Learning Outcomes:

After taking this course, students will be able to

- explain the working of a Mass spectrograph
- describe theories explaining the structure of atoms
- explain the origin of spectra of hydrogen and alkali elements
- explain the observed dependence of atomic spectral lines on externally applied magnetic field
- compare a drop of liquid with that of a nucleus
- discuss the nuclear Shell model
- distinguish different types of detectors, counters and accelerators.
- describe basic radioactivity, decay law and half-life
- describe the theory of alpha decay ,beta decay and gamma decay
- calculate Q-value of a reaction
- describe the applications of isotopes and hazards of nuclear radiations
- distinguish nuclear Fission and Nuclear Fusion
- explain nuclear reactor and its types

Syllabus:

Mass spectrographs and X-ray:
Atomic masses: Bainbridge and Aston mass spectrograph,
X-rays: continuous and characteristic X-rays; Mosley's law; absorption of X-ray and absorption spectra, X-ray diffraction and Bragg's law; measurement of X-ray wave length. 10 Marks

Atomic spectra:
Hydrogen spectrum, Bohr's theory, Sommerfeld's modification of Bohr's' theory and relativistic correction, vector model of atom, electron spin, Pauli's exclusion principle, periodic table of elements; spin-orbit interaction - fine structure of hydrogen, spectra of alkali elements, selection rules, L-S and j-j coupling schemes, Zeeman Effect. 20 Marks

Radioactivity:
Law of radio-active decay and half-life, radio-active series; theory of successive transformations; secular and transient equilibrium; Carbon dating, artificial radioactivity; radio-isotopes and their uses; radiation hazards; theory of alpha decay; beta decay and neutrino hypothesis; gamma decay. 10 Marks

Particle accelerator: Linear accelerator, Cyclotron; Betatron; Synchrotron.

Nuclear detectors: Proportional counter, G.M. counter, cloud chamber, bubble chamber, scintillation counter, nuclear emulsion. 10 Marks

Nuclei and their properties: Rutherford's theory of alpha particle scattering and its experimental verification; Charge mass, size, constituents, spin and parity of nuclei; nuclear stability and binding energy; nuclear moments- electric dipole moment, electric quadrupole moment and magnetic moment, nuclear forces.
5 Marks

Nuclear models: Liquid drop model, Semi-empirical mass formula and its applications, shell model. 10 Marks

Nuclear reactions: Q-value of a reaction; kinematics of nuclear reactions; types of nuclear reactions; cross sections for nuclear reactions; nuclear fission-elementary theory of nuclear fission, energy and mass distribution of fission fragments, fission neutrons, four factor formula, nuclear reactor and its types, breeder reactor; nuclear fusion reaction in the sun; controlled nuclear fusion. 10 Marks

Suggested Books:

I. Atomic and Nuclear Physics: Gopalakrishnan (McMillanJ
2. Concepts of Modern Physics: A Beiser
3. Concepts of Nuclear Physics: Bernard L Cohen
4. Nuclear Physics: S N Ghosal
5. Nuclear Physics: D C Tayal

Laboratory: **Marks: 25**

1. To draw the (i-D) curve for a prism using a spectrometer and to find the minimum deviation using sodium light.
2. To draw the (i-D) curve for a prism using a spectrometer and to find the refractive index of the prism using sodium light (angle of prism given).
3. Determination of radius of curvature of a convex lens by Newton's ring method.
4. Determination of dispersive power of a prism for sodium light using a spectrometer.
5. Determination of width of a single slit from a diffraction pattern and verification of the value by means of a travelling microscope.
6. Determination of wavelength of sodium light using a plane transmission grating.
7. Determination of internal resistance of a cell using potentiometer.
8. To measure current in an external circuit with the help of a potentiometer.
9. Calibration of an ammeter with the help of potentiometer

Semester – V
(Honours Course)
PHY-505: ELECTRONICS **Marks: 100**

Course Objectives:

- To understand the Basic Electronics circuits and network theorems
- To acquire knowledge about common solid state devices: Semiconductor diodes and transistors
- To learn the basics of amplifiers, oscillators, operational amplifier and their applications
- To understand the logic gates which are foundation blocks of digital electronics

Course Learning Outcomes

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

- explain the characteristics and working of pn junction
- describe two terminal devices: Rectifier diodes, Zener diode, photodiode etc
- explain NPN and PNP transistors: Characteristics of different configurations, biasing, stabilization and their applications.
- classify various types of Field effect transistor
- explain the characteristics and applications of different types of operational amplifier
- verify the truth tables of basic logic gates and universal gates

Syllabus:

Basic Circuit Analysis:

Circuit models, Kirchhoffs law, single equation loops, single node pair circuit, voltage and current divider riles, principle of superposition, Thevenin and Norton's theorems, two-port analysis of an electrical network. 10 Marks

Semiconductor diodes:

p-n junction diode, I-V characteristics, application in rectifiers, clippers and limiters, Zener diode and its applications. 10 Marks

Bi-polar junction transistors (BJT):

p-n-p and n-p-n structures,active and saturation regions, characteristics of BJT, common emitter configuration, input and output characteristics, z and h parameters, common-base configuration. output characteristics, two-port analysis of a transistor using z and h parameters, load line concept, emitter follower, biasing methods, stability factor, low frequency model

Derivation of current gain, input resistance, voltage gain and output resistance of the CB, CE amplifier configurations (for small signals) and the CE configuration with an emitter resistor (also for small signals), bypassing of the emitter resistor with a bypass capacitor. 30 Marks

Field effect transistor (FET):

Classification of various types of FETS, constructional details of junction field-effect transistor, drain characteristics of JFET, biasing of JFET, operating regions, pinch-off voltage, idea of metal-oxide-semiconductor-field-effect-transistor (MOSFET). 10 Marks

Amplifiers:

Resistance- capacitance and transformer coupled amplifiers, power amplifiers-class A, B, AB and C operations, Concept of negative and positive feedback, representation of a single loop negative feedback amplifier, transfer gain with feedback, merits and demerits of negative feedback, Differential amplifiers, principles of operational amplifiers, transfer characteristics, offset parameters, differential gain, CMR, inverting and non-inverting operational amplifier, operational amplifier adder, differentiator, integrator, applications of operational amplifiers. 25 Marks

Oscillators:

Wave-form generators: Barkhausen criterion, RC oscillator, Wien Bridge oscillator, phase shift oscillator. 5 Marks

Digital circuits:

Binary system, Boolean algebra, NOR, NAND gates, half and full adders, minimization of Boolean expressions using K –map. 10 Marks

Suggested Books:

1. Digital principles and applications: Donald P. Leach & Albert Paul Malvino, (Glencoe, 1995).
2. Electronic Principles: Albert Paul Malvino (Tata McGraw Hill).
3. Basic Electronics and Linear Circuits: N.N. Bhargava, D.C. Kulshreshtha and S.C. Gupta (Tata McGraw Hill, 2006).
4. Integrated Electronics: Millman and Halkias
5. Electronics: D Chattopadhyay and PC Rakshit

PHY-506: MATHEMATICAL PHYSICS **Marks: 100**

Course Objective

- To equip students with the mathematical tools required in solving problem of interest to physicists

Course learning outcome:

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

- describe the complex numbers and their properties, functions of complex numbers and their properties such as analyticity, poles and residues
- explain the residue theorem and its applications in evaluating definite integrals
- explain special functions -the beta and gamma functions and special polynomial - Hermite polynomial, the Legendre polynomial, the Laguerre polynomial and Bessel functions
- solve partial differential equations with the examples of important partial differential equations in Physics.
- discuss Fourier analysis of periodic functions and their applications in physical problems such as vibrating strings etc

Syllabus:

Complex variables and functions of a complex variable:

Complex numbers and their graphical representation, modulus and argument of a complex number, function of a complex variable, continuity and derivative, Cauchy-Riemann condition, analytic functions, integration of a function of a complex variable, Cauchy's theorem, Cauchy 's integral formula, Taylor's series for an analytic function, Laurent series, singularities and their classification, residue and the residue theorem, evaluation of definite integrals. 35 Marks

Special functions:

Gamma functions, recurrence relations, Beta function and recurrence relations, relation between gamma and beta function Legendre, Hermite and Laguerre polynomials and associated Legendre functions, differential equations and series solutions, generating functions, recurrence relations, orthogonality relations

Bessel Differential equation, generating function, recurrence relation, zeroes of the Bessel function, orthogonality relation, series expansion of a function in terms of a complete set of orthogonal functions. 30 Marks

Partial differential equations:

Vibrations of stretched string, derivation of the equation and its solution under various initial conditions, vibration of rectangular and circular membranes, heat conduction, derivation of the equation, solution for the temperature in a finite rod, semi-infinite rod, the classical wave equation and the Laplace equation. 20 Marks

Fourier series:

Orthogonality of the sine and cosine functions, Fourier series of a function, Fourier series expansion of a periodic function, Parseval's theorem, sine and cosine series 15 Marks

Suggested Books:

1. Advanced Engineering Mathematics: by Erwin Kreyszig
2. Mathematical Methods for Physicists: by G. Arfken and Weber
3. Mathematical Physics: by A. K. Ghatak, I Goyal and Chu
4. Applied Mathematics for Engineers and Physicists: by L. A. Pipes and L. R. Harvell
5. Complex Variables (Schaurn Series): M Spiegel

Semester – VI
(Honours Course)
PHY -608: QUANTUM MECHANICS **Marks: 100**

Course Objective

- To introduce the basics of quantum mechanics formulation
- To understand wave mechanics
- To study Schrodinger equations, particle in one dimensional potential, quantum theory of linear harmonic oscillator and H atom

Course learning outcome:

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

- describe inadequacies of classical mechanics in explaining microscopic phenomena
- explain the behaviour of matter and energy at atomic and subatomic level through quantum theory formulation
- interpret the wave function of quantum particle and probabilistic nature of its location and subtler points of quantum phenomena
- discuss the behaviour of quantum particle encountering a barrier potential
- solve Schrödinger's equation for many systems such as particle in a box, linear harmonic oscillator and Hydrogen atom

Syllabus:

Origin of the Quantum theory:
Blackbody-radiation spectrum and Planck's hypothesis, Einstein's idea and the photoelectric effect, Compton Effect, Franck-Hertz experiment
Stability of the atom, Bohr's postulate of angular momentum quantization and the Bohr atom model, Bohr- Sommerfeld quantization rule
De Broglie wave and wave particle duality, Davisson Germer experiment, electron diffraction and neutron diffraction
Developement of Quantum mechanics: Wave behaviour of matter. two-slit experiment with electron (thought experiment), superposition, description in terms of probability and need for probability amplitude, Wave packet, Heisenbergs uncertainty principle (thought experiment and applications), Bohr's complimentary principle, Bohr's correspondence principle. 30 Marks

Basic postulates and formalism:
Schrodinger equation, wave function as probability amplitude and dynamical variables as operators, probability conservation and normalization of wave function, conditions for physical acceptance of wave function, equation of continuity (differential probability conservation)
Eigenvalues and eigenfunction of a dynamical variable, Hermiticity and reality of eigenvalues, physical meaning of eigenvalues of a dynamical variable, superposition of of wave functions and the expansion postulate, expectation value and Ehrenfest's theorem, the commutator and the quantum analogue of the classical equation of motion, constants of motion
The fundamental commutators, commutator algebra, precise definition of uncertainty and the uncertainty relation (statement) 30 Marks

Stationary states and Energy eigen-states:
Stationary states, time independent Schrodinger equation, the stationary state wave functions, free particle and plane wave
Particle in a one-dimensional box:
Energy eigenvalues and eigenfunctions, graphical illustrations, nodes as the energy quantum number, calculation of expectation values, qualitative estimation of the ground state energy from the uncertainty principle
Linear harmonic oscillator:
Solution of the Schrodinger equation for energy eigenvalues and eigenfunctions, calculation of expectation values and matrix elements, parity of eigenfunctions, the varial theorem
One dimensional potential barrier:
One-dimensional finite potential step, stationary solutions, reflection and transmission coefficients, phenomenon of barrier penetration
Hydrogen atom:
Solution for the energy spectrum and the eigenfunctions, the quantum numbers n, 1, m, degeneracy, expectation values, the virial theorem 40 Marks

Suggested Books:
1. Quantum Mechanics: B H Bransden and C J Joachain (Pearson, 2008)
2. Quantum Mechanics: L. I. Schiff (McGraw Hill Book Co., New York, 1968).
3. Quantum Mechanics: E. Merzbacher, (John Wiley & Sons, Inc 1997)
4. Quantum Mechanics: J.L. Powell & B. Crasemann (Addison-Wesley Publs. Co., 1965)

5. Quantum Mechanics: Theory and Applications: A. Ghatak & S. Lokanathan 5th Edition, (Macmillan India: 2004)

PHY -609: PHYSICS OF MATERIALS **Marks: 100**

Course Objectives:

- To introduce the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids
- To appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents
- To study problems in solid state physics using relevant mathematical tools

Course Learning Outcomes:

On successful completion of the course, the students should be able to

- elucidate the concept of lattice, crystals and symmetry operations.
- discuss about unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials
- describe the elementary lattice dynamics and its influence on the properties of materials
- describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behavior.
- explain the different types of magnetism from diamagnetism to ferromagnetism and hysteresis loops and energy loss.
- discuss Einstein and Debye theory of specific heat of solids
- discuss the basic concept about superconductors and their classifications

Syllabus:

Crystal structure:

Crystalline and amorphous materials, lattice and unit cell, lattice translational vectors, lattice with a basis- central and non central unit cell, reciprocal lattice, Bravais lattice types, Brillouin zones of sc, bcc, fcc lattices, X-ray diffraction: Braggs Law, X-ray scattering, atomic structure factor and geometric structure factor 20 Marks

Electrical Properties of Materials:

Free electron model and its limitation, elementary band theory: Bloch theorem, Kronig Penney model, effective mass, concept of hole, band gaps, classification of solids, intrinsic and extrinsic semiconductors, p-type and n-type semiconductors, conductivity of semiconductors, concentration of charge carriers, Femi level and its temperature dependence, classical Hall effect 20 Marks

Magnetic properties of Materials:

Types of magnetic materials, classical theory of diamagnetism and paramagnetism, quantum mechanical treatment of paramagnetism, Curies law, Weiss' theory of ferromagnetism, magnetic domains, soft and hard magnetic materials. 20 Marks

Lattice Dynamics:

Lattice vibrations, monatomic and diatomic lattice vibrations, acoustic and optic modes, Einstein's' theory of specific heat, Density of states, Debye's theory of specific heat 20 Marks

Superconductivity:

Experimental properties, Meissner effect, London's theory and penetration depth, isotope effect, type I and type II superconductors, elementary idea of high Tc superconductivity 15 Marks

Physics of low dimension:

Density of states in low dimension, different types of nanomaterials, Blue Shifting, quantum wells, wires and application of nanoscience 10 Marks

Suggested Books:

1. Solid State Physics: - A J Dekkar
2. Introduction to Solid State Physics: - C Kittel
3. Solid State Physics: - A R Verma and 0 N Srivastava
4. Introduction to Nanoscience: - Poole etal
5. Solid State Physics: - Keer

DEPARTMENT OF POLITICAL SCIENCE

NAMBOL L. SANOI COLLEGE

PROGRAMME OUTCOME

Some of the significant outcomes expected after the completion of the BA programme in Political Science is listed below:

1. Relations between the subject Political Science and Society: understanding the interrelationship between policy decisions and their effects on society. This is achieved through a comprehensive teaching of the practice of public administration in India.
2. The ability to think critically: analyse and predict socio-political phenomena based on the study of existing socio-economic determinants and past experiences. This goal is achieved by training students in the different approaches and tools of investigation such as empirical research methods.
3. To become an effective citizen: Programme would focus on the standing of the rights and duties of citizenship and thereby acting as responsible citizens through spreading awareness in society based on specific socio-political issues such as domestic violence, disillusioned youth of the materialistic world, gender issues etc.
4. Bridge between academics and society: Establishment of linkages between academics and civil society at large to successfully address socio-political problems. The discussion in the class would be keeping the entire student population up to date with political occurrences both global and domestic.
5. Individual and teamwork: promotion of team spirit for the welfare of the community.

COURSE OUTCOME

Paper 1: Political Theory

After the end of the course the student would be able to:

- Understand the concepts and nature of the following important concepts if political l theory about
- Know and adopt the various approaches to the study of political science, theories of state.
- Have full knowledge of the idea of democracy, socialism, communism and fascism.
- Use efficiently the behavioral and post behavioral approach to the study of political Science.

Paper 2: Western Political Thought

After the end of the course the students will be able to learn:

- Plato: his idea on justice, education, state
- Aristotle: his thoughts on slavery, state and justice
- Machiavelli's concept of ethics and state
- Bodin: his theory of state
- Hobbes Locke Rousseau's concept of human nature, state of nature and social contract
- Hegel philosophy of dialectics
- Marx: on his idea of class struggle, dialectic materialism and mode of production
- Lenin's theory of imperialism

Paper3: Indian Government and Politics

After the completion of the course the students would be able to

- Have full knowledge of the socio historical background of India' freedom struggle,
- Have a comprehensive knowledge of the constitutional structure of India
- Analyse the Centre state relations and its working in the political system
- Awareness of the party system in India be it regional or national
- Have the knowledge of the influence of caste in Indian politics
- Understand communalism, regionalism and national integration

Paper 4: Comparative Government and Politics:

After the successful completion of the course the students would be able to learn:

- Define and apply key concepts in comparative politics, including nation-states, political regimes, political identity, gender and politics, and political violence
- Explain and evaluate the importance of specific historical events in the context of the political and economic development of the countries studied
- Compare and contrast the political systems of the countries explored in the course, paying particular attention to historical, political, economic, geographical, and moral aspects of governance in a variety of countries.
- Use the comparative method to analyse contemporary political issues.
- Demonstrate an ability to communicate in writing your knowledge and beliefs about the institutions and forces shaping the political systems of UK, USA, Japan, China and Switzerland

Paper 5: International Politics

After the successful completion of the course the students would be able to :

- Understand the nature and scope of international politics
- Comprehend the concept of power in understanding international relations.
- Understand Balance of power
- Study the anatomy of League of nations
- analyses the factors influencing India's Foreign policy
- Discuss the issues of Indian foreign policy: Kashmir issue, causes of Sino-Indian war of 1962 etc.

Paper 6: Socialist Thought:

After the successful completion of the course the students would be able to:

- Fully understand the concept and theoretical evolution of Utopian socialism,
- Analyze the socialist thought of various thinkers Marx, Engels, Lenin, Stalin and Mao
- Acquaint with the main principle of anarchism and fascism
- Deal with Relevance of utopian socialism in the present times

Paper 7: Public Administration

After the completion of this course the students would be able to:

- Learn the meaning, nature and scope of public administration
- Understand the nature of an organization: definition and structures
- Comprehend the administrative units like line staff and auxiliary agencies
- Understand the nature of personnel administration
- Fully analyze the agencies of financial administration and planning commission of India

Paper 8: Government and politics of North-East India

After the completion of this course the students would be able to learn:

- Traditional political institutions of the North-East region,
- The relation between the British and the Northeast India,
- Sixth schedule of the Indian constitution,
- Formation of states like: Nagaland, Meghalaya, Mizoram and Arunachal Pradesh:
- The role of national and regional political parties in Northeast India
- The relations between the center and the region

Paper 9: Gandhian Studies

After the successful completion of this course the students would be able to learn:

- The origin of Gandhian philosophy,
- Gandhian understanding of human nature,
- Gandhian views on spiritualization of politics,
- Gandhi's concept of satyagraha,
- Gandhian views on non-violence, freedom and equality,
- Gandhi's views on state, democracy and socialism,
- Trusteeship, economic, science and technology,
- Gandhi and world peace, and relevance of his ideas in contemporary times,

Paper 10: Indian Political Thought

After the successful completion of this course students would be able to learn:

- Ancient philosophical traditions of India,
- Political philosophy of a Manu and Kautilya
- Political thought of Raja Ram Mohan Roy
- the political ideas of Vivekananda, Aurobindo Ghosh, Bal Gangadhar Tilak, Gopal Krishna Gokhale,
- The political thoughts of MN Roy, Md Iqbal, Jawaharlal Nehru, Subhas Chandra Bose,
- The political philosophy of Dr BR Ambedkar, Jayaprakash Narayan,

DEPARTMENT OF ZOOLOGY
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Program outcome and course specific outcomes

Program outcomes:

PO1- Students gain knowledge and skill in fundamentals of animal sciences, the complex interaction among various living organisms.

PO2-Analyse complex interaction among the various animals of different phyla,their distribution and their relationship with the environment.

PO3- Apply the knowledge of internal structure of cell, its function in control of various metabolic functions of organisms.

PO4- Understand the complex evolutionary processes and behaviour of animals.

PO5- Correlates the physiological processes of animals and relationship of organ system.

PO6- Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species.

PO7-Gain knowledge of Agro based small scale industries like sericulture, fish farming, Apiculture and vermicompost preparation.

PO8- Understand about various concepts of genetics and its importance in human health.

PO9- Apply the knowledge and understanding of zoology to one's own life and work. Develops sympathy and love towards the animals.

PO10- Gains knowledge about research methodologies, effective communication and skills of problem solving methods.

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COURSE SPECIFIC OUTCOMES :

B.Sc Semester 1
Course code:ZOO-101 (Elective)

Unit 1 : Classification

Unit 2 : Code & Approaches in Taxonomy

Unit 3 : Zoogeography

Unit 4 : Palaeozoology

After completion of the course the students are able

- To understand the fundamental principles of systematics in which the animals are how to classify according to their characters and what are theories which have to follow for classification.
- To grasp the knowledge of distribution of fauna indifferent realms interaction
- To understand about the fossils such as fossilization, types, dating and significance

Course code:ZOO101P (PRACTICAL)

Topic: Practicals on principal of classification,zoogeography & paleozoology.

After completion of practicals on principles of classification, zoogeography & paleozoology students are able to

- To comprehend the knowledge of how to collect specimens from different locality and how to label/tag and its correlation with field record book
- To understand about origin and evolution of animals in geological time scale

BSc Semester II
Course code: Zoo:202 (ELECTIVE)

Unit I : Protozoa, Metazoa and Porifera

Unit II : Coelentrata, Ctenophora, Platyhelminthes and Nemathelminthes

Unit III : Annelida, Arthropoda, Mollusca and Echinodermata

Unit IV : Minor phyla

After completion of this course the students are able

- to understand the distinguishing characters and classification upto orders from Phylum Protozoa to Echinodermata.
- to know the life history and pathogenicity of Parasitic protozoan*: Plasmodium vivax* (Malarial parasite). *Trypanosoma gambiense*. *Entamoeba histolytica*, reproduction in Paramecium and nutrition in Euglena.
- to understand the idea of canal system in Sponges- types, structure and function.
- to have the idea of Parasitic adaptation and life history of *Fasciola hepatica* (liverfluke), *Taenia solium* (Pork Tapworm) and Ascaris lumbricoides.
- to understand the structure and affinities of Ctenophora, Trochophore Larva and Neopilina.
- to learn about mouth parts of insects, social life in insects, torsion and detorsion in Gastropods.

- to understand the larval forms and water vascular system of Echinodermata.
- to know the distinguishing characters and examples of phylum Rotifera, Bryozoa, Brachyopoda etc.

ZOOLOGY 202P (PRACTICAL)

Topic : Practicals on Functional Anatomy of Non- Chordata

By doing practical experiments related to above topic students are able

- to dissect the different systems of invertebrate animals such as Nereis, Pila and Cockroach.
- have the idea of study of permanent slides: identification and characters.
- to understand study of museum specimens: identification, classification and comments.
- to prepared temporary slides to study the parts of different specimens

B.Sc. Semester III
Course code: ZOO: 303 (ELECTIVE)

Unit I : General organization of Chordata: -

Unit II : Agnatha and Pisces

Unit III : Amphibia and Reptilia

Unit IV: Aves and Mammalia

Unit V : Comparative anatomy

After completion of the course, the students are able

- to Understand general characters and classification upto classes of Chordata.
- to Know the affinities of Amphioxus, Sphenodon and Archaeopteryx.
- to gain knowledge about the origin, distinctive characters and classification upto living orders of Amphibia, Reptilia, Aves and Mammalia.
- to learn the different systems of Petromyzon, Scoliodon, Pegion and Rabbit.
- to understand about the accessory respiratory organs of fishes and general characters and distribution of lung fish (Dipnoi).
- to learn neotony and metamorphosis in amphibia and perching mechanism in birds.

- to distinguish between poisonous and non-poisonous snakes,

- to learn about dentition and placentation in mammals.
- to gain knowledge about the structure of different systems such as integumentary, digestive, nervous, respiratory, circulatory, etc. in comparative way among the vertebrate groups.

ZOOLOGY 303P (PRACTICAL)

Topic : Practicals on Functional Anatomy of Chordata

- to dissect the different systems of vertebrate animals such as Scoliodon, Frog and Calotes.
- To have the idea of identification,classification and giving comments by studying museum specimens and bones

B.Sc Semester IV
Course code – ZOO-404 (ELECTIVE)

Unit 1 :Biodiversity

Unit 2 :Environmental biology

Unit 3 :Applied Zoology

Unit 4 :Computer Application

After studying the above courses students are able

- to relate different levels of biological diversity,concepts,hotspots,IUCN Red list category
- to acquire knowledge on concept of wild life conservation,Sanctuaries,National parks and Ramsar sites
- to relate the physical features of environment to the structure of population, communities and ecosystem.

- to gain knowledge in the areas of Laws of Limiting factors, minimum, Tolerance etc.
- to have the basic idea of rearing silk worm,Honeybee and fishes.
- to impact the basic knowledge of applications of computer in biological scienses.

ZOOLOGY- 404P (PRACTICAL)

Topic : Practicals on Biodiversity,Environmental Biology,Apllied Zoology and Computer Applications

After completion the practical experiments students are able

- to identify biotic and abiotic components ,to record turbidity,temperature, PH and to estimate oxygen and carbondioxide of a pond ecosystem.
- to know the life history stages of honey bee,silk moth and fish
- to study available animals of zoo/National Park after organising study tour

BSc Semester V
Subject code:ZOO-505 (HONOURS)

Unit 1 : Cellular organization

Unit 2 : Cytoplamic organelles

Unit 3 : Nuclear organization

Unit 4 : Cell regulatory mechanism

Unit 5 : Genetics

Unit 6: Molecular genetics and tools

After completion of the course students are able

- to acquire knowledge on organisation of prokaryotic and eukaryotic cells and to grasp about active and passive transport through cell membrane.
- to understand the structure and functions of plasma membrane and all cellular organelles in details
- to have the idea of how nucleus organise into its envelope,nuclear matrix nucleolus,chromosomes,chromatids etc and how it controls and regulates the activities of the cell

- to acquire the knowledge of about chromosomes cell cycle,cell divisions both mitosis and meiosis,protein synthesis and its regulation
- to comprehend the fundamental genetics like Mendelian and non-Mendelian inheritances,linkages,gene interaction,sex determination of man and Drosophila,extra chromosomal inheritances etc
- to understand the genome organization including various types of genes,genetic disorders,central dogma of molecular biology and mechanism of DNA replication
- to gain the knowledge of tools and techniques of molecular genetics like RFLP,RAPD,AFLP,PCR etc

BSc Semester V
Course code: ZOO 506 (HONOURS)

Unit I : Evolution
Unit II : Adaption
Unit III : Ethology
Unit IV : Biotechnology
Unit V : Bioinstrumentation

After completion of this course, the students are able

- to learn the origin of life and evidences of evolution,
- to understand mutation, variation and natural selection.
- to learn about speciation and evolution of Man.
- to understand the knowledge of vertebrate adaptaion in relation to their habitat.
- to learn colouration and different kinds of mimicry and how animals protect themselves from enemies.
- to understand the different types of animal behaviour and types of communication in insects, various method of parental care in fishes.
- to learn the biological rhythm and migration in insects, fishes and birds.
- to understand the importance of biotechnological techniques for human welfare. The students will be taught about the idea of recombinant DNA technology (genetic engineering) via which modification of different genes for treatment of different diseases, gene therapy for untreatable diseases, gene targeting, invitro-fertilization, ART, etc.
- to learn the principles and types of microscopy, spectrophotometry, electrophoresis, chromatography and centrifugation.

BSc Semester -V
Subject code-ZOO 507P (PRACTICAL)

Topic- Practicals on cell biology and genetics, Adaptation, Ethology, Biotechnology and bioinstrumentation

After completing the experiments of the above topics students are able

- to see by their own eyes under the microscope and recognised the various stages of cell division, giant chromosomes,sex chromatin,mitochondria etc by preparing slides
- to study adaptation by examining specimens
- to perform curd formation,alcohol and soyabean fermentation through experiments
- to handle and gain knowledge about various bioinstrumentations used in biological practicals

Bsc Semeser VI
Subject Code : ZOO 608 (HONOURS)

Unit 1 : Nutrition
Unit 2 : Heart, blood and circulation
Unit 3 : Respiration
Unit 4 : Excretion
Unit 5 : Muscles, nerve and sense organs
Unit 6 : Endocrinology
Unit 7 : Immunology

After studying the above course students are able –

- to grasp about the knowledge of nutrients and physiology of digestion
- to comprehend different aspects of heart and blood such as pumping oxygenated blood to other body parts, regulation of heart beat, composition of blood, haemoglobin and haemopoiesis.
- to acquire the knowledge of mechanism and control of breathing related to Bohr effect, Haldane effect, chloride shift etc.
- to understand about physiology of excretion such as urine formation, micturition, role of kidney in water regulation, salt and acid-base balance.

- to have the idea of different physiological aspects of muscle, nerve and sense organs.

- to gain knowledge about structure function and hormones secreted by different endocrine glands.

- to develop knowledge about structure and function of immune cells, immunoglobulins, antigens, their interactions with antibodies and brief idea of HIV and AIDS

BSc Semester VI

Course code: ZOO 609 (HONOURS)

Unit I : Gametogenesis, fertilization and Parthenogenesis

Unit II : Animal egg, early stages of development, foetal membranes

Unit III : Organogenesis, tissue interaction and metamorphosis

Unit IV : Histology

Unit V : Biological Chemistry

After completion of this course, the students are able

- to learn the process of Spermatogenesis and oogenesis, fertilization and parthenogenesis.
- to understand egg membrane and maturation.
- to learn types of animal eggs, cleavage pattern, blastulation, gastrulation in Frog and Chick
- to gain knowledge about the structure and development of extra embryonic membrane, placenta and its type.
- to understand the formation of different organs such as heart, kidney, sense organs, etc., metamorphosis and role of hormone in metamorphosis
- to learn the various types of tissue, histological pecularities, the microscopic anatomy and function of various organs.

- to understand about the basic terms, importance and scope of biological chemistry and able to explain the structure, functions and reactions of various biomolecules.
- to comprehend the knowledge of macromolecules such as carbohydrates, protiens, nucleic acids and fat in their types, metabolism and significance.
- to know the concept of enzyme, its mechanism of action, kinetics and regulation

BSc Semester VI
Subject code-ZOO 610P (PRACTICAL)

Topic- Practicals on animal physiology, Endocrinology, Immunology, Developmental Biology, Histology and Biological Chemistry

After completion practical experiments related to above topics students are able-

- to grasp the results and procedure of physiological experiments such as effects of isotonic,hypotonic,hypertonic solutions on erythrocytes,counting of RBC &WBC,estimation of haemoglobin percentage,haemin crystals,coagulation of blood,recording of heart beat etc
- to know and see by their own eye the endocrine glands of rat by dissection and also can get knowledge about the structure by studying section of permanent slides under compound microscope
- to determine their own blood type and RH factors by doing immunological procedures
- to see and study the different developmental stages of frog and chick
- to understand different types off tissues by doing histological procedures and by studying permanent slides of sections of different organs
- to test for identification of carbohydrate,lipid and protein and to separate amino acids using paper chromatography