B.Sc. B.Ed Programme

PLOs (Programme Learning Outcomes): -

An integrated programme of teacher education titled Bachelor of Science Education (B.Sc.B.Ed)is a 4-year integrated programme, Organized on semester pattern with 2 semesters in a year in Choice Based Credit System (CBCS) pattern and the program has 209 credits in total. The programme contents related to Physics, Chemistry, Mathematics, Botany, Zoology, Education offered in B.Sc.B.Ed. This degree B.Sc.B.Ed is equivalent to B.Sc and B.Ed degree of the University of Mysore. We have 3 major science programmes integrated with Teacher education Program.

The programme learning outcomes relating to B.Sc.B.Ed degree programme are as follows:

- Demonstrate(i) a systematic and coherent understanding of the fundamental concepts, principles and processes underlying the academic fields of Science, Mathematics and Education, their different subfields (chemistry, physics, zoology, botany, philosophy, sociology, psychology, pedagogical perspective), and their linkages with related disciplinary areas/subjects; (ii) procedural knowledge that creates different types of professionals in the field of Science Education and mathematics education; (iii) skills related to specialisation areas within Science(Physics, Chemistry, Botany, Zoology),Mathematics and Education.
- Apply appropriate Pedagogical content knowledge in order to transact the fundamental concepts, principles and processes underlying the academic fields of Science, Mathematics and Education to classrooms; and apply relevant knowledge and skills to seek solutions to problems that emerge from the classroom teaching learning process. as well as from broader interdisciplinary subfields.
- Undertake hands on laboratory work, practicum and practical activities which develop problem solving abilities required for successful career in teaching profession and in concerned subjects (Science and Mathematics). Communicate the results of studies undertaken as field study / Lab exercises accurately using the main concepts, construct his or her own knowledge and techniques of the subject (Science, Mathematics and Education)
- Recognize and appreciate the importance of the Science, Mathematics and Education and its application in an academic, industrial, economic, environmental and social contexts.
- Using appropriate emerging technologies meaningfully integrating with the content knowledge.

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COURSE LEARNING OUTCOMES
Core Course 3A Zoology
BSE I.3 B: DIVERSITY OF ANIMALS – I

On completion of the course, prospective teachers will be able to:

1. Understand diversities, organizational hierarchies, complexities, external and internal body structures, identifications and classifications, various modes of adaptations, habitats and biological systems of lower invertebrates (Protozoa, Porifera, Cnidaria, Acnidaria, Platyhelminthes, Nemathelminthes and Annelida).
2. Develop positive attitudes towards taking interest to know about and to relate the invertebrates studied with the specimens of their local surrounding.
3. Acquire the responsibility, interest and concern to protect the invertebrates of their surroundings.
4. Follow and practice the various preventive measures of disease-causing protozoan and helminth parasites.
5. Make judicious use of the invertebrates in their life for different economic purposes with concern about protecting environment and diversity.
6. Draw the external and internal structures, different organ systems of the invertebrates, compare and contrast, identify, classify, find the evolutionary relationship among the invertebrates.
7. Practice and perform laboratory experiments and practical to possess skills of using simple and compound microscopes, handling, observing, identifying, classifying the invertebrate specimens, staining and mounting of biological materials, preparation and culturing of protozoans.
8. Prepare specimen slides, collect local specimens for classroom transaction and Zoology Museum.

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Core Course I B Botany

BSE II. I B

Diversity of Cryptograms and Archegoniate

Course Learning Outcomes (CLOs) :

1. The student's teachers will be able to classify the structure and enumerate the life history of Bryopnesta and Pteridophytes.
2. Understand the Geological timescale and the importance of fossils.
3. To analyze the significance of Heterospory and seed Lia bit.
4. They are able to understand the evolution of Steles in General in pteridophytes.
5. Skill of Drawing, labeling and bisecting of the materials for Morphology and anatomical understanding of the form genera of palaeobotanical forms Rhynia, Lepidodendron, Lepidocarpon, Lepidostrobus.
6. Identifies general characters of Rhynia, Geological time scale types of fossils.
7. Understand the fossilization process and calculation of age of fossils by radioactive carbonization process.
8. To categories different Bryophyta-
9. Hepaticopsida: Marchantia.
10. Anthecerotopoida: Anthoceros
11. Bryopodia: Funaria
12. General understanding of initiatives of bryophytes and their evolution.
13. To demonstrate the skills of freehand sections, stainins, mounting of bryophyte and pteridophyte materials.
14. To observe and identify temporary micro preparation and permanent slides.

Core Course 3B Zoology
BSE II.3 B: DIVERSITY OF ANIMALS – II

On completion of the course, prospective teachers will be able to:

1. Understand diversities, organizational hierarchies, complexities, identifications and classifications, various modes of adaptations and habitats, external and internal body structures andfunctions, metamorphosis and life cycles of higher invertebrates(Arthropoda, Onychophora, Mollusca, Echinodermata), Hemichordata, Protochordata (Herdmania and Amphioxus) andvertebrates (Cyclostomata).
2. Develop positive attitudes towards taking interest to know about and to relate the higher invertebrates and chordates studied with the specimens of their local surrounding.
3. Acquire the responsibility and concern to protect higher invertebrate and chordate diversity and sustainability of their surroundings.
4. Make judicious use of beneficial invertebrates and chordates in their life with concern about protecting environment and diversity.
5. Draw the external and internal structures, different organ systems, compare and contrast, identify, give examples, classify, find the evolutionary relationship among higher invertebrates and vertebrates.
6. Practice and perform laboratory experiments and practical to possess skills of handling, observing, identifying, classifying the invertebrate and chordate specimens, staining and mounting of insect mouth parts.
7. Perform project work on collection, identification, classification and preservation of local insects through field studies.
8. Prepare specimen slides, collect local specimens for classroom transaction and Zoology Museum.

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Core Course I C : Botany
BSE III . I B: Gymnosperms and reproductive Biology of Angiosperms.

Course Learning Outcomes (CLOs):

1. On completion of the course, prospective teachers will able to demonstrate, the skills to observation and identifies the Morphological and anatomical structural variations and classification of Gymnosperms- Gnetum, Cycas and Pinus.
2. Recognise developmental process associated with Angiosperm embryology.
3. Perform experiments in tissue culture, toti-potency of plant cell and tissue culture techniques and different media preparation.
4. Understand the reproduction in embryological perspective Apomixis and Polyembryoy.
5. Pollination and Fertilization sect- incompatibility and double fertilization.
6. Types of cellular, nuclear and helobial endosperms and endosperms haustoria
7. Classify the types of embryos based on development crucifer type embryo development.
8. Understand the developmental stage of megaspore genesis, microspore genesis, bisporic and monosporic, tetrasporic embryo sacs.
9. Analyze the wide range of flowers for pollination and examination of Pollen germinability.
10. In-vitro germination of pollen grains.
11. Mounting the endosperm and embryo on slide and observe and infer the structursl variations.
12. Preparation of culture media and familiarization with tissue culture procedures.
13. Prepares permanent slides, with double staning micro preparations.
14. Categories different Farm genera.

    a) Psilopodia: psilotum
    b) Lycopodia: Lycopodium, Selaginella
    c) Sphonopodia: Equisetum
    d) Pteropotia: Marselia

Core Course 3C Zoology
BSE III.3 B: DIVERSITY OF ANIMALS – III AND COMPARATIVE ANATOMY

On completion of the course, prospective teachers will be able to:

1. Understand different animal tissues, diversities, organizational hierarchies, complexities, identifications and classifications, various modes of adaptations and habitats, external, internal body structures and functions, affinities and evolution, of higher vertebrates (Pisces, Amphibia, Reptilia, Aves and Mammalia).
2. Understand specific topics on scales in fish, parental care in Amphibia, poisonous apparatus and biting mechanism in snakes, feathers and migration in bird and skin in mammals.
3. Compare digestive, respiratory, circulatory, nervous and urinogenital systems of fish, amphibian, reptile, bird and mammal to find evolutionary relationship, diversity and taxonomic hierarchy.
4. Develop positive attitudes towards taking interest to relate the higher vertebrates studied with the specimens of their local surrounding.
5. Acquire the responsibility and concern to protect the vertebrate diversity and sustainability of their surroundings.
6. Make judicious use of beneficial invertebrates and chordates in their life with concern about protecting environment and diversity.
7. Draw the external and internal structures, different organ systems, compare and contrast, identify, give examples, classify and find the evolutionary relationship among vertebrates.
8. Practice and perform laboratory experiments and practical to possess skills of handling, observing, identifying, classifying the vertebrates, staining and mounting of fish scales.
9. Prepare permanent slides of tissues of vertebrates using microtome techniques and compare various tissues and bones among vertebrates.
10. Perform project work on observation, identification and classification of local common birds and mammals through field studies.
11. Prepare tissue slides and collect local specimens for classroom transaction and for museum enrichment.

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Skill Enhance Course I – Botony

BSE III. 6 B : Plant propagation, Nursery and Gardening.

Course Learning Outcomes (CLOs)

On Completion of the course, the student teachers will be able to demonstrate

1. Development and Management of Garden.
2. Cultivate vegetables in Kitchen Garden
3. Growing plants through appropriate techniques.
4. Identify seeds and Garden plants.

Skill Enhance Course I – Zoology

BSE III. 6 E: Apiculture

Course Learning Outcomes (CLO's)

1. The Student teachers will be able to understand and observe the different techniques of bee keeping.
2. Understand the behaviour of bee biology understand the role of bees in pollination.
3. To understand the techniques of honey bee management and importance to man
4. To understand the diseases of preserving honey, economic importance and medicinal value.
5. To understand, observe the diseases of honeybees and prophylactic measures.
6. To develop entrepreneurial skills in beekeeping.
7. Apiculture its history, importance, types of bees, beehives, floral colander.
8. Quality of honey vs floralcolander.
9. Bee colony management.
10. Different methods of collective honey. Harvesting quality honey. Hive products.
11. Understand the reproduction honey bees, maintenance of beehive boxes selection of beehive equipment.
12. To provide hands on experience in bee keeping and skills of bee keeping.
13. Applications of the modern technology employee in beekeeping
14. Understanding the honey bee environment and life cycle.
15. Honey extraction methods
16. Study of predators on honeybees
17. Study of robber bees
18. Study of Morphology of worker, drone and Queen Bees.

Core Course 1 D : Botany

BSE IV I B : Plant Anatomy and Ecology

Course Learning Outcomes (CLOs):

1. On completion of course Prospective student teacher will be able to demonstrate and acquaint the students with development organization and function of tissue in plants
2. To understand the histological complexity in plants
3. Able to understand and analyze the structural dynamics of cell division in meristematic cell and permanent cells historical complexity of vercularization like xylem, phloem and cambium.
4. Understanding the theories of tunica-corpus theory of Shootapex. Mantle core concept, histogen theory, buvats theory of tissues.
5. Secondary or within RAO and shoot related theory of RAO – Karper-kappe theory
6. Secondary growth in stem, anamdorus secondary grouth Bougainvillea, Dracaena
7. Broad understanding about various factors and their influence on environment and ecosystem and its biotic and abiotic components, food chain, food web ecological Phylamids. Bio-geochemical cycle like carbon nitrogen and phosphorus in environment.
8. Understanding the nature of community ecology like frequency density , lifeform.
9. Understanding the plant Succession, xearch as an example
10. Understand the anatomical morphological and physiological adaptation in plants to environment example hydropnutes, xenopnutes, halopnutes.
11. Understanding the WCU, IPR, red data book, plantation laws conservation types, conservational strategies and conservation efforts done at India at International level
12. Understanding environmental pollution causes, effects, remedies of
    - air pollution
    - water pollution
    - soil pollution
    - radioactive pollution
    - Noise pollution and remedies.

*RAO= Root apical organization

SAO= Shoot apical organization

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Core Course 3D: Zoology
BSE IV.3B: ECOLOGY, BIOGEOGRAPHY AND WILDLIFE

On completion of the course, prospective teachers will be able to:

1. Understand various components of the environment, recycling of minerals and nutrients through biogeochemical cycle, flow of energy and conservation of natural resources management in changing environment, types, causes and remedial measures for various types of pollution, population and community characteristics, sustainability of population in environment, nature of ecology, dynamics of ecosystem- ecological pyramids, energy flow in ecosystem, production, process of bioremediation, biosphere and impact of climate on biomes, aquatic and terrestrial habitat as ecosystem, types and biotic communities, physico-chemical factors, ecological succession, biogeography realms of the world, fauna diversity in India, biodiversity and its importance, basic principles of ecology in wildlife conservation and management.
2. Understand factors affecting population, paramount role and importance of nature, impart knowledge about the judicious use of existing ecological resources for sustainable development and suggest measure to conserve wildlife.
3. Develop positive attitudes towards taking interest in conserving wildlife, analyze the relationships among animals with their ecosystem, and develop leadership skills to promote betterment of environment.
4. Acquire the responsibility, interest and concern to protect local habitats and wildlife.
5. Draw ecological pyramids, food chain and food web, lake and marine stratifications.
6. Practice and perform laboratory tests to estimate dissolved oxygen, alkalinity, salinity in pond water, identify common planktons, nektons in aquatic environment and find out gut contents in fish and animal adaptation in different habitats.
7. Perform practical of ciliate culture in a medium, terrarium of local insect, collection and analysis (qualitative and quantitative) of soil organism for population growth pattern.
8. Perform project work to identify different specimens and economically important species of different habitats through biological study tour.
9. Collect local specimens for classroom transaction and for museum enrichment.

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Skill Enhancement Course SEC 2: Zoology
BSE IV.6E: SERICULTURE

On completion of the course, prospective teachers will be able to:

1. Understand types, classification, life cycle, morphology, silk gland, endocrine gland and distribution of silkworm; role of Central Silk Board, maintenance of mulberry plants, soil condition for mulberry plants.
2. Recognize the diseases, pests of silkworm and their control measures.
3. Attain skills in collecting disease free layings (DFLs), selecting races and species of silkworm, incubating the egg, hatching, brushing, feeding, moulting and spinning of silkworm, emergence of silk moth, pairing, despairing and laying of eggs.
4. Develop positive attitudes towards silkworm for their importance in the economy of the country.
5. Practice and perform laboratory and field experiments to possess skills of collecting, handling, observing, identifying, managing sericulture techniques and owning entrepreneurship.
6. Appreciate the modern techniques employed in sericulture.
7. Prepare models and teaching-learning materials in sericulture for classroom transaction.

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Core course 1E: Botony

BSE V 1 B: Botanical Nomenclature,

Angiosperm Taxonomy and utilization of plants.

(CLOs): Course learning outcomes:

On completion of the said course, the student teachers will be able to exhibit following skills.

1. To understand the principles of plant nomenclature, keys, furals and herbaria.
2. Rules & Recommendation RCBN, and to appreciate the evolution of taxonomic thrusht and various system of classification; Bentham & Hooker, cron quirt artificial system of classification.
3. To understand the diversity that exists among angiosperms.
   Hasnoliale: Fabaceae;Rutaceae; Apiaceae: Rubiaceae.
4. To make a detailed study of selected families. Euphorbiaceae; Amaranthaceae; Solanaceae; Lamiaceae; Liliaceae; poaceae; Arecaceae
5. To appreciate the utility of plants and plant products in human welfare.
   Like cereals, pulses, fibres, vegetables, Timber & bamboos, beverages, spices & condiments, rubber & medicinal plants.
6. Leave to go on local
7. Visit of field stay for 3-5 days to understand the
8. The student will be able floral elements.
9. To draw floral diagram & floral formula of plant in detail.
10. Student will understand the concept of Ethno botany.

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Core Course 3 E: Zoology
BSE V.3B: DEVELOPMENTAL BIOLOGY, APPLIED ZOOLOGY AND ETHOLOGY

On completion of the course, prospective teachers will be able to:

1. Comprehend the structures, types and functions of sperm and ovum, significance of fertilization, parthenogenesis, cleavage, gastrulation and organizer phenomenon.
2. Understand the developmental stages of chick embryos, extra-embryonic membranes of chick, placenta in mammals and regeneration in animals.
3. Recognize the economic importance of beneficial and harmful animals; objectives of ethology, significance of learning and imprinting, social behaviors in honey bees and monkey, and control of behavior.
4. Make judicious use of beneficial animals and their products and effective control measures of economically harmful animals.
5. Practice and perform laboratory experiments and practical to possess skills of staining and mounting of chick embryos; preening behavior in birds, taxes in *Drosophila*, aggressive behavior in male Siamese fighter fish and colour change in female Siamese fighter fish.
6. Perform project work on moriculture, collection of laying, incubation, black boxing, brushing, rearing, moulting, spinning, harvesting cocoons, reeling raw silk.
7. Prepare models on fate maps of chick and frog embryology for classroom transaction.

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BSE V.6A : Pedagogy of Mathematics 1

Course Learning Outcomes (CLOs)

On completion of this course, prospective teachers will be able to demonstrate:

1. Analyses and applies nature and structure of mathematics, its horizontal and verticle linkages, branches and relationships with other subjects
2. Recongnises the importance of facilitation of mathematization process among learners to deal effectively with various situations
3. Appreciating the contributions of Indian and other mathematicians
4. Realises the essence of Aims and objectives of teaching mathematics, applying these into practice by designing unit and lesson planning
5. skills of analysing the content, writing good instructional objectives, writing unit and lesson plans
6. Applies the strategies of teaching mathematical concepts by using- CAM, AOM and moves in teaching concepts
7. Applies the strategies of teaching mathematics generalizations by using-expository strategies-discovery, inductive, deductive and moves in teaching generalization.
8. Applies logical reasoning and problem solving ability in solving various mathematical problems

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Core Course 1F Botany

BSE VI. 1B: Plant physiology and metabolism.

Course learning outcomes (CLO's)

On completing the course the prospective student teachers will be able to demonstrate & exhibits the following skills.

Unit I:

1. Acquit the students will sub-cellular physiological phenomena in plants.
2. To understand the water relations in plants
3. To understand the functioning of plants from the physiological point of view; Like absorption of water; apoplast, symplast and Trans-membrane pathways.
4. Observation of cyclises.
5. Importance of water to plant life properties of water.
6. Review of diffuriem, osmonis and imbibitions.
7. Concept of water potential, osmotic partial pressure potential; solute potential; role of aquaperins.
8. Ascent of sap; Root pressure theory.

Unit II:

1. The students teachers will observe understand and analyze the different physiological problems like Transpiration definition, mechanism, stomatal closing and opening (role of k^+ ions and absciric acid).
2. Calculation of stomatal index, frequency, area of stomatal aperture.
3. Factors affecting the rate of Transpiration Guttation. Anti-transpiration.
4. Cellular respiration, Introduction, R.Q (Respiratory Quitient)
5. Aerobic respiration
6. Structure of mitochondria (power gause of cell)
7. Glycolysis
8. Synthesis of acetyl-coA
9. Krebs cycle
10. Oxidate phosphorilation
11. Electron carrier complexes
12. Chemi osmatic hypothesis
13. Proton pump theory
14. Synthesis of ATP (Paul Boyer's)
15. Pentose phosphate hypothesis pathway
16. Demonstration of necessity of Co_2, gisht & chlorophyll for photosynthesis

Unit III:

1. Photosynthesis, its history, introduction
2. Ultra structure of chloroplast
3. Photosynthetic pigments, pigment system I, Pigment system II.
4. Absorption and action spectra of chlorophyll
5. Plotting absorption spectrum chlorophylls
6. Photo chemical gist reaction
7. Separation of photosynthetic pigments by paper chromatography.
8. Photo phosphorylation
9. Z-scheme
10. Calvin cycle
11. C_4 Pathway
12. EAM pathway
13. Photo respiration
14. Factors and significance of photosynthesis
15. Quantative estimation of chlorophylls by calorimetry.

b) Transport of organic substances,

1. Ultra structure of phloem (sieve tubes)
   Function of phloem in food conduction in plants
2. Mechanism of phloem transport
3. Source – sink relation slip
4. Theories and factors effecting photosynthesis
5. Demonstration of transpirational pull

c)

1. Miner nutrition; Major, Minor
2. Micro-nutrients absorption of mineral salts, mechanism, theories of mineral uptake
3. Passive absorption; mass flow, Denman equilibrium
4. Active absorption – carrier concept
5. Cytochrome pump hypothesis
6. Role of N,P,K,Ca, Mg, Fe, N and Zn in plant metabolinon
7. Mineral deficiency symptoms

Unit IV:

Student will able to understand growth & development definition, phases of growth, development, photosynthesis,

- ❖ Testing of germinibility of seeds by TTC method. Brief account of phytochromes. – Discovery, physiological role and mechanism of action.

b) Plant growth regulations:

- ❖ General account, discovery, chemical nature, physiological effects and application of auxins, kinins, gibbellins, ethylene and abscinic acid.
  Brief account of plant movements.

c) Physiology of flowering:

1. Brief account of photoperiodism, short day, long day and day neutral-plants.
2. Night interruption phenomenon
3. Florigin concept
4. Role of phytochromes
5. Demonstration of photo-periodism geo-tropism
6. Brief account of vernalization

Core Course 3F : Zoology
BSE VI. 3B: ANIMAL PHYSIOLOGY, ENDOCRINOLOGY AND IMMUNOLOGY

On completion of the course, prospective teachers will be able to:

1. Understand various physiological process of human body (digestion, circulation, respiration and excretion), role of endocrine secretion in mammals, muscle physiology, adaptation of animals in change in internal environment, mechanism of digestion and absorption of nutrients, reproductive cycles in mammals, chemical nature and role of biological molecules, defense mechanism of body.
2. Comprehend the mechanisms that work to keep the human body alive and functioning; interaction and interdependence of physiological and biochemical processes in the body.
3. Acquire fundamental knowledge in composition of blood, blood born disease, mode of action of hormones, mechanism of immune deficiency and preventive measures of AIDS.
4. Draw the structures of circulatory, excretory and respiratory organs of humans, structure and types of neurons, ultra structure of striated muscle and various immune cells.
5. Practice and perform laboratory experiments include total count of RBC, WBC, preparation of blood smears of frog and man, estimation of hemoglobin, find out the rate of respiration in terrestrial / aquatic animals, human urine analysis, study of stained slides of mammals, demonstration of antigen antibody reaction in gels.

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BSE VI.5 PEDAGOGY OF PHYSICAL SCIENCE 2

Course learning outcomes (CLOs)

On completion of the course, the student teacher's will be able to

1. Adopt constructivistic approach of lesson plan by using 5E model
2. Apply different teaching methods; integrate ICT in physical science teaching.
3. Conduct action research in physical science , explore various assessment strategies in physical science.
4. Conduct science fairs, debates, visits to a special school, science museum, science parks, science day celebration.
5. Apply innovative approaches to teaching physical sciences, simulated teaching, use of improvised apparatus in teaching physical science..

BSE VI.6A : PEDAGOGY OF MATHEMATICS 2

Course Learning Outcomes (CLOs)

On completion of this course, prospective teachers will be able to demonstrate:

Course Learning Outcomes (CLOs)

1. Visualizes the nature of teaching proof and problem solving in mathematics and applies them with suitable approaches in given mathematical context as well as real life context.
2. Analyses the purposes of teaching algebra and geometry and using it in real life context.
3. Select suitable tools for mathematical construction and measurements and uses them efficiently.
4. Appreciates the utility aspects of mathematics in day today activity in various fields and applies problem solving skills in dealing with them.
5. Adopts different of approaches, methods, strategies to meet the diversified needs of learners and appreciates the availability of various learning resources in mathematics teaching.
6. Shows decision making ability to use appropriate assessment tools for mathematical assessment and justifies with relevant evidences.
7. Realizes the essence of feedback mechanism for improvement of learning process.

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Discipline Specific Elective (DSE) 3 A: ZOOLOGY
BSE VII.3B: CELL BIOLOGY, GENETICS AND EVOLUTION

On completion of the course, prospective teachers will be able to:

1. Understand the modern concepts of Cell Biology, viz., plant and animal cell differences, cell theory, protoplasm, cytoskeleton, cell membranes, structure and functions of various cell organelles (endoplasmic reticulum, mitochondria, Golgi complex, ribosomes and lysosomes, nucleus, chromosomes) and cancer.
2. Comprehend the modern concepts of genetics namely, Mendel's laws of inheritance, non-Mendelian inheritance (Incomplete dominance and codominance), interaction of genes (Epistasis, complementary genes, multiple gene inheritance and multiple alleles inheritance), linkage and crossing over, sex determination, sex linked inheritance, cytoplasmic inheritance, chromosomal aberrations and inborn errors of metabolism in humans.
3. Understand different concepts of evolution, namely theories of origin of life, Urey Miller's experiment, theories of evolution (Lamarckism, neo-Lamarckism, Darwinism, neo-Darwinism, mutation theory, modern synthetic theory of evolution, genetic drift and Hardy-Weinberg's law), concept of species and speciation, micro-, macro- and mega-evolution, evolution of man, coloration and mimicry.
4. Develop positive attitudes towards taking interest to know about the relationship among cell biology, genetics and evolution.
5. Create awareness regarding hereditary diseases, cancer, scientific basis of inheritance, origin of life and evolution of animals.
6. Perform laboratory experiments and practical related to cell biology to possess skills of staining mitochondria in buccal epithelium, preparing slides of mitosis in onion root tips, meiosis in grasshopper testis and drosophila salivary gland chromosomes, measuring cell size through micrometry and observing cerotype and ideogram of man.
7. Perform laboratory culture of drosophila to study life cycle, mutant and normal flies of drosophila and identify ABO groups and Rh factor in human blood with use of anti-serum.
8. Perform 2project works in genetics: 1st for conducting breeding experiments of in *Drosophila* to verify laws of a) segregation, b) independent assortment and sex linked inheritance and the 2nd for finding out inheritance patterns of selected trains in human population (PTU-test, rolling of tongue, ear lobe attachment, baldness etc.).
9. Identify different fossils from the models of trilobites, fish, archaeopteryx and skulls of prehistoric and modern man.
10. Prepare models of fossils for classroom transaction and for museum enrichment.

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DSE 3 B: ZOOLOGY
BSE VIII.3B: BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

On completion of the course, prospective teachers will be able to:

1. Understand the modern concepts of concepts and applied aspects of biochemistry, viz., carbohydrates (classification, structures, metabolism-glycolysis, TCA cycle, electron transport system and gluconeogenesis), proteins and lipid (classification, structure and metabolism), enzymes (classification, laws of mechanism of enzyme action, regulation and factors affecting enzyme action, coenzymes and inhibitors), roles of vitamins and minerals in health and nucleic acids (types, structure and functions).
2. Comprehend the modern concepts of molecular biology namely, RNA (structure, types and functions), DNA replication in prokaryotes, gene expression (central dogma, transcription in prokaryotes, genetic code, translation in prokaryotes) and regulation of gene expression (lac operons).
3. Understand different concepts of biotechnology, namely restriction endonucleases, ligases, vectors, cDNA library, cloning, PCR and bioinformatics.
4. Develop positive attitudes towards taking interest to know about the relationship among biochemistry, molecular biology and biotechnology.
5. Appreciate application of biological tools and techniques in understanding the concepts of these three subjects.
6. Perform practical to develop the skills of identifying enzyme actions and effects of factors (pH, temperature and substrate concentrations) on enzyme actions and in digestive tracts of cockroach and qualitatively different amino acids in the food samples through paper chromatography,
7. Demonstrate the presence of different carbohydrates, protein and lipids in food and body fluids and isolate DNA from the tissues of kidney and spleen of rat.
8. Demonstrate easy and simple experiments for classroom transaction.

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DSE 2B Botany

BSE VIII: Molecular Biology, Biochemistry & Biotechnology

Credits: 3 (L + 1T + 1P) **Marks: 100**
Contact hours per week: 5 **C1+C2=50**
Exam duration: 2hours **C3=50**

CLOs: Course Learning Outcomes

On completion of the course, prospective student teachers will be able to demonstrate the following skills and acquit themselves with tools & techniques of Bio-technology.

Unit I:

- Student's teachers will understand the functions of biological macromolecules: like DNA, plastids, DNA damage, repair replication DNA.
- To understand and appreciate the importance of Nucleic acids and gene research in modern times.
- RNA types, structure, characteristics, structural properties and functions. Role of RNA's in protein synthesis.
- Gene structure, regulation in prokaryotes, operon concept – lac & tryptophanoperon.
- Genetic code

Unit II:

Nitrogen metabolism; biological nitrogen fixation.

Identification of amino acid by calculating the Rf values and comparing in the given sample by proper chromate graphic method.

- ❖ Understanding redutamination and Trans amination process.
- ❖ Understanding the principles of, protein clarification; primary, secondary, tertiary and quaternary types.
- ❖ Bio synthesis of protein, transcription, m-Rosa, translation inhibitors of protein synthesis.

Unit III:

Carbohydrates: Understanding the structure & nature of Carbohydrates,Introduction, clarification, chemical structure, mono, oligo and polysaccharides, synthesis and break down of surne & stench.

Lipids: Understanding the structure, nature of Lipids, Introduction, clarification, synthesis and break down of fatty acids b-oxidation.

Enzymology: Discovery, nature, nomenclature and clarification
Mechanism of enzyme action,
-louc & key hypothesis
-induce fit hypothesis
-regulation of enzyme action, enzyme inhibitors, prosthetic groups, co-enzymes, factors, affecting enzyme action.

Unit IV:
Biotechnology and Bio-informatics.

(a) Tools and techniques, cloning vectors,
    (i) Brief account of genomics and e-DNA library.
    Understanding the clones: Procedure, PBR3zz, vector
    (ii) Gene cloning with vectors,
    Ti-plasmid mediated gene transfer brief account of genomics.
    (iii) e-DNA, library, interferon, transposable elements.
    Understand PCR & BIO-informatics.

(b) Applications of Bio-technology and functional definition and applications. Brief account of DNA finger printing Agro bacterium – mediated gene transfer & r-DNA Technology. Achievement in crop plants, improvement transgenic plants and their applications. (GM crops and issues) Bt-Binjal, Bt-cotton, turmeric, basmathi patent rights.

(c) Brief account of recent advances in plant bio-technology; products of Bio-technology

(d) Brief account of bio-informatics – Genomics, proteomics.

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B.Sc.BEd

VIII.5 : KNOWLEDGE AND CURRICULUM

On completion of the course, prospective teachers will be able to :

1. Explain the concept and the need for curriculum in schools.
2. Explore the influences of the knowledge categories, social, cultural, economic and the technological aspects in shaping the present school curriculum and the text books.
3. Analyze the principles employed in sequencing the school curriculum and the syllabus at different levels.
4. Identify various learning sites and resources operating as curriculum supports in the system.
5. Analyze the multiple roles of schools in implementation of curriculum.
6. Discuss the roles and responsibilities of curriculum stakeholders.
7. Critically analyse the role of teachers in operational sing the curriculum.
8. Examine the processes and criteria commonly used to evaluate curriculum in pursuit of improvement.
9. Explore the evaluation approaches adopted to revise the curriculum at the national and state levels.
10. Analyze the national curriculum frameworks for necessary reforms proposed and their implications at school level.
11. Develop an image of oneself as a curriculum informant, designer, agent, and evaluator.

BSE VIII.7. VALUE AND PEACE EDUCATION

Course learning outcomes (CLOs)

On completion of course, the student teacher will be able to

1. Know the importance of peace and values in education.
2. Understand and illustrate various methods, techniques and approaches of value development.
3. Understand the five core values of truth, righteous conduct, peace, love and Non-violence and their importance in life.
4. Understands the necessity of living together and imbibe change in their attitude and behaviour.
5. Understands the need for value based education for peace at present context, national and international context.
6. Analyse the direct and indirect approaches of inculcating value based education and peace.

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B.Ed

B.Ed - PC-5: CREATING AN INCLUSIVE SCHOOL

BA.B.Ed - BAE VII. 4: Creating an Inclusive School

BSc.B.Ed- BSE VII.4 :CREATING AN INCLUSIVE SCHOOL

M.Sc.Ed:CREATING AN INCLUSIVE SCHOOL

On completion of the course, prospective teachers will be able to :

1. Analyse the meaning and concept of Special Education, Integration and Inclusion.
2. Appreciate the special needs of Individuals with diverse needs.
3. Realize the importance of inclusive education and inclusive education programmes
4. Examine the role of various agencies towards inclusion.
5. Appreciate the concept of exceptional children.
6. Identify the exceptional learners in a classroom.
7. Explore the nature and needs of different categories of children with special needs.
8. Implement the different considerations and provisions for facilitating inclusion.
9. Exercise various educational intervention programmes for meeting the needs of exceptional learners.
10. Employ the skills of adapting curriculum to meet the need of the students with diverse needs.

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Yoga Education, Self-Understanding and Development

Course Learning Outcome.

On the Completions of the Course, prospective teachers will be able to demonstrate

1. Some Important Asanas and Pranayamas
2. He/She will have a clear Idea about the Concepts like Self-esteem & Self-Concept & its importance.
3. Ability to State the Different types of yoga (Astana Yoga, Hatha Yoga etc.,)
4. The Process of Meditation and Stress management
5. The Process of Personality Development through Yogic Practice.

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UNIVERSITY OF MYSORE

REGIONAL INSTITUTE OF EDUCATION
[National Council of Educational Research and Training, New Delhi]

Regulations governing the Programme

1.0 Programme and Duration :

Integrated Programme of Teacher Education titled **'Bachelor of Science and Bachelor of Education' (B.Sc.B.Ed.)** degree programme. The programme will be of four year duration organized on the semester pattern with 2 semesters in a year. Each semester will consist of a minimum of 16 weeks of instruction excluding examination.

1.1 **Equivalence:**

The course contents related to Physics/ Chemistry/ Mathematics/ Botany/ Zoology offered in the Programme are equivalent to the courses offered in the
B.Sc. (PCM/CBZ) Programme recommended by the UGC (2015) and the University of Mysore.

The Course contents of the professional education component are equivalent to that of B.Ed. of University of Mysore and are in accordance with the norms and regulations for the B.Sc.B.Ed. Programme as prescribed by the NCTE (2014). This degree B.Sc.B.Ed. is thereby equivalent to B.Sc. degree of the University of Mysore and the UGC and the B.Ed. degree of the University of Mysore and the NCTE.

On successful completion of the programme, students are eligible for admission to Master Degree Programmes in respective subjects in the University of Mysore and other Indian/Foreign Universities.

2.0 Eligibility for admission to B.Sc.B.Ed.

2.1 Candidates seeking admission to the programme should have passed CBSE Senior Secondary examination/ Pre-University examination of Karnataka or an equivalent examination of Kerala, Andhra Pradesh, Tamil Nadu, Telangana or the UT of Lakshadweep/Puducherry with 45% marks in the aggregate. Relaxation up to 5% of marks is given to the SC/ST candidates.

2.2 Candidates should have passed the qualifying examination with the following combinations of subjects. For admission to the PCM stream : Physics, Chemistry, Mathematics/Statistics; For admission to CBZ stream : Physics, Chemistry, Mathematics, Biology or Biotechnology; Physics, Chemistry, Biology / Chemistry, Botany and Zoology.

2.3 Admission shall be made by selection on the basis of marks in the qualifying examination and performance in a specially designed national level test (Common Entrance Examination) conducted by the NCERT. It shall be governed by the admission policies of NCERT and the guidelines of the University of Mysore.

Admission will be in accordance with administrative policies related to proportionate representation (based on the latest available census report) to different States in the region. It will also be governed by the reservation policies of Govt. of India as prevalent at the time of admission.

3.0 Scheme of Instruction :

Details of courses and scheme of study, duration, etc. are provided in Table 1.

Courses of Study are organized under the following captions :

a) Core Courses
b) Ability Enhancement Courses
c) Discipline Specific Electives
d) Skill Enhancement Courses
e) Generic Courses
f) Professional Education Courses.

3.1 **Core Courses:**

The Programme offers two streams. Each stream has 3 majors ï PCM and CBZ. Each Major comprises of 6 core courses. The titles of courses in each major and their positions are given in Table 2.

3.2 **Ability Enhancement Courses :**

This is mandatory for all students. It comprises of 8 courses offered during I to IV Semesters, four each in a language of studentôs choice and four in English.

a) Language: Any one of the following: Kannada/ Hindi / Malayalam/Tamil / Telugu
b) English

3.3 **Discipline Specific Elective:**

Total of six courses, two in each Major Subject are offered in the VII and VIII semesters of the Programme.

3.4 **Skill Enhancement Course:**

Two courses are offered in the third and fourth semesters of the Programme. Students can choose any two courses of their choice, cutting across disciplines, from a pool of courses that are being offered in each subject area.

3.5**. Generic Course:**

Two courses of inter-disciplinary nature are offered in the first and eighth semester of the programme.

3.6 **Professional Education Courses:**

In accordance with the NCTE regulations ï 2014, the programme includes 23 courses which are positioned throughout the 8 semesters. The requirements of the 20-week internship proposed by the NCTE, are met through five rigorous phases of School Attachment Programmes. The first three Phases are of 2-week duration each, which will be organized in the Demonstration School and selected schools in and around Mysuru. The fourth phase is of 3 weeks duration, i.e. 1 week exclusively for working with community. The final phase is of 11 weeks and will be organized in selected schools of NVS of Hyderabad Region or other schools.

4.0 Attendance

Each student has to attend a minimum of 75% of the classes conducted in each course. Failure to meet the minimum requirement renders disqualification from terminal

examination and makes him/her ineligible for NCERT scholarship/ free ship. Such a student is deemed to have dropped the course and is not allowed to write the semester end examination of that course. He has to re-register for the course/s as and when they are offered by the institute.

5.0 Medium of Instruction:

The medium of instruction and examination is English.

6.0 **Course Structure**

TABLE 1: Credit Break-up into B.Sc. and B.Ed. Components and Mode of Evaluation

Semester	Total Credits		Programme	Credits (Theory) (L)	Teaching hours per week (L)	Credits : Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)	Assessment C1+ C2	Terminal Assessment C3)
I	24	18	B.Sc.	13	13	5	10	23	50	50
		6	B.Ed.	4	4	2	4	8	50	50
II	24	18	B.Sc.	13	13	5	10	23	50	50
		6	B.Ed.	4	4	2	4	8	50	50
III	29	21	B.Sc.	15	15	6	12	27	50	50
		8	B.Ed.	4	4	4	8 + 2 Wks	12	50	50
IV	29	21	B.Sc.	15	15	6	12	27	50	50
		8	B.Ed.	4	4	4	8 + 2 Wks	12	50	50
V	26	12	B.Sc.	9	9	3	6	15	50	50
		14	B.Ed.	7	7	7	10+ 2 Wks	17	50	50
VI	27	12	B.Sc.	9	9	3	6	15	50	50
		15	B.Ed.	6	6	9	12 + 3 Wks	18	50	50
VII	29	9	B.Sc.	3	3	6	12	15	50	50
		20**	B.Ed.	4	4	12**+4	8+11 Weeks	12	50	50
VIII	21	11	B.Sc.	5	5	6	12	17	50	50
		10	B.Ed.	6	6	4	8	14	50	50
Total	209			121	121	88	142	263		

*internship ** includes internship credits

L : Lectures: 1 credit =1hr/week x 16 weeks T :Tutorial/ 1 credit = 2 hr/week x 16 weeks

P : Practicum/practical = 2 hr/week x 16 weeks V: Credit value of a course is L+T+P

TABLE 2 PANORAMA OF COURSES WITH CREDIT BREAK-UP IN THE EIGHT-SEMESTERS

Sl.No.	*COURSE*	*CREDIT BREAK-UP SEMESTERWISE (L+T+P)*								Credits (L+T+P)	*Total Credits In Prog.*
		I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*		
	CORE COURSES:										
1	*Physics/Botany*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	--	--	*18+0+6*	*24*
2	*Chemistry*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	*3+0+1*	--	--	*18+0+6*	*24*
3	*Maths/Zoology*	*3+1+0 3+0+1*	*3+1+0 3+0+1*	*3+1+0 3+0+1*	*3+1+0 3+0+1*	*3+1+0 3+0+1*	*3+1+0 3+0+1*	--	--	*18+6+0 18+0+6*	*24*
	ABILITY ENHANCEMENT COURSES										
1	*Language H/K/M/Tam/Tel*	*2+1+0*	*2+1+0*	*2+1+0*	*2+1+0*	--	--	--	--	*8+4+0*	*12*
2	*Eng/Comm. Eng*	*2+1+0*	*2+1+0*	*2+1+0*	*2+1+0*					*8+4+0*	*12*
	SKILL ENHANCEMENT COURSES										
1	*Courses 1 & 2*	--	--	*2+0+1*	*2+0+1*	--	--	--	--	*4+0+2*	*6*
	DISCIPLINE SPECIFIC ELECTIVE										
1	*Physics/Botany*							*1+1+1*	*1+1+1*	*2+2+2*	*6*
2	*Chemistry*							*1+1+1*	*1+1+1*	*2+2+2*	*6*
3	*Maths/Zoology*							*1+1+1*	*1+1+1*	2+2+2	**6**
	GENERIC ELECTIVE										
1	*Environmental Education*	*1+1+0*								*1+1+0*	*2*
2.	*Indian Constitution & Human Rights*	*1+1+0*								*1+1+0*	*2*
	PROFESSIONAL EDUCATION COURSES										
1	*Language Across Curriculum*	*3+1+0*								*3+1+0*	*4*
2	*Contemporary Indian Education*		*3+1+0*							*3+1+0*	*4*
3	*Yoga Edu., self-understanding & development*		*1+0+1*							*1+-0+1*	*2*
4	*Understanding the Learner*			*3+1+0*						*3+1+0*	*4*
5	*Gender School & Society.*			*1+1+0*						*1+1+0*	*2*
*6**	*School Attachment Programme 1to 4*			*0+0+2*	*0+0+2*	*0+0+2*	*0+0+3*			*0+0+9*	*9*
7	*Learning & Teaching*				*3+1+0*					*3+1+0*	*4*
8	*Drama & Art Education*				*1+1+0*					*1+1+0*	*2*
9	*Assessment for Learning*					*3+1+0*				*3+1+0*	*4*
10	*Pedagogy of Physical Science*					*2+2+0*				*2+2+0*	*4*
11	*Pedagogy of Maths/ Biol. Sci.*					*2+2+0*				*2+2+0*	*4*
12	*Critical Understanding of ICT*						*2+2+0*			*2+2+0*	*4*
13	*Pedagogy of Physical Science*						*2+2+0*			*2+2+0*	*4*
14	*Pedagogy of Maths/ Biol. Sci.*						*2+2+0*			*2+2+0*	*4*
15	*Creating an inclusive school*							*2+2+0*		*2+2+0*	*4*
16	Health & Physical *Education*							*1+0+1*		*1+0+1*	*2*

17	*Reading & reflection on text*							*1+1+0*		*1+1+0*	*2*
*18**	Internship in School Subject 1: Physical Science							*0+0+6*		*0+0+6*	*12*
*19**	Internship in School Subject 2: Maths/ Biol. Sci							*0+0+6*		*0+0+6*	
20	Knowledge & Curriculum								*2+2+0*	*2+2+0*	*4*
21	Guidance & Counselling in Schools								*3+1+0*	*3+1+0*	*4*
22	Value & Peace Education								*1+1+0*	*1+1+0*	*2*

***=courses which do not have C3 Theory examination**

L : Lectures: 1 credit =1hr/week x 16 weeks

T :Tutorial: 1 credit = 2 hr/week x 16 weeks

P : Practicum/practical 1 credit = 2 hr/week x 16 weeks

V: Credit value of a course is L+T+P

Note : VII Semester consists of 25 weeks out of which 11 weeks of School Attachment Programme-internship in Teaching will be organized in schools outside Mysore. 14 weeks are available for classroom instruction.

Tables 3 to 10: Detailed Course Structure for B.Sc.B.Ed.

Total Credits = 209; B. Sc. Component = 122; B.Ed. Component = 87

TABLE 3: Semester I (Credits: B.Sc.12; AEC 6; B.Ed. 6; Total 24)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	Core Course1A Physics/Botany	3	3	1	2	5
2	4	Core Course 2A Chemistry	3	3	1	2	5
3	4	Core Course 3A Mathematics/ Zoology	3	3	1	2	5
4	3	AEC 1A Lang H/K/M/Tam/Tel	2	2	1	2	4
5	3	AEC 2A English	2	2	1	2	4
6	2	GE - Environmental Education	1	1	1	2	3
7	4	Language across the curriculum	3	3	1	2	5
Total	**24**		**17**	**17**	**7**	**14**	**31**

Note: 1A, 2A & 3A ï Numerals refer to the majors, and A refers to the First course in each major.

From Sem II to VI, papers in core courses are designated B, C, D, E & F

AEC ï Ability Enhancement Course; GE- Generic Elective of Inter-disciplinary nature

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 4 : Semester II (Credits: B.Sc. 12; AEC 6; B.Ed. 6; Total 24)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	Core Course 1B Physics/ Botany	3	3	1	2	5
2	4	Core Course 2B Chemistry	3	3	1	2	5
3	4	Core Course 3B Mathematics/ Zoology	3	3	1	2	5
4	3	AEC 1B Lang ï H/K /M/ Tam/Tel	2	2	1	2	4
5	3	AEC 2B English	2	2	1	2	4
6	4	Contemporary Indian Education	3	3	1	2	5
7	2	Yoga Edu., self-understanding & development	1	1	1	2	3
Total	24		17	17	7	14	31

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 5 : Semester III (Credits: B.Sc. 12; AEC 6; SEC 3; B.Ed. 8; Total 29)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	Core Course 1C Physics/Botany	3	3	1	2	5
2	4	Core Course 2C Chemistry	3	3	1	2	5
3	4	Core Course 3C Mathematics/ Zoology	3	3	1	2	5
4	3	AEC 1C Lang ï H/K /M/ Tam/Tel	2	2	1	2	4
5	3	AEC 2C English	2	2	1	2	4
6	3	*Skill Enhancement Course 1	2	2	1	2	4
7	4	Understanding The Learner	3	3	1	2	5
8	2	Gender School & Society	1	1	1	2	3
9	2	School Attachment Programme 1	0	0	2	2 weeks	4
Total	29		19	19	10	20	39

*** SEC 1 - Skill Enhancement Course 1 –** Each student will select any one of the 5 courses offered.
Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 6 : Semester IV (Credits: B.Sc.12; AEC 6; SEC 3; B.Ed. 8; Total 29)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	CoreCourse1D Physics/Botany	3	3	1	2	5
2	4	Core Course 2D Chemistry	3	3	1	2	5
3	4	Core Course 3D Mathematics/ Zoology	3	3	1	2	5
4	3	AEC 1D Lang ï H/K /M/ Tam/Tel	2	2	1	2	4
5	3	AEC 2D English	2	2	1	2	4
6	3	*Skill Enhancement Course 2	2	2	1	2	4
7	4	Learning & Teaching	3	3	1	2	5
8	2	Drama & Art Education	1	1	1	2	3
9	2	School Attachment Programme 2	0	0	2		2 weeks
Total	29		19	19	10	16	35

*** SEC 2 - Skill Enhancement Course 2 –** Each student will select any one of the 5 courses offered.

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 6: Semester V (Credits: B.Sc. 12; B.Ed. 14; Total 26)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	Core Course 1E Physics/Botany	3	3	1	2	5
2	4	Core Course 2E Chemistry	3	3	1	2	5
3	4	Core Course 3E Mathematics/ Zoology	3	3	1	2	5
4	4	Assessment For Learning	3	3	1	2	5
5	4	Pedagogy of Physical Sciences	2	2	2	4	6
6	4	Pedagogy of Maths/Biol. Sci.	2	2	2	4	6
7	2	School Attachment Programme 3	0	0	2		2 Weeks
Total	26		16	16	10	16	32

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 8: Semester VI (Credits: B.Sc. 12; B.Ed. 15; Total 27)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	4	CoreCourse1F Physics/Botany	3	3	1	2	5
2	4	Core Course2F Chemistry	3	3	1	2	5
3	4	Core Course 3F Mathematics/ Zoology	3	3	1	2	5
4	4	Critical Under-standing Of ICT	2	2	2	4	6
5	4	Pedagogy of Physical Sciences	2	2	2	4	6
6	4	Pedagogy of Maths/Biol. Sci.	2	2	2	4	6
7	3	School Attachment Programme 4 and Community Living)	0	0	3		3 weeks
Total	**27**		**15**	**15**	**12**	**18**	**33**

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 9: Semester VII* (Credits: DSE 9; B.Ed. 20; Total 29**)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	3	DSE 1 A Physics/Botany	1	1	1+1	2+2	5
2	3	DSE 2 A Chemistry	1	1	1+1	2+2	5
3	3	DSE 3 A Mathematics/ Zoology	1	1	2/1+1	4/2+2	5
4	4	Creating an Inclusive school	2	2	2	4	6
5	2	Health & Physical Education	1	1	1	2	3
6	2	Reading & Reflections on text	1	1	1	2	3
7*	6	Internship in School Subject 1 : Physical Science	0	0	6	0	11 weeks
8	6	Internship in School Subject 2 : Mathematics/ Biological Science	0	0	6	0	
Total	**29**		**7**	**7**	**22**	**20**	**27**

*Semester duration 25 weeks; Instructional duration -14 weeks; Engagement in field -10 weeks
**includes Internship 12 credits.

Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$

TABLE 10 : Semester VIII (Credits: DSE 9; GE 2; B.Ed. 10; Total 21)

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week (L)	Credits: Practicum/al (Lab/Field) (T/P)	Practicum/al Hours per week (T/P)	Total Hours per week (L+T+P)
1	3	DSE 1 B Physics/Botany	1	1	1+1	2+2	5
2	3	DSE 2 B Chemistry	1	1	1+1	2+2	5
3	3	DSE 3 B Mathematics/ Zoology	1	1	2/1+1	4/2+2	5
4	2	GE 2 Indian Const. & Human Rights	2	2	0	0	2
4	4	Knowledge & Curriculum	2	2	2	4	6
5	4	Guidance & Counseling in Schools	3	3	1	2	5
6	2	Value & Peace Education	1	1	1	2	3
Total	**21**		**11**	**11**	**10**	**20**	**31**

TABLE 11 : SUBJECTS AND TITLES OF COURSES IN THE PROGRAMME

SEMESTER	COURSE	CODE	SUBJECT	TITLE
FIRST	**Core course 1A**	BSE I.1A BSE I.1B	Physics/ Botany	Mechanics Diversity of Microbes
	Core Course 2A	BSE I.2	Chemistry	Atomic Structure and Bonding
	Core Course 3A	BSE I.3A BSE I.3B	Mathematics / Zoology	Calculus ï I and Matrices Diversity of Animals I
	AEC 1A	BSE I.4A BSE I.4B BSE I.4C BSE I.4D BSE I.4E	Language	Hindi/ Kannada/ Malayalam / Tamil/ Telugu
	AEC 2A	BSE I.5	English	
	GE 1	BSE I.6		Environmental Education
	Professional Education	BSE I.7		Language Across Curriculum
SECOND	**Core course 1B**	BSE II.1A BSE II.1B	Physics/ Botany	Elasticity, Waves, Heat and Thermodynamics Diversity of Cryptogams and Archegoniatae
	Core Course 2B	BSE II.2	Chemistry	States of Matter and Nuclear Chemistry
	Core Course 3B	BSE II.3A BSE II.3B	Mathematics / Zoology	Calculus ï II , Analytical Geometry and Number Theory Diversity of Animals II
	AEC 1B	BSE II.4A BSE II.4B BSE II.4C BSE II.4D BSE II.4E	Language	Hindi/ Kannada/ Malayalam / Tamil/ Telugu

	AEC 2B	BSE II.5	English	
	Professional Education	BSE II.6		Contemporary Indian Education
		BSE II.7		Yoga Edu., self-understanding & development
THIRD	**Core course 1C**	BSE III.1A BSE III.1B	Physics/ Botany	Electricity and Electromagnetism Gymnosperms and Reproductive Biology of Angiosperms
	Core Course 2C	BSE III.2	Chemistry	Organic Chemistry ï I
	Core Course 3C	BSE III.3A BSE III.3B	Mathematics / Zoology	Real Analysis Diversity of Animals III and Comparative Anatomy
	AEC 1C	BSE III.4A BSE III.4B BSE III.4C BSE III.4D BSE III.4E	Language	Hindi/ Kannada/ Malayalam / Tamil/ Telugu
	AEC 2C	BSE III.5	English	
	SEC 1	BSE III.6A BSE III.6B BSE III.6C BSE III.6D BSE III.6E	Physics Botany Chemistry Mathematics Zoology	Basic Instrumentation Skills Plant Propagation, Nursery & Gardening Industrial Chemicals and Environment Combinatorics, Statistics & Basic Probability Apiculture
	Professional Education	BSE III.7		Understanding the Learner
		BSE III.8		Gender School & Society
		BSE III.9		School Attachment Programme 1
FOURTH	**Core course 1D**	BSE IV.1A BSE IV.1B	Physics/ Botany	Optics Plant Anatomy and Ecology
	Core Course 2D	BSE IV.2	Chemistry	Thermodynamics, Equilibrium and Solutions
	Core Course 3D	BSE IV.3A BSE IV.3B	Mathematics / Zoology	Differential Equations Ecology, Biogeography & Wildlife
	AEC 1D	BSE IV.4A BSE IV.4B BSE IV.4C BSE IV.4D BSE IV.4E	Language	Hindi/ Kannada/ Malayalam / Tamil/ Telugu
	AEC 2D	BSE IV.5	English	
	SEC 2	BSE IV.6A BSE IV.6B BSE IV.6C BSE IV.6D BSE IV.6E	Physics Botany Chemistry Mathematics Zoology	Computational Physics Utilisation of Plants & Herbal Technology Industrial Inorganic Materials Data Handling Sericulture
	Professional Education	BSE IV.7		Learning & Teaching
		BSE IV.8		Drama & Art Education
		BSE IV.9		School Attachment Programme 2

FIFTH	**Core course 1E**	BSE V.1A BSE V.1B	Physics/ Botany	Atomic and Molecular Physics Botanical Nomenclature, Angiosperm Taxonomy and Utilization of Plants
	Core Course 2E	BSE V.2	Chemistry	Transition Elements, Coordination Compounds and Chemical Kinetics
	Core Course 3E	BSE V.3A BSE V.3B	Mathematics / Zoology	Multivariate Calculus and Vector Calculus Development Biology, Applied Zoology & Ethology
	Professional Education	BSE V.4		Assessment For Learning
		BSE V.5		Pedagogy of Physical Science 1
		BSE V.6A BSE V.6B		Pedagogy of Mathematics 1 Pedagogy of Biological Science 1
		BSE V.7		School Attachment Programme 3
SIXTH	**Core course 1F**	BSE VI.1A BSE VI.1B	Physics/ Botany	Classical and Quantum Mechanics and Special Theory of Relativity Plant Physiology and Metabolism
	Core Course 2F	BSE VI.2	Chemistry	Organic Chemistry II
	Core Course 3F	BSE VI.3A BSE VI.3B	Mathematics / Zoology	Groups and Rings Animal Physiology, Endocrinology & Immunology
	Professional Education	BSE VI.4		Critical Understanding of ICT
		BSE VI.5		Pedagogy of Physical Science 2
		BSE VI.6A BSE VI.6B		Pedagogy of Mathematics 2 Pedagogy of Biological Science 2
		BSE VI.7		School Attachment Programme 4
SEVENTH	**Discipline Specific Elective 1**	BSE VII.1A BSE VII.1B	Physics Botany	Nuclear and Particle Physics Cell Biology and Genetics
		BSE VII.2	Chemistry	Electrochemistry and Photochemistry
		BSE VII.3A BSE VII.3B	Mathematics / Zoology	Linear Algebra Cell Biology, Genetics and Evolution
	Professional Education	BSE VII.4		Creating an inclusive school
		BSE VII.5		Health & Physical Education
		BSE VII.6		Reading & reflection on text
		BSE VII.7A		Internshipin School Subject 1 : Physical Science
		BSE VII.7B/ BSE VII.7C		Internship in School Subject 2: Mathematics/Biological Science
EIGHTH	**Discipline Specific Elective 2**	BSE VIII.1A BSE VIII.1B	Physics Botany	Solid State Physics Molecular Biology, Biochemistry and Biotechnology
		BSE VIII.2	Chemistry	Spectroscopy, Natural Products and Heterocyclics
		BSE VIII.3A BSE VIII.3B	Mathematics / Zoology	Complex Analysis and Numerical Analysis Biochemistry, Molecular Biology and Biotechnology
	Generic Elective 2	BSE VIII.4		Indian Constitution and Human Rights
	Professional Education	BSE VIII.5		Knowledge &Curriculum
		BSE VIII.6		Guidance & Counselling in Schools
		BSE VIII.7		Value & Peace Education

8.0 Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The structure for evaluation is as follows:

8.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C_1, C_2, and C_3.

8.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below.

8.2.1 The first component (C_1), of assessment is for 25 marks. This will be based on Test/ assignment / seminar. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8^{th} week of the semester. Beyond 8^{th} week, making changes in C_1 is not permitted.

8.2.2 The second component (C_2), of assessment is for 25 marks. This will be based on test/ assignment/ seminar. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th} week of the semester. During the second half of the semester the remaining units in the course will be completed.

8.2.2.1 The outline for continuous assessment activities for Component-I (C_1) and Component-II (C_2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Section/Department. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C_1) and component II (C_2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained for this purpose by the concerned teacher.

8.2.3 During the 18th-20^{th} week of the semester, a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C_3) and the maximum marks for the final component will be 50.

Setting questions papers and evaluation of answer scripts.

I. Questions papers in three sets shall be set by the internal examiner for a course. Whenever there are no sufficient internal examiners, the chairman of BoE shall get the questions papers set by external examiners.

II. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

III. (i) There shall be single valuation for all theory papers by internal examiners. In case, the number of internal examiners falls short, external examiners may be invited.

(ii) The examination for Practical work/ Field work/Project work will be conducted jointly by two internal examiners. However the BoE on its discretion can also invite external examiners if required.

IV. Each theory paper comprises of 9 questions of 10 marks each. Each unit will have two questions with internal choice. Question 9 will have questions drawn from all the 4 units.

V. Challenge valuation

A student who desires to apply for challenge valuation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 15 days after the announcement of the results. This challenge valuation is only for C_3 component. The answer scripts for which challenge valuation is sought for shall be sent to another external examiner. The marks awarded will be the higher of the marks obtained in the challenge valuation and in maiden valuation.

8.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners (ref: 8.2.3 III (ii)). A candidate will be assessed on the basis of a) knowledge of relevant processes b) Skills and operations involved c) Results / products including calculation and reporting. If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

8.2.5 If X is the marks scored by the candidate out of 50 in C_3 in theory examination, if Y is the marks scored by the candidate out of 50 in C_3 in Practical examination, and if Z is the marks scored by the candidate out of 50 in C_3 for a course of (L=0):T:(P=0)type that is entirely tutorial based course, then the final marks M in C3 is decided as per the following table.

L.T.P. distribution	**Calculation of M in C_3**
L:T:P	
L : (T = 0) :òP	
L:T : (P=0)	X
L : (T=0) : (P = 0)	X
(L=0) : T : P	Y
(L=0) : (T = 0) : P	Y
(L=0) : T : (P = 0)	Z

8.2.6 The details of continuous assessment are summarized in the following Table.

Component	**Syllabus in a Course**	**Weightage**	**Period of Continuous Assessment**
C_1	First 50% (2 units of total units)	25%	First half of the semester. To be consolidated by 8^{th} week.
C_2	Remaining 50% (Remaining units of the course)	25%	Second half of the semester. To be consolidated by 16^{th} week.

C_3	Semester-end examination (All units of the course)	50%	To be completed during 18th ï 20th Week
Final Grades to be announced latest by 24th week			

8.2.7 A candidateøs performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (25 + 25 + 50).

8.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

8.3 In case a candidate secures less than 30% in C_1 and C_2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C_3 in that course.

In case a candidateøs class attendance in a course is less than 75% or as stipulated by the University, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C_3 in that course.

Teachers offering the courses will place the above details in the Departmental meeting during the last week of the semester, before the commencement of C_3, and subsequently a notification pertaining to the above will be brought out by the Principal before the commencement of C_3 examination. A copy of this notification shall also be sent to the office of the Registrar & Registrar (Evaluation).

8.4 In case a candidate secures less than 30% in C_3, he/she may choose DROP/MAKEUP option.
In case a candidate secures more than or equal to 30% in C_3, but his/her grade (G) = 4, as per section 8.12 below, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 16 credits for the entire programme..
In case a candidate secures less than 30% in C_3, he/she may choose DROP/MAKE-UP option.
The candidate has to exercise his/her option to DROP immediately within 10 days from the date of notification of results.
A MAKE UP examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with a next regular even semester examinations. If a candidate is still unsuccessful, he/she may opt for DROP or again take up MAKE UP examination; however, not exceeding double the duration norm in one stretch from the date of joining the course.

8.5 A candidate has to re-register for the DROPPED course when the course is offered again by the Institute if it is a hard core course. **The details of any dropped course will not appear in the grade card.**

8.6 Each student can go with a normal pace of credits prescribed for each per semester. However, he/she has provision to go with a slow pace of 20 credits per semester or an accelerated pace of +4 credits per semester.

8.7 The tuition fee and the examination fee of a semester will be in accordance with the number of credits registered by each student in that semester.

8.8 The student may avail a maximum of two blank semesters in one stretch. However, he has to pay a nominal fee for maintaining a semester blank to the institution.

8.9 The Institute shall follow the CBCS guidelines of the University and its amendments thereof provided they are beneficial to the system.

8.10 The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

8.11 Upon successful completion of B.A.B.Ed., a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).

8.12 The grade and the grade point earned by the candidate in the subject will be as given below.

Marks	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, P is the percentage of marks (P=[(C1+C2)+M] secured by a candidate in a course which is rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

8.13 A candidate can withdraw any course within in ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.
A DROPPED course is automatically considered as a course withdrawn.

8.14 Overall cumulative grade point average (CGPA) of a candidate after successful completion the required number of credits (302) is given by CGPA = ∑GP / Total number of credits

CGPA = ∑GP / Total number of credits

9. Classification of results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 <= CGPA < 5	5	SECOND CLASS
5 <= CGPA < 6	6	
6 <= CGPA < 7	7	FIRST CLASS
7 <= CGPA < 8	8	
8 <= CGPA < 9	9	DISTINCTION
9 <= CGPA < =10	10	

Overall percentage=10*CGPA or is said to be 50% in case CGPA<5

10.0 Provision for Appeal

A candidate, if dissatisfied with the grades that he/she has got with a feeling that he/she is unnecessarily penalized can approach the grievance cell with the written submission together with all facts and all the assignments, test papers etc. which were evaluated. He/she can do so before the semester-end examination (based on 2 continuous assessment components already completed) or after the semester-end examination. The grievance cell is empowered to review the grades if the case is genuine and is also empowered to penalize the candidate if his/her submission is found to be baseless and unduly motivated. This Cell may recommend to take disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the Grievance Cell is final.

The Registrar (Evaluation) will be the Chairman and Convener of the Grievance Cell. For every subject there will be one grievance cell. The composition of the Grievance Cell is as follows:

i) The Registrar (Evaluation) ex-officio Chairman/Convener.
ii) The Principal
iii) The Dean of Instruction.
iv) Heads of Concerned Departments and Sections
v) An external expert in the concerned subject from the PG department of University

The appropriate fee as fixed by the University shall be collected from the candidate who goes for an appeal to the Grievance Cell.

11.0 Barring of Simultaneous Study:

11.1 No student admitted to a degree course in a college under the jurisdiction of this university, shall be permitted to study simultaneously in any other course leading to a degree (regular/evening/morning) offered by this/any other university.

11.2 If a candidate gets admitted to more than one course leading to a degree, the university shall without giving prior notice cancel his/her admission to all such courses to which he/she has joined.

12.0 Miscellaneous:

12.1 These revised regulations will apply to the candidates admitted for the academic year 2016-17 and onwards for the course mentioned in Regulation 1.0 above.

12.2 Other regulations not specifically mentioned above are as per the Regulations of the University as applicable from time to time.

12.3 Any other issue not envisaged above, shall be resolved by the Vice-Chancellor in consultation with the appropriate Bodies of the University, which shall be final and binding.

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SYLLABUS

FIRST SEMESTER

Core course 1A: Physics

BSE I.1 A : MECHANICS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- The students will be able to understand Newtonian mechanics and apply its principles to explain natural physical phenomena.

- The teacher will be able to enable the students to identify and modify alternative conceptions in the domains of Newtonian Mechanics.

COURSE CONTENT:

Unit I

Vectors: Vector and scalar products. Scalar triple product and Vector triple product. Differentiation of a vector with respect to scalars (such as time). Gradient, Divergence, Curl-definitions, physical meaning, and operations, Laplacian, Line, Surface, and Volume integrals. Gaussø, Stokes, and Greens theorem.
Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients.

Unit II

Laws of Motion: Newtonøs Laws of motion. Frames of reference, inertial and non inertial, pseudo forces, Galilean transformations; Galilean invariance, Dynamics of a system of particles. Centre of Mass.
Momentum and Energy: Principle of conservation of momentum for a system of particle, Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Conservation of energy. Momentum of variable-mass system: motion of rocket.

Unit III

Rotational Motion: Angular velocity and angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum.
Gravitation: Newtonøs Law of Gravitation. Central force and motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). two-body central force problem and reduction to the equivalent one body problem, inverse square law potential and different forms of orbit, Keplerøs laws of planetary motion. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness.

Unit IV

Oscillations: Simple Harmonic Motion (Basic idea), Differential equation of SHM and its solutions (simple pendulum, compound pendulum, loaded spring), Kinetic and Potential Energy, Total Energy and their time averages. Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats), Lissajous figures with equal an unequal frequency and their uses. Damped vibrations. Forced vibrations.

Reference Books:

1. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6th Edition, John Wiley and Sons Inc.
2. Harris Benson, University Physics, Revised Edition, John Wiley and Sons, Inc.
3. FW Sears, MW Zemansky and HD Young, University Physics, 1986. Addison-Wesley.
4. K. R. Symon, Mechanics, Addison Wesley, 1971.
5. Basudeb Bhattacharya,Engineering Mechanics, 2nd edn., 2015, Oxford University Press
6. Ronald Lane Reese, University Physics, 2003, Thomson Brooks/Cole
7. Y. R. G. Takwale and P. S. Puranik, Introduction to classical mechanics, Tata McGraw Hill.
8. Charles Kittel et. al., Mechanics Berkeley Physics course, 2007, Tata McGraw-Hill.
9. H C Verma, Concepts of Physics, Bharati Bhawan; Revised Reprint 2015 edition

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments out of the following)

1. Study of the motion of an air bubble.
2. Study of the motion of a freely falling body.
3. Study of the acceleration of a body subjected to different unbalanced forces.
4. Study of accelerations of different masses under a constant unbalanced force.
5. Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass.
6. Study of conservation of momentum and energy of a collision in a plane.
7. Conservation of momentum in a mechanical explosion.
8. To study the relation between length and time period of a simple pendulum.
9. To study the relation between force and extension produced in a stretched spring.
10. Study of the variation of the time period of a bar pendulum with different length and determination of ógôat the given place.
11. Study of the dependence of the period of oscillation of a spring-mass system on mass

12. The Spiral spring: Determination of the acceleration due to gravity by the graphical method.
13. Determination of moment of Inertia, mass and density of the flywheel.
14. Moment of inertia of a disc supported on strings.
15. The moment of inertia of a wheel and axle.
16. The Bifilar Suspension

Reference Books:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House,1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7thEdition, Cengage Learning, 2009.

Core Course 1A - Botany

BSE I.1B : DIVERSITY OF MICROBES

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To acquaint students with the diversity that exists in microorganisms;
- To understand the morphology, organization, structure, and reproduction in microbes;
- To appreciate the role and significance of microbes in human welfare and environment;
- To study the symptoms of selected diseases caused by microbes.

COURSE CONTENT:

Unit I :

a) Brief account of history, discovery, characteristics of viruses, viroid, virusoid and prions. Structure, types and reproduction of Bacteriophages.
A brief account of diseases caused by 1. Virus ï yellow mosaic of bean and HIV, 2. Prions ï BSE, Cruzefeldt Jacob disease, Kuru disease; d) Role of viruses in human welfare ï a brief account. Brief account of bacterial diseases of plants (Citrus Canker)

b) Brief account of history, discovery, occurrence, ultrastructure, modes of nutrition, reproduction and economic importance. Review of classification based on morphology and flagellation;

c) Role of bacteria in human welfare ; Environment ï decomposition and

bioremediation; Agriculture ï biofertilizers (*Rhizobium*) biopesticides (*B. thuringiensis)*; Pharmaceuticals ï antibiotics and probiotics; industrial ï organic acids.

d) A general account of Mycoplasma (e.g. sandal spike disease) and Ricketsiae.

e) *Cyanobacteria:*

i) General account, occurrence, structure, reproduction and economic importance ï nutritive value, biofertilizers (N_2 fixation, role of heterocyst), algal blooms as biological indicators.

ii) Study of *Spirulina, Nostoc* and *Oscillatoria.*

Unit II :

General account of occurrence, structure, thallus organization, reproduction, economic importance and classification (classification of Fritsch).

b) Study of the structure, reproduction and life-cycle of the following:

Chlorophyceae : *Oedogonium, Chara*
Phaeophyceae : *Sargassum*
Rhodhophyceae : *Polysiphonia*
Bacillariophyceae : General account, structure and reproduction of pennate diatom, economic importance.

Unit III :

General characters, thallus organization, reproduction, economic importance and classification (Alexopoulos and Mims).

a) Study of structure, reproduction, life-cycle and phytopathology and/or economic importance of the following :

Myxomycetes -*Stemonites*
Phycomycetes -*Albugo*
Ascomycetes ï Yeast

Unit IV :

a) Study of structure, reproduction, life-cycle, phytopathology and economic importance of the following :

Basidiomycetes ï *Puccinia*
Deuteromycetes ï *Cercospora, Colletotrichum*

b) Lichens ï General characters, distribution, types, structure, reproduction, economic and ecological importance.

References:

1. Smith, G.M.,1971, Cryptogamic Botany Vol.I, Algae & Fungi, TMH Publishing Co., New Delhi.
2. Sharma, O.P., 1992, Text book of Thallophytes, TMH Publishing House, New Delhi.
3. Pandey, B.P., A Text book of Algae, Sultan Chand & Co., New Delhi.
4. Sharma, P.D. 2005, The Fungi, Rastogi Publications, Meerut.
5. Singh, V., P.C.Pande & D.K.Jain, 2007, Diversity of Microbes and Cryptogams, Rastogi Publications, Meerut.
6. Singh.V., P.C.Pande & D.K.Jain, 2006. A Text book of Botany, Rastogi Publications, Meerut.
7. Kumar, H.D., A Textbook of Algae.
8. Alexopoulos.C.J. Introductory Mycology.
9. Dubey H.D. A Text book of Fungi, Bacteria and Viruses.
10. Chopra, A Class book of Fungi, S.Nagin & Co., Jullandar.

PRACTICALS

Exam Duration : 3 hrs **C_3: 50**

Objectives :

- To develop the skill of handling dissection and compound microscope.
- To develop the skill of staining and mounting microbes.
- To develop the skill of drawing and labeling microbes.
- To develop the skill of identifying the symptoms and diseases caused by microbes.
- To develop the skill of observing and identifying microbes using temporary and permanent slides.

COURSE CONTENT:

1. Gram staining of bacteria.
2. Preparation of bacterial media and culture of bacteria.
3. Study of genera included in theory under Cyanobacteria, algae and fungi by making temporary micropreparations and using permanent slides.
4. Study of crustose, foliose and fruticose lichens.
5. Observation of disease symptoms in hosts infected by virus, mycoplasma and bacteria.

Core Course 2A- Chemistry

BSE I.2 :ATOMIC STRUCTURE AND BONDING

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives :

- To understand and appreciate the development of various atomic theories
- To develop an understanding of principles of Atomic structure
- To justify the need for quantum mechanical structure of atoms
- To develop an understanding of the periodic trends, preparation and uses of s- and p-block
- elements and their compounds in terms of structure and bonding
- To understand the nature of bonding and to predict the shapes of molecules
- To construct MO energy level diagrams and predict the properties of molecules

COURSE CONTENT:

Unit I: Atomic Structure

History of an atom. List the Characteristics of Black-body radiation- Planckôs radiation law, photoelectric effect, Compton effect and their explanation using quantum theory. Bohr's

model of hydrogen atom and its limitations. Summarise the evidence for the wave nature of matter. State de Broglie hypothesis and Heisenberg uncertainty principle.

Schrodinger wave equation and its importance, physical interpretation of the wave function, significance of ψ and ψ^2, postulates of quantum mechanics, particle in one dimensional box. Radial wave functions, angular wave functions. Quantum numbers and their importance, atomic orbitals and shapes of s, p, d orbitals , Multi-electron atoms, Aufbau and Pauli exclusion principles and Hundôs multiplicity rule- Electronic configurations of the elements(s,p,d blocks), effective nuclear charge. Explanation for the stability of completely filled and half filled shells with examples. Screening effect: Slatersô rule, Energy level diagram for multi ï electron atoms.

Unit II: Periodic Properties and s -and p-Block Elements

Atomic radii, Covalent radii, ionic radii and Vander waal's radii- definition with explanation with examples in a group and period Explanation of observed trwends. Comparison of the ionic size of atoms with the corresponding anion and cation. Variation of ionic radii in isoelectronic ions. Additive nature of covalent radii.
Ionization energy: Definition, the factors influencing ionization energy, variation in a group and period. Effect of the size and electronic configuration on successive ionization energies.

Electron affinity :Definition, variation in a group and in a period (observed trends in the values to be accounted for).
Electronegativity: Definition, variation in a group and in a period (observed trends in the values to be accounted for), calculation of electronegativity by Pauling and Mulliken methods.
s- and p-block elements: Comparative study of s-Block Elements, diagonal relationships, an introduction to alkyls and aryls ï salient features of hydrides, Action of Liquid Ammonia , Properties of solutions of alkali metals in Liquid Ammonia, Anomalous properties of Lithium and Beryllium.
To appreciate the wide variety in Physical and Chemical characteristics of p-Block elements and their compounds. Comparative study (including diagonal relationships) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16. tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

Unit III: Chemical Bonding - I
Chemical bond as a basis for predicting the properties which should be expected for a given chemical substance. Ionic Solids ï Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajanôs rule, Metallic bond-free electron, valence bond and band theories. Weak interactions ï Hydrogen bonding, van der Waals forces. Covalent Bond ï Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, CIF_3, ICl_2, and H_2O.

Unit IV: Molecular Orbital theory, boranes and Xenon compounds

Approaches to understand the properties and stabilities of molecules as viewed by different theories of bonding. Molecular orbital theory, basic ideas ï criteria for forming M.O. from A.O., construction of M.Oôs by LCAO ï H_2^+ion, calculation of energy levels from wave

functions, physical picture of bonding and antibonding wave functions, concept of σ, σ*, π, π* orbitals and their characteristics. Hybrid orbitals ï sp, sp^2, sp^3; calculation of coefficients of A.O.s used in these hybrid orbitals. Introduction to valence bond model of H_2, comparison of M.O. and V.B. Models.
Discussion about homonuclear (He_2, N_2, O_2, F_2, C_2) and heteronuclear (CO and NO) diatomic molecules, bond Order and bond energy, percentage ionic character from dipole moment and electronegativity difference.
Hydrides of boron-diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, silicates (structural principle), - Chemistry of xenon: structure and bonding in xenon compounds.

References :

1. University Chemistry : Bruce Mahan
2. Concise Inorganic Chemistry : J D Lee , fifth Edition,Wiley Publishers
3. An Introduction to Inorganic chemistry Mackay and Mackay
4. Advanced Inorganic Chemistry Satya Prakash, G.D.Tuli,S.K.Basu,R.D.Madan
5. S.Chand & Company Pvt. Ltd. Principles of Physical Chemistry Puri, Sharma, Pathania, 47th Edition, Vishal Publishing Co.
6. Text book of Inorganic Chemistry P.L. Soni Sultan Chand & sons.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To develop the concept of good lab practices including safety, glasswares handling,
- chemicals handling, chemical/glassware waste management, error analysis, note
- book maintenance
- To strengthen the concepts of mole and stoichiometry
- To develop analytical skills of volumetric technique

COURSE CONTENT :

1. Calibration and handling of balances, pipette, burette, and standard flask. Basic principles underlying the preparation of solutions, knowledge of primary and standard substances, Indicators used in titrations, their working principles range and their uses. Concept of Molarity, Normality, Molality, Equivalent weight and related calculations.
2. Stoichiometry of neutralization reactions of Sulphuric, Hydrochloric and Nitric acid using sodium hydroxide solution.
3. Preparation of standard Sodium Carbonate solution, Standardisation of Hydrochloric acid and estimation of Sodium hydroxide present in the given solution.
4. Estimation of carbonate and hydroxide present in a mixture.
5. Estimation of Carbonate and Bicarbonate in a given mixture by double indicator method.
6. Estimation of ammonium chloride in a given solution by back titration
7. Estimation of oxalic acid present in the given solution using sodium hydroxide solution and pure crystals of potassium hydrogen phthalate.

8. Estimation of Ferrous ammonium sulphate present in the given solution using potassium
   permanganate solution and pure crystals of oxalic acid.
9. Estimation of iron(II) using Potassium dichromate with internal and external indicators.
10. Estimation of ferrous and ferric ions in a given mixture using potassium dichromate solution.
11. Standardisation of Sodium thiosulphate using potassium dichromate and estimation of copper by Iodometry.
12. Estimation of Copper in the given Copper salt by Iodimetry.
13. Estimation of total hardness of water using EDTA solution and pure crystals of Zinc sulphate.

References :

1. A Text Book of Quantitative Inorganic Analysis, A I Vogel
2. Systematic Experiments in Chemistry Arun Sethi New Age International (p) Ltd. Cochin.

Core Course 3A Mathematics

BSE I.3A : CALCULUS - I AND MATRICES

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
At the end of the course students will be able to understand and to apply the concepts, principles and techniques of calculus and matrix theory in problem solving.

COURSE CONTENT:

Unit I: Differential calculus:
Limits revisited, Continuous functions, Discontinuous functions and types. Differentiation, Linear approximation theorem, Higher derivatives, Leibnitzôs theorem. Monotone functions, Maxima and Minima, Concavity, Convexity and Points of inflection. Angle of intersection between two curves.
Differentiability theorems, Rolleôs theorem, Mean Value theorems, Taylorôs theorem, Maclaurinôs theorem, Taylorôs and Maclaurinôs infinite series, Indeterminate forms.

Unit II: Integral Calculus:
The integral of a function, Techniques of integration, Integration of Rational Functions, Rationalizable Integrals.
Definite Integral, Properties, Definite integral as the limit of a sum, The fundamental theorem of Calculus, Reduction formulae, Area, Volume and Length.

Unit III: Matrices – I

Matrices of order mXn, Algebra of matrices, Symmetric and Skew Symmetric, Hermitian and Skew Hermitian matrices and their standard properties, Determinants, Adjoint of a square matrix, Singular and non-singular matrices, Rank of a matrix, Elementary row / column operations, Invariance of rank under elementary operations, Inverse of a non-singular matrix by elementary operations.

Unit IV : Matrices - II

System of m-linear equations in n-unknowns, Matrices associated with linear equations, Trivial and non-trivial solutions, Criterion for existence of non-trivial solution of homogeneous and non-homogeneous systems and their uniqueness.

Characteristic equation of a square matrix, Eigen values and Eigen vectors, Finding them for a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley ï Hamilton theorem and its applications.

References :

1. Calculus by Anton, Addison-Wiley.
2. First Course in Calculus, Serge Lang, Addison-Wiley
3. Calculus by Lipman Bers, Vols. 1 and 2, IBH.
4. Advanced Calculus, Frank Ayres, Schaum Publishing Co.
5. Higher Algebra by Bamard and Child, MacMillan India Ltd.
6. Integral Calculus by Shanthinarayan, S.Chand and Co.Ltd.
7. Differential Calculus by Gorakhprasad, Pothishala Ltd.
8. Calculus and Analytical Geometry by Thomas ï Finney, Narosa Publishing House.
9. Algebra by Natarajan, Manicavachagon Pillay and Ganapathy, S. Vishwanath Pvt. Ltd.
10. Matrices by Frank Ayres, Schaum Publishing Co.
11. Textbook of Matrix Algebra by Suddhendu Biswas.

Core Course 3A Zoology

BSE I.3 B : DIVERSITYOF ANIMALS–I

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To acquaint students with the diversity that exists in invertebrates
- To enable students to understand invertebrates, their organizational hierarchies and complexities;
- To understand the external morphology and internal structure; identification and classification with examples;
- To enable them to understand various modes of adaptations in animals

COURSE CONTENT:

Unit I: ANIMAL CLASSIFICATION AND PROTOZOA

a) **Principles of classification:** Binomial nomenclature and outline classification of animal kingdom ; Body organization in animals (different grades of organization, coelom)

b) **Protozoa:** General characters and classification of Phylum, Protozoa up to classes with examples ; Nutrition in Protozoa ï Holozoic, holophytic, saprozoic and parasitic nutrition; Locomotion in Protozoa ï Locomotor organelles, types and mechanisms of movement; Reproduction in Protozoa: Asexual ï fission, budding, sporulation; Sexual ï conjugation; Life cycle of *Plasmodium* and *Entamoeba*

Unit II: PORIFERA

a) **Porifera:** General characters and classification of Phylum, Porifera up to classes with examples; Type study: *Sycon* ï External morphology and cellular organization; Skeletal system in sponges; Canal system ï Ascon, sycon and leucon types; Reproduction in sponges: Budding, gemmule, Amphiblastula and Parenchymula larvae; Affinities and systematic position in sponges.

b) **Acnidaria (Ctenophora):** General characters and classification of Phylum, Acnidaria up to classes with examples; External morphology of *Pleurobrachia*, Affinities of Acnidaria.

Unit III: CNIDARIA, ACNIDARIA AND PLATYHELMINTHES

c) **Cnidaria:** General characters and classification of Phylum, Cnidaria up to classes with examples; Type study: *Obelia* ï External morphology; life cycle (with reference to metagenesis); Mesenteries in Metridium (1); Polymorphism in Cnidaria; Corals and coral reefs, their types, formation, theories and importance.

d) **Platyhelminthes:** General characters and classification of Phylum, Platyhelminthes up to classes with examples; Type study: *Taenia solium* ï External morphology, proglottid, excretion, reproduction, life cycle and pathogenicity.

UNIT IV: NEMATHELMINTHES AND ANNELIDA

a) Nemathelminthes: General characters and classification of Phylum, Nemathelminthes up to classes with examples; External morphology, life-cycle and pathogenicity of *Wucheraria bancrofti*; Mode of infection and pathogenicity of i) *Ancylostoma duodenale*, ii) *Enterobius*; Parasitic adaptations in Helminthes.
b) Annelida: General characters and classification of Phylum, Annelida up to classes with examples; Type study: *Hirudinaria*ï External morphology, locomotion, digestive system, reproductive system, life-history; Comparative study of a) digestive system, b) nephredia in *Pheretima, Nereis* and *Hirudinaria*; Trochopore larva, metamerism and pseudometamerism.

References:

1. Modern Textbook of Zoology Invertebrates by R.L. Kotpal ï (Rastogi Publications, Meerut, 10th Revised Edition).
2. Invertebrate Zoology series (Protozoa to Echinodermata) by R.L. Kotpal ï (Rastogi Publications, Meerut).
3. Invertebrate Zoology by E.L.Jordon and P.S. Verma ï S. Chand & Co., Delhi).
4. Invertebrate Zoology by J.K. Dhami and P.S. Dhami ï S. Chand & Co., Delhi).
5. A Textbook of Invertebrate Zoology by S.N. Prasad ï (KitabMahal, Allahabad).
6. Life of Invertebrates by Russel and Hunter ï (Macmillan)
7. Invertebrate Zoology by R.D. Barnes ï (W.B.Saunders, Philadelphia)
8. A manual of Zoology, Vol.1 by Ekambernatha Ayyar (Vishwanathan, Madras).
9. The invertebrate series of L.H.Hyman ï (McGraw Hill)
10. A student's textbook of Zoology by Adam Sedgwick Vol. I, II & III ï (Central Book Depot, Allahabad).
11. A Text book of Zoology vol.1 by Parkar and Haswell ï (Macmillan)

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

OBJECTIVES:

To develop in students the skills of:

- Staining and mounting of materials (temporary and permanent);
- Preparation of cultures of invertebrates by using common culture methods;
- Laboratory observation of animal specimens

COURSE CONTENT:

1. Study of microscopes: Simple and compound, handling of microscopes, use of Micro-image projection system.
2. Study of permanent slides of Protozoa:
   a) Euglena b) Plasmodium c) Opalina d) Entamoeba e) Foramenifera

f) *Paramoecium* g*)Paramoecium* conjugation

3. Preparation of permanent and stained slides:
   a)Sponge spicules b) Sponge gemmules
4. Study of specimens and permanent slides of Poriferans:
   a) *Sycon*, b) *Spongilla,* c) *Euplectella*, d) *Euspongia*
5. Study of specimens and permanent slides of Cnidaria (Hydrozoa and Scyphozoa): a) *Obelia* medusa, b*) Obelia* colony c) *Physalia, d) Aurelia*
   e) *Porpita*
6. Study of specimens of Cnidaria (Anthozoa):

a) *Madrepora, b) Meandrina, c) Gorgonia d*) T. S. of *Metridium*

7. Study of specimens of Platyhelminthes:
   a)Dugesia, b) Fasciola, c) Taenia solium,
8. Study of specimens of Nematodes:
   a) Wuchereria, b) Enterobius, c) Ancylostoma, d) Ascaris
9. Study of specimens and permanent slides of Annelida*:*
   a) Nereis, b) Heteronereis, c) Aphrodite, d) Hirudinaria
   e)T.S. of Pheretima, f) T.S. of Nereis, g) T.S. of *Hirudinaria, h)* Parapodium of *Nereis*
10. Study of *Pheretima:* a) Digestive system and b) Nervous system
11. Study of *Hirudinaria:* a) Digestive system and b) reproductive system

Ability Enhancement Course 1 A : Language

BSE I.4A : HINDI

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction Mode :
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT :

Unit I: History of Language and Literature-1
Hindi Bhasha aur Sahitya ka Itihas [Aarmbha se Lekar 1857 Tak]

Unit II: Short Story-1 [Pre-Independence Literature]
Swatantratapurva Hindi Kahani Ka Vikas

1. **Chandradhar Sharma Guleri-** Usne Kaha Tha
2. **Jayshankar Prasad**- Puraskar
3. **Premchand-** Panch Parmeshwar
4. **Jainendra-** Ek Raat

Unit III: Short Story-2 [Post-Independence Literature]
Swatantrayottar Hindi Kahani Ka Vikas

1. **Mohan Rakesh-** Uski Roti
2. **Kamleshwar-** Dilli Mein ek Maut
3. **Phanishwar Nath Renu-** Teesari Kasam
4. **Bhism Sahani**- Cheef ki Dawat

Unit IV: Communication skill:
Group Discussion [Samooh Charcha]
Introduction ï Definition ï Characteristics ï Types of Discussion ï Round table, Symposium, Lecture forum etc. ï Relevance of Group Discussion ï Exercises.

Reference:

1. Hindi Sahitya Ka Itihas: Ramchandra Shukla Rajkamal Prakashan,Delhi
2. Hindi Sahitya Ka Itihas: Dr Nagendra, Mayoor Paperbacks, Delhi
3. Hindi Sahitya Ki Bhoomika: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
4. Hindi Sahitya Ka Adikaal: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
5. Hindi Sahitya Ka Udbhav Aur Vikas:Hajari Prasad Divedi Rajkamal Prakashan,Delhi
6. Hindi Sahitya Ka Ateet: Viswanath Prasad Mishra, Rajkamal Prakashan,Delhi
7. Bhakti Aandolan Aur Bhaktikavya: Shivkumar Mishra,Lokbharti Prakashan, Delhi
8. Bhakti Aandolan aur Surdaska Kavya: Maneger Panday, Vani Prakashan, Delhi
9. Bhakti Ke Aayam: Dr P Jayraaman, Vani Prakashan, Delhi
10. Bhartiya Bhakti Sahitya: Dr Rajmal Bora, Vani Prakashan, Delhi
11. Bhaktikavya ka Samajdarshan: Dr Premshankar, Vani Prakashan, Delhi
12. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
13. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
14. Hindi Kahani- Antarang Pahchan: Dr Ramdars Mishra, Vani Prakashan, Delhi
15. Hindi Kahani-Sanrachana aur Samvedana: Dr Rachna Saah, Vani Prakashan, Delhi
16. Galp Ka Yatharth-Kathaloochan ke Aayam: Suvas Kumar, Vani Prakashan, Delhi
17. Hindi Ka Gadyaparva: Namvar Singh, Rajkamal Prakashan,Delhi
18. Sahitya ki Pahchan: Namvar Singh, Rajkamal Prakashan,Delhi
19. Katha Vivechan aur Gadyashilp: Ramvilas Sharma, Vani Prakashan, Delhi
20. Kahani Anubhav aur Abhivyakti: Rajendra Yadav, Vani Prakashan, Delhi
21. Kahani- Swaroop aur Samvedana: Rajendra Yadav, Vani Prakashan, Delhi
22. Kahani-Sankramansheel Kala: Khagendra Thakur, Vani Prakashan, Delhi
23. Aadhoonik Hindi Kahani: Laxminarayan Laal, Vani Prakashan, Delhi

24. Hindi Kahani-Vakt Ki Shinakht aur Srijan ka Raag: Rohini Agarwaal, Vani Prakashan, Delhi
25. Kahani Samkaleen Chunautiyan: Dr Sambhoo Gupt, Vani Prakashan, Delhi
26. Effective Group Discussion:Theory and Practice, Gloria J.Galanes, McGraw Hill Company
27. http://www.hindisamay.com

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects), tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

BSE I.4B KANNADA

Credits : 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENT :

Unit I : Descriptive Grammar

Sandhi (Agama, Adesa, Dwitva, etc) A suitable grammar book on Sandhi will be followed in the classroom.

Reference: Kannada Kaipidi, Prasaranga Publication, University of Mysore.

Unit II: Functional Language

a. **Group Discussion** : Introduction ï Definition ï characteristics ï types of discussions ï round-table symposium ï panel ï lecture forum etc. ï relevance of Group Discussion ï exercises.

b. **Conversation** : Definition ï styles of conversation ï formats of conversation ï telephonic conversation, etc. ï Exercises

Reference: Effective Group Discussion ï Theory and Practice by Gloria J.Galanes, McGraw Hill Company (Publishers).

Unit III: Modern Poetry

i. Kalki ï Kuvempu
ii. Sabhyata Devate ï Kuvempu
iii. Balegaarana Haadu ï K S Narashimha Swamy
iv. Patitha Pavana ï Pu Thi Na
v. Nanna avathara ï M Gopalakrishna Adiga
vi) Hakki Haruthide Nodidraé ï DA. RA.Bendre

Selected from Aunika Kannada Kavya Part I, University of Mysore.

Unit IV: Prose : Collection of short stories

Collection of Short Stories
i. Mochi ï Bharteepriya
ii. Kallina Kolalu ï Chaturanga
iii. Radheya Kshame ï Ananda
iv. Cappaligalu ï Sara Abubakkar

Selected from Sanna Kathegalu, Mysore University, Mysore

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:
Assessment will be based on tutorials,(seminars, projects etc.), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

BSE I.4C MALAYALAM

Credits : 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Unit I : **Descriptive Grammar - Sandhi**

Ref : Kerala Panineeyam By A R Rajaraja Varma, NBS, Kottayam

Unit II: Functional Language

Group Discussion- Introduction ï Definition ï characteristics ï types of discussions ï round-table symposium ï panel ï lecture forum etc. ï relevance of Group Discussion ï exercises

Conversation - Definition ï styles of conversation ï formats of conversation ï telephonic conversation, etc. ï Exercises

Reference: Effective Group Discussion ï Theory and Practice by Gloria J.Galanes, McGraw Hill Company (Publishers).

Unit III: Modern Poetry

Lessons from ñKavya Mala, University of Kerala Publications, Kerala

1. Mazhuvinte Katha
2. Sabhalamee yaatra
3. Shanta
4. Kochiyile Vrikshangal
5. Bharatheeyam

Unit IV: Literature

Collection of Short Stories:
From Katha malika, University of Kerala publications

1. Kadal theerathu
2. Shavadaham
3. Ammayum makanum
4. Perumazhayude pittennu
5. Chaya

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc,) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

ABILITY ENHANCEMENT COURSE - AEC 1 A: LANGUAGE

BSE I. 4D Tamil

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C3:50**

Objectives:

(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region

Mode of Interaction:
Theoretical aspects will be discussed through lecture and discussion mode. Activities like enacting a drama scene, etc. will be conducted in the class room as a practice to conversation skills. Students will be given activities to prepare different types of letters (Official, Demy official, personal letters etc.). Group discussion will be conducted in the classroom on various topics. With the help of newspapers, the NEWS Reporting abilities will be enhanced among the students in class room. Appreciation of literary works will be practiced through group work and seminars.

COURSE CONTENT:

Unit I: Descriptive Grammar:
Sandhi (Ezhuthu Elakkanam) Muthal Ezhuthugal, Sarpezhuthugal, Punarchi

Unit II: Functional Language:
Group Discussion: Introduction-Definition-Characteristics-Types of Discussion-Round Table-Symposium-Panel-Lecture forum etc., - Relevance of Group Discussion - Exercises
Conversation: Definition - Styles of conversations - Formats of conversations - Telephonic conversations, etc., - Exercises

Unit III: Poetry: Modern Poetry:
Ikkala Kavithaikal,
Kannan En Sevagan,
Thiru Arutpa

Unit IV: Prose: Collection of Short Stories:
Naatru - (Collection of Short Stories)

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.

C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25,
Total=50.

References:

1. *Tamil Neengalum Thavarillamal Ezhuthalam* - Dr. Porko.
2. *Effective Group Discussion- Theory and Practice*, Gloria J. GALANES, Mc Graw Hill Company (Publishers)
3. *Nannul-Ezhuthathikaram*, Prof. Soma Elavarasu, Manivasar Pathippagam, Parish, Cheennai ï 600 108
4. *Natru*, Vaanathi Pathippagam, 13 Deenadayalu Street, T. Nagar, Chennai- 600 017.
5. *An Anthology of Tamil Poetry* (For First Year Degree Classes), University of Mysore, Mysore.

ABILITY ENHANCEMENT COURSE - AEC 1 A: LANGUAGE

BSE I. 4E Telugu

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C3:50**

Objectives:

(i) To enable the students to acquire basic skills in functional language.
(ii) To develop independent reading skills and reading for appreciating the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language.
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Mode of Interaction:

Theoretical aspects will be discussed through lecture and discussion mode. Activities like enacting a drama scene, etc. will be conducted in the class room as a practice to conversation skills. Students will be given activities to prepare different types of letters (Official, Demy official, personal letters etc.). Group discussion will be conducted in the classroom on various topics. With the help of newspapers, the NEWS Reporting abilities will be enhanced among the students in class room. Appreciation of literary works will be practiced through group work and seminars.

COURSE CONTENT:

Unit I: Functional language:

Letter writing: Characteristics ï Definition ï Types of Letters ï E-mails ï Language of Letters ï Exercises

News Reporting: Characteristics ï Definition ï Language of NEWS Reporting - Models ï Role of Median NEWS Reporting ï Exercises.

Unit II: Communication skills in language:

Group discussion: Introduction ï Definition ï Characteristics ï Types of Discussion ï Round table, Symposium, Lecture forum etc. ï Relevance of Group Discussion ï Exercises.
Interview: Characteristics ï Definition ï Types of Interviews ï Preparation for Interview ï Models ï Exercises.

Unit III: Modern Poetry and Folk literature:
Desha Charitralu ï Sree Sree (From Maha Prasthanam, Visalandhra Publications, Hyderabad).
Folk Songs from ôRayalaseema Raagaluô & ôTriveniô Published by Telugu Academy, Hyderabad,

Unit IV: Genre of literature: (Piece of a Drama/Portion of Autobiography)
Selected scenes from drama ô**Kanyashulkam'** by Gurazada Apparao (available at Visalandhra Publication, Hyderabad.

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc.) =25
C2-10 (test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:

1. *A Hand book of writing activities*, Prasaranga, University of Bangalore.
2. *Effective Group Discussion – Theory and Practice*, by Gloria J. Galanes, McGraw Hill Company.
3. *Effective Communication Skills,* by Omkar N Kour

Ability Enhancement Course 1B : English

BSE I.5 : PROFICIENCY IN ENGLISH

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3: 50**

Objectives:
Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: Descriptive Grammar

1. Tenses:

a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.

b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous

Unit II: Skills in Communication

1. Negotiating a point of view ï learning to talk persuasively so as to get across oneôs perspective.
2. Debating on an issue ï agreeing / disagreeing.

Unit III: Study and Reference Skills

Note making; Note- taking; Summary writing.
Comprehension Skills
Extracts from literary, scientific and educational journals.

Unit IV: Skills of Communication

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application.
Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Suggested Activities:

- Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.
- Students introduce themselves though using symbols/ metaphors.
- Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

1. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
2. Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
3. Hornby,A.S.(2001).Oxford Advanced Learnerגs Dictionary, OUP
4. Thomsan,A.J. & Martinet.(2002).A Practical English Grammar.OUP

GENERIC ELECTIVE 1

BSE I.6 : ENVIRONMENTAL EDUCATION

Credits: 2 (1L+ 1T +0P) **Marks: 100**
Contact hrs per week: 3 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student-teacher will be able to:

- Develop awareness and concern for environmental issues and sustainable development.
- Acquaint with the concept, objectives and importance of Environmental Education (EE).
- Introduce multi-disciplinary approach to environmental problems.
- Acquaint how to design, develop and implement strategies for Environmental Education (EE).
- Acquaint with the different methods and techniques of teaching Environmental Education (EE).
- Undertake practical activities for school cleanliness, neighbourhood cleanliness drive, and healthy personal hygiene in relation to Swachh Bharat and healthy living. (These activities would have been observed and practiced during the 16-week Internship in schools)
- Inculcate environment friendly values through EE.

COURSE CONTENT :

Unit I : Meaning and Concepts

Meaning as evident from Indian literature and contemporary texts, Definition, Objectives, Importance of EE with special reference to Indian view of life and sustainable development Sustainable Development Goals.

Unit II: Basic Environmental Concepts

Ecosystem, Biotic and Abiotic factors, Inter-relationship, Factors affecting environment, population, air, water, soil, noise; Acid rain, Greenhouse effect, Extinction of species, Soil erosion, Energy crisis, Environment and sustainable development; Role of specially designed strategies for cleanliness, Role of mass media and technology in developing awareness about environmental problems and its prevention, Role of NGO and governmental organizations in developing EE.

Unit III: Curriculum, Methods and Techniques of EE

Designing, developing strategies for EE, Evaluation of EE resources materials; Field trips, Role play, Poster presentation, Quiz, Debate, Projects, Swachh Bharat Abhiyan sustainability

Unit IV: Value Development through EE as in Indian View of Life

Practical work in relation to school cleanliness and neighbourhood watch, Text book evaluation for contents on environment and cleanliness, Field trip on environmental degradation, and school and neighbourhood cleanliness, Visit to nature park, industry polluted areas.

Practicum

- Study sustainable development initiative in the country.
- Visits to polluted sites and preparation of report.
- Interviewing people and reporting the inconveniences due to any of the environmental problems.
- To study innovations done by to improve the environment of that area.
- To study the implementation of Environmental Education Programmes in schools/stated country.
- To prepare models and exhibits for general awareness of public regarding environmental hazards.
- To prepare a programme for environmental awareness and school cleanliness, and to conduct the same with school children.
- To visit industries and study alternative strategies of Environmental pollution management.
- To prepare a resource material on any of the environmental problems along with a suitable evaluation strategy. To prepare quizzes and games on environmental issues.
- Organise Swacch Bharat Abhiyan as sustainable activity.
- To study the contribution of NGOs in improving the environment of the city. Classroom. Prepare posters/chart on Sustainable Development Goals.

* In addition, school and community based activities may be organised.

Evaluation Strategies

1. Assignments/sessional work.
2. Unit tests.
3. Portfolio assessment of exhibits, model of charts prepared by student teachers.
4. Seminar presentations followed by group discussion.

References:

1. Trivedi, M.M. and Pathak, Y.P. (1994). *Manav ane Paryavaran: Bhaugolic Paripekshma, Universitygranth Nirman.* Board Publication, Ahmedabad, Gujarat.
2. Garg, B. and Tiwana (1995). *Environmental Pollution and Protection*. New Delhi: Deep & Deep Publication.
3. Sharma, R.C. (1981). *Environmental Education.* New Delhi: Metropolitan Publication.
4. UNESCO, Environmental Education in the light of the Tbilisi Conference, UNESCO.
5. NCERT (2009), *Project Book in Environmental Education from Class I-X*. New Delhi: NCERT.
6. NCERT (2004), *Environmental Education in Schools.* New Delhi: NCERT.
7. **Web Resources** Towards a Green School on Education for Sustainable Development for Elementary Schools, 2015, NCERT
8. http://www.ncert.nic.in/departments/nie/dee/publication/pdf/Towards%20A%20green%20School.pdf
9. Swachh Bharat Swachh Vidyalaya: A National Mission, Clean India: Clean Schools A Handbook, MHRD, http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/Eng_Swachch-Bharat-Swachch-Vidhalaya.pdf

PROFESSIONAL EDUCATION COURSES

BSE I.7 : Language Across Curriculum

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

The student teacher will be able to:

- Understand nature, function and role of different kinds of languages in curriculum transaction
- Acquaint with obstacles in language usage while using the language and ways to overcome them.
- Understand importance and use of first and second language, multilingualism and impact of culture.
- Acquire knowledge about the communication process and verbal and nonverbal communication skills.
- Familiarize the students with of barriers to (Listening, Speaking, Reading, Writing) LSRW skills and activities for developing these skills.

COURSE CONTENT :

Unit I: Nature and Functions of Language

Language ï Meaning and Concept, Functions of Language, Role of Language in Curriculum Transaction, Theories of Language Learning, Barriers in Using a Language & Strategies to Overcome them, Verbal and Non-verbal communication

Unit II :Language across Curriculum in the Indian Context

Language as a determinant of Access, Language proficiency and studentsô attitude towards Learning and Schooling/ dropouts, Language/oral proficiency and critical thinking

Unit III: Strategies for Multilingual Classrooms

Role Plays and Discussions as tools for learning, ówQuestioningô to stimulate thought and to encourage and motivate to respond, Preparing Subject/content based exercises in reading, comprehension and usage, Sensitizing, Reflecting and Facilitating, Understanding the learner and his/her language background, Creating sensitivity to the language diversity, Using oral & written language in the classroom for optimal learning

Unit IV: Developing Receptive Skills and Productive Skills

Barriers to Listening Skills, Activities for Developing Listening Skills, Barriers to Reading Skills, Activities for Developing Reading Skills, Barriers to Writing Skills, Activities for Developing Writing Skills, Need and Importance of Classroom Discourse. Barriers to Speaking Skills, Activities for Developing Speaking Skills

Practicum : School Visit to Find out Communication Problem/Apprehension in Students

1. Designing Games and Exercises for Developing Listening, Speaking, Reading and Writing Skills
2. Assignments on Developing Writing Skills- Summary, Letter, Paragraph, Essays, Speech
3. Assignments on Developing Speaking Skills ï Oral Presentations, Debate, Elocution, Discussion, Brain-storming

Assignments on Developing Listening Skills ï Listening to speech, directions

***** In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc. Action research based on teaching learning and school and community could be conducted.

References:

1. Akmajian, A. et al. (2010). *Linguistics: Introduction to Language and Communication.* (6th ed.). Cambridge: MIT Press.
2. Fasold, R. & Connor-Linton, J. (2013). *An Introduction to Language and Linguistics*. (6th ed.). Cambridge: Cambridge University Press.
3. Floyd, K. (2009). *Interpersonal Communication*. New York: McGraw Hill Companies Inc.
4. Fromkin, V., Rodman, R. & Hyms, N. (2011). *Introduction to Language.* (9th ed.). Canada: Cengage Learning.
5. Pearson, J.C. et al (2011). *Human Communication.* (4th ed.). New York: McGraw Hill Companies Inc.

Web Resources

6. First and Second Language Acquisition ï A Brief Comparison.
   Retrieved from https://www.uni-due.de/ELE/FLA_SLA_brief_comparison.pdf
7. Similarities and Differences between First and Second Language Acquisition
   Retrieved from
   http://multilingualism.pbworks.com/w/page/21913433/Similarities%20and%20Differences%20between%20First%20and%20Second%20Language%20Acquisition
8. Activities for Developing Speaking Skill
   Retrieved from http://faculty.weber.edu/ppitts/ed4320/Handouts/speakingskills.htm
9. http://www.educ.ualberta.ca/staff/olenka.Bilash/best%20of%20bilash/speaking.html
10. Activities for Developing Listening Skill Retrieved from
    http://www.educ.ualberta.ca/staff/olenka.bilash/best%20of%20bilash/listening.html
11. https://blog.udemy.com/listening-skills-exercises/
12. Learning curves: Language Education (2009), by Azim Premji Foundation
    http://azimpremjifoundation.org/pdf/LCIssue13.pdf
13. Courses on Communication Skills, http://nptel.ac.in/courses/109104030/

SECOND SEMESTER

Core Course I B Physics

BSE II.1A : ELASTICITY, WAVES, HEAT, AND THERMODYNAMICS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- The students will be able to understand principles of elasticity, waves, heat, thermodynamics and classical statistical mechanics and apply its principles to explain natural physical phenomena.
- The teacher will enable the students to identify and modify alternative conceptions in the domains of elasticity, waves, heat, thermodynamics and classical statistical mechanics.

COURSE CONTENT:

Unit I: Elasticity

Elasticity: Hookeôs law - Stress-strain diagram - Elastic moduli- Dependence of Youngôs modulus on temperature and its applications, Relation between elastic constants - Poissonôs Ratio-Expression for Poissonôs ratio in terms of elastic constants - Elastic potential Energy, Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional pendulum-Determination of rigidity modulus and moment of inertia - q, ɖ and ů by Searleôs method.

Unit II: Waves

Review of Mechanical waves, types of waves, travelling waves, the superposition principle, wave speed, power and intensity in wave motion. Transverse waves on a string- travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, interference of waves, standing waves, resonance, Doppler effect. Analysis of complex waves. Fourier Series, Application to square wave, triangular wave.

Unit III: Thermodynamics-I

Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between C_P& C_V, Work Done during Isothermal and Adiabatic Processes, Compressibility & Expansion Coefficient. Reversible & irreversible processes, Second law & Entropy, Carnotôs cycle & theorem.

Unit IV: Thermodynamics-II

Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams. Third law of thermodynamics, Unattainability of absolute zero. Thermodynamic potentials. Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwellôs relations& applications - Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for (C_P ï C_V), C_P/C_V, TdS equations.

References:

1. David Halliday, Robert Resnick and Jay Walker, Fundamentals of Physics, 6th Edition, John Wiley and Sons, Inc.
2. Harris Benson, University Physics, Revised Edition, John Wiley and Sons Inc.
3. Zeemansky and R. Dittman, Heat and Thermodynamics, McGraw Hill, 7th edition, 1996.
4. H J Pain, Physics of Vibration and Waves, Wiley; Sixth edition, 2006.
5. Brijlal and Subramaniam, Heat and Thermodynamics, S Chand, 2008.
6. Matveev, Thermal Physics, MIR Publications
7. D S Mathur, Elements of Properties of Matter, S.Chand (G/L) & Company Ltd., 2010.
8. A. B. Gupta and H. Ray, Heat and Thermodynamics, New central publications.
9. D. S. Mathur, Heat and Thermodynamics, Sultan Chand.
10. M. N. Saha and B. N. Srivastava, Treatise on Heat, The Indian Press.
11. A. Kumar and S.P. Taneja, Thermal Physics, R. Chand Publications, 2014.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments out of the following).

1. Study of the oscillations of a column of water as a function of its length and study of damped oscillation.
2. To determine the velocity of sound at 0^o C and the end correction by setting up a resonance column (first resonance length).
3. Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire.
4. Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method.
5. Study of Newtonôs law of cooling.
6. Determination of solar constant.
7. J by Joules Calorimeter.
8. Study of the rate of flow of water through a capillary tube under different pressure heads.
9. Study of the relation between pressure and volume of a gas at constant temperature

10. Study of variation of pressure and temperature of a gas at constant volume.
11. To study the variation of thermo emf across two junctions of a thermocouple with temperature
12. Surface Tension-capillary rise method-radius by vernier microscope
13. Study of the motion of a steel sphere in a viscous liquid and determination of the coefficient of viscosity of the liquid.
14. Meldeôs experiment ï determination of frequency.
15. Lees and Charlton disc ï Thermal conductivity of a bad conductor.
16. Specific heat of a solid by the method of mixtures.

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House,1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7thEdition, Cengage Learning, 2009.
7. D.P. Khandelwal,A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication, 1985.

Core Course 1 B Botany

BSE II.1B :DIVERSITY OF CRYPTOGAMS AND ARCHEGONIATAE

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
- To acquaint students with the structure, classification and life history of Bryophyta and Pteridophyta.
- To understand the Geological time scale and the importance of fossils.
- To understand the evolutionary trends among Pteridophytes.

COURSE CONTENT :

Unit I : BRYOPHYTA

a) General characters, distribution, structure, reproduction, alternation of generation, classification and economic importance.
b) Study of morphology, anatomy and reproduction in Hepaticopsida: Marchantia
c) Study of morphology, anatomy and reproduction in
Anthocerotopsida : Anthoceros
Bryopsida : Funaria
d) Origin and affinities of bryophytes ï brief account.

Unit II : PALAEOBOTANY

a) General account of geological time scale, types of fossils, fossilization process, radioactive carbon dating, and importance of fossils.
b) Study of Rhynia, Lepidodendron, Lepidostrobus.

Unit III : PTERIDOPHYTA

a) General characters, distribution, reproduction, life cycle and classification.
b) Study of morphology, anatomy and reproduction in
Psilopsida : Psilotum
Lycopsida : Lycopodium, Selaginella

Unit IV :

a) Sphenopsida : Equisetum
b) Study of morphology, anatomy and reproduction in Pteropsida : Marsilea
c) Evolution of steles in Pteridophytes
d) Origin and significance of heterospory and seed habit.

References:

1. Smith.G.M.,1971, Cryptogamic Botany Vol.II, TMH Publishing House, New Delhi.
2. Sporne, K.R., 1974, Morphology of Pteridophytes, Hutchinson & Co., London.
3. Rashid, A. An Introduction to Pteridophyta.
4. Pandey, Mishra & Trivedi, 2007, A Textbook of Botany Vol.II, Rastogi Publications, Meerut.
5. Singh,V., P.C.Pande & D.K.Jain 2006, A Textbook of Botany, Rastogi Publications, Meerut.
6. Singh V., P.D.Pande & D.K.Jain 2005, Diversity and Systematics of Seed plants, Rastogi Publications, Meerut.
7. Parihar, N.S., Bryophyta.
8. Parihar, N.S., Introduction to Embryophyta Vol.II Pteridophyta.
9. Vashishta, P.C.1982, Peridophyta, S.Chand & Co. Ltd., New Delhi.
10. Gangulee H.C., Kar and Ashok Kumar,1982, College Botany Vol.II, Central Book Agency, Calcutta.
11. Anrold, Introduction to Palaeobotany, McGraw Hill, London.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives :

Å To develop the skill of freehand sectioning, staining and mounting Bryophyta and Pteridophyta materials.
Å To observe and identify temporary micropreparations and permanent slides.
Å Study of the genera included under bryophytes and pteridophytes by observing temporary micropreparations and permanent slides.
Å To prepare permanent, double-stained micropreparations.

COURSE CONTENT:

1. Study of the morphology, anatomy and reproductive structures of genera included in Byophyta and Pteridophyta.
2. Preparation and submission of 2 double-stained slides

Core Course 2 B :Chemistry

BSE II.2 :STATES OF MATTER AND NUCLEAR CHEMISTRY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives :

- Illustrate how a scientific model can be constructed based on the experimental observations of the behaviour of gases and to explain the properties in terms of microscopic organization.
- To develop an understanding of properties of Gases, Liquids, colloids and Solutions.
- To understand the shapes of molecules in terms of symmetries and to relate the properties of matter in solid state to the structure.
- To develop an understanding of the concept of acids and bases, characteristics of non-aqueous solvents.
- To familiarize radioactivity as a nuclear phenomenon in understanding the nuclear reactions

COURSE CONTENT

Unit I : Gaseous and Solid State

Review of kinetic theory of gases and van der walls equation. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases based on Joule-Thomson effect.

Explanation of the macroscopic properties of solids in terms of structure, bonding and defects. Definition of space lattice, unit cell.

Laws of crystallography – (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices, (iii) Law of symmetry. Symmetry elements in crystals.

X-ray diffraction by crystals. Derivation of Bragg equation. Predicting crystal structure . Defects in solids , Dielectric properties. Review a perfect gas connecting temperature with kinetic theory. Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of state. Critical Phenomena : P-V isotherms of real gases, continuity of states, the isotherms of van der Waals equation, Derive a relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities: Root mean square, average and most probable velocities. Qualitative

discussion of the Maxwellôs distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases (based on Joule-Thomson effect).

Unit II : Liquids and Colloids

Accounting the Isotropic and intermediate behaviour of liquids as a link between solids and gases. Also tracing the role of liquids as solvents and reaction regulators Intermolecular forces, structure of liquids (a qualitative description).
Structural differences between solids, liquids and gases.
Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.
Definition of colloids, classification of colloids.
Solids in liquids (sols) : Properties ï kinetic, optical and electrical; stability of colloids, protective action, Hardy ï Schulze law, gold number.
Liquids in liquids (emulsions) : Types of emulsions, preparation. Emulsifier.
Liquids in Solids (gels) : Classification, preparation and properties, inhibition, general applications of colloids.

Unit III : Acids and bases

A discussion on changing concepts of acids and bases involving concentrations and effects of solvent medium. Arrhenius, Bronstead-Lowry and Lewis concepts of acids and bases.
Hard and Soft Acids and Bases (HSAB) -Classification of acids and bases as hard and soft. Pearsonôs HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.
Non-aqueous Solvents- Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Unit IV : Nuclear Chemistry

Fundamental particles of nucleus, Concept of Nuclides, isotopes, isobars and isotones (with specific examples), nuclear forces, qualitative idea of stability of the nucleus (n/p ratio), binding energy, packing fraction, Natural and artificial radioactivity, Radioactive Disintegration series, half life, average life,nuclear reactions, artificial transmutation, nuclear fusion and fission. Nuclear fusion as a future source of energy, Nuclear reactors, Application of Radioactivity and Radio isotopes as tracers in chemistry, biology, medicine, agriculture and industry. Isotope dilution analysis, Neutron activation analysis.

References :

1. Essentials of Physical Chemistry Arun Bahl B.S.Bahl, G.D.Tuli, S.Chand & Company Ltd.
2. Principles of Physical Chemistry : Marron and Prutton
3. Elements of Physical Chemistry : Samuel Glasstone and Lewis
4. Physical Chemistry : P W Atkins
5. Nuclear Chemistry V.N.Darls Sultan Chand & sons.
6. Essentials of Nuclear Chemistry Arnikar, Hari jeevan, 4th edition, New Age International.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To evolve a scheme of qualitatively analyzing an inorganic mixture classification of anions and cations.
- Quantitative inorganic analysis of mixtures containing four radicals.
- To develop skills of synthesizing coordination compound

COURSE CONTENT:

1. To arrive at a scheme of analysis of anions and cations based on solubility products and common ion effect: Systematic qualitative analysis by micro-scale methods of a mixture containing two acidic and two basis radicals from the following list(not more than one interfering radical):
   Cations: lead, copper, bismuth, cadmium, tin, antimony, iron, aluminium, zinc, cobalt, nickel, calcium, strontium, barium, magnesium, sodium potassium, ammonium.
   Anions: carbonate, bicarbonate, acetate, fluoride, chloride, bromide, iodide, nitrate, sulphate, borate, oxalate, phosphate.
2. Preparation of the complexes:
   Tris(thiourea)copper(I)sulphate monohydrate, Mercury tetra thiocyanato cobaltate(II), simple cobalt and chromium complexes and their analysis.

References:

1. A Text Book of Quantitative Inorganic Analysis, A .I . Vogel
2. Advanced Practical Inorganic Chemistry, Gurudeep

Core Course 3 B Mathematics

BSE II.3A :CALCULUS – II, ANALYTICAL GEOMETRY AND NUMBER THEORY

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

At the end of the course students will be able to understand the concepts of number system and analytical geometry and principles and techniques of calculus of several variables in problem solving.

COURSE CONTENT:

Unit I: Partial Derivatives – I

Functions of two or more variables, Limits, Continuity, Partial derivatives, Differentiable functions, Linear approximation theorem. Homogeneous functions, Eulerôs Theorem, Chain Rule, Change of Variable, Directional Derivative, Partial Derivatives of higher order, Taylorôs Theorem, Derivative of Implicit functions, Jacobians.

Unit II: Analytical Geometry – I

Cartesian coordinates in three dimensional spaces, Relation between Cartesian coordinates and position vector, Distance formula (Cartesian and Vector form), Direction cosines, Direction ratios, Projection on a Straight line, angle between two lines, Area of Triangle, Volume of a tetrahedron. Straight line, equations of straight lines (Cartesian and Vector form).

Unit III: Analytical Geometry – II

Planes, Equations of Planes (Cartesian and Vector form), Normal form, Angle between planes, Coaxial planes, Parallel and Perpendicular planes, Length of a Perpendicular from a point to a plane, Bisectors of angles between two planes, Shortest distance between two skew lines.
Translation and Rotation of Cartesian axes in plane, Curves of second degree, Discriminant and Trace, Theorem on Discriminant and trace, Classification theorem on second degree equation.

Unit IV: Theory of Numbers

Division Algorithm ï Prime and Composite Numbers ï proving the existence and uniqueness of GCD and the Euclidean Algorithm ï fundamental theorem of Arithmetic - the least common multiple ï congruences ï linear congruences ï Wilsonôs theorem ï Simultaneous congruences ï Theorem of Euler ï Fermat and Lagrange.

References :

1. Calculus by Anton,Wiley.
2. Calculus with Analytic Geometry by S K Stein, McGraw Hill.
3. Calculus and Analytical Geometry by Thomas and Finney, S.Chand and Co. Ltd.
4. First Course in Calculus by Serge Lang, Addison-Wiley.
5. Calculus, Vols. 1 and 2 by Lipman Bers, IBH.
6. Introduction to Calculus and Analytical Geometry by Courant and John, Narosa Publishing House.
7. Advanced Calculus by Frank Ayres, Schaum Publishing Co.
8. Higher Algebra by Bamard and Child, Macmillan India Ltd.
9. Integral Calculus by Shanthinarayan, S.Chand and Co. Ltd.
10. Differential Calculus by Gorakhprasad, Pothishala Ltd.
11. A Course in calculus and Real Analysis-Iby Ghorpade S R and Limaye B V (2006), Springer Verlag
12. Elementary Number Theory by David M. Burton.
13. Elementary Number Theory with applications (2nd edition) by Thomas Koshy, Academic Press.

Core Course 3B : Zoology

BSE II.3B : DIVERSITYOF ANIMALS–II

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To acquaint students with the diversity that exists in invertebrates and vertebrates
- To enable students to understand invertebrates, their organizational hierarchies and complexities;
- To understand the external morphology and internal structure; identification and classification with examples;
- To enable them to understand various modes of adaptations in animals

COURSE CONTENT

UNIT I: ARTHROPODA AND ONYCHOPHORA

a) **Arthropoda**: General characters and classification of Phylum Arthropoda up to classes with examples, Type study: *Periplaneta americana* ï External morphology, digestive system, circulatory system, respiratory system, excretory system, nervous system and reproductive system; Mouth parts and metamorphosis in Insects.

b) **Onychophora**: Salient features of *Peripatus*, systematic position and phylogeny of Onychophora.

UNIT II: MOLLUSCA

a) **Mollusca**: General characters and classification of Phylum Mollusca up to classes with examples; *Pila* ï External morphology, digestive system, nervous system, respiration, circulation and reproduction; Torsion and detorsion in Mollusca; Molluscan shell; Comparative account and Pearl formation.

UNIT III: ECHINODERMATA AND CHORDATA

a) **Echinodermata:** General characters and classification of Phylum Echinodermata up to classes with example; Type study: *Asterias* ï External morphology, digestive system, water-vascular system, haemocoelomic system and reproductive system, life-cycle and metamorphosis; Larval forms in Echinodermata.

b) **Chordata**: General characters and outline classification of Phylum Chordata up to classes with examples;

c) **Hemichordata:** *Balanoglossus* External morphology, nutrition, respiration and reproduction.

UNIT IV: PROTOCHORDATA AND CYCLOSTOMATA

a) ***Herdmania*** ï External morphology, nutrition, respiration and reproduction.

b) ***Amphioxus*** **–** External morphology, Digestive system, nutrition, respiration and reproduction; Affinities and phylogenetic relationship among Hemichordata, Urochordata and Cephalochordata.

c) **Cyclostomata –** General characters and classification of Class Cyclostomata up to

orders with examples.; Type study: *Petromyzon* ï External morphology, digestive system, respiratory system and reproduction; Structure and metamorphosis of Ammocoetes larva; Affinities of Cyclostomata.

References:

1. Invertebrate Zoology by E.L.Jordon and P.S. Verma ï S. Chand & Co., Delhi).
2. Invertebrate Zoology by J.K.Dhami and P.S.Dhami ï S. Chand & Co., Delhi).
3. Invertebrate Zoology series (Protozoa to Echinodermata) by R.L. Kotpal ï (Rastogi Publications, Meerut, 2008).
4. The Invertebrate series of L.H.Hyman ï (McGraw Hill).
5. A student's textbook of Zoology by Adam Sedgwick Vol. I, II & III ï (Central Book Depot, Allahabad).
6. A Textbook of Zoology vol.1 by Parkar and Haswell ï (MacMillan).
7. Destructive and Useful Insects- Their habits and control by Metcalf and Flint ï (Tata McGraw Hill, New Delhi).
8. Protochordates by K.S. Bhatia.
9. Modern Textbook of Zoology Invertebrates by R.L. Kotpal ï (Rastogi Publications, Meerut, 10th Revised Edition, 2008).
10. Modern Textbook of Zoology: Vertebrates by R.L. Kotpal ï (Rastogi Publications, Meerut, 3rd Edition, 2008).

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

OBJECTIVES:

To develop in students the skills of:

- Staining and mounting of materials (temporary and permanent);
- Preparation of cultures of invertebrates by using common culture methods;
- Laboratory observation of animal specimens;

COURSE CONTENT:

1. Study of specimens of Arthropoda and Onychophora:
   a) *Limulus b) Palamnaeus c) Palaemon d) Balanus, e) Cancer, f) Scolopendra, g) Spirobolus h) Peripatus j)Aranea*
2. Identification and classification of any common insects belonging to five different orders (Diptera, Coleoptera, Hymenoptera, Lepidoptera and Hemiptera)
3. Study and mounting (a & b) of mouth parts:
   a) *Culex/Anopheles* b) *Periplaneta,* c) *Apis*, d) butterfly e) housefly
4. Study of Crustacean larvae:
   a) Nauplius, b) Zoaea, c) Mysis, d) Megalopa
5. Study of specimens and permanent slides of Mollusca:
   a) *Chiton b) Pila, c) Dentalium d) Unio, e) Sepia, f) Glochidium*larva.
6. Study of specimens and permanent slides (larvae) of Echinodermata:
   a) *Astropecten/Asterias, b) Ophiothrix, c) Echinus, d) Holothuria,*

e) Antedon f) Bipinnaria larva g) Echinopluteus larva

7. Study of specimens and permanent slides of Protochordata:
   i) *Balanoglossus*: a) Entire, b) T.S. through proboscis, c) T.S. through trunk region,
   ii) *Herdmania*
8. Study of *Amphioxus*: a) Entire, b) T.S. through pharynx, c) T.S. through intestine
9. Study of specimens of Cyclostomata: a) *Petromyzon* and b) *Myxine*
10. Identification of gastropods, cephalopods and bivalves using keys for identification
11. Study of *Palaemon/Periplaneta (Chart/assimilation)*: a) Digestive system b) Nervous system c) statocyst d) mouth parts
12. Study of *Pila (Chart/assimilation)*: a) Radula b) Nervous system

ABILITY ENHANCEMENT COURSE AEC 1B : LANGUAGE

BSE II.4A : HINDI

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalise grammar rules so as to facilitate fluency in speech and writing .
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode :

Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: History of Language and Literature-2

Aadhunik Hindi Sahitya ka Itihas [1857 Se Lekar Ab Tak]

Unit II : **Modern Poetry-1 [Pre-Independence Literature]**
Swatantratapurva Hindi Kavita Ka Vikas

1. **Maithilisaran Gupt-** Nar Ho Na Nirash Karo Man ko
2. **Jayshankar Prasad**- Himadri Tung Sring Se Prabudh Sudhha Bharti
3. **Suryakant Tripathi Nirala**- Joohi ki Kali
4. **Sumitranandan Pant-** Drut Jharo Jagat Ke Jirn Patra
5. **Mahadevi Verma-**MaiNeer Bhari Dhukh Ki Badli,

Unit III : Modern Poetry-2 [Post-Independence Literature]

Swatantrayottar Hindi Kavita Ka Vikas

1. **Gajanan Madhav Muktibodh**- Bhool Galti,
2. **Kedarnath Agrawal**- Chandra Gahna Se Lautati Ber
3. **Raghveer Sahay-** Aapki Hansi
4. **Nagarjun-** Aakal Aur Uske Bad
5. **Kedarnath Singh**- Aakal Me Saras

Unit IV : Communication skills

Conversation [Varta]:

Characteristics ï Definition ï Styles of conversation ï Higher order skills-Telephonic conversation, Role Play, ï Models, etc. ï Exercises.

References:

1. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
2. Hindi Sahitya ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Dr Nagendra , Mayoor Paperbacks, Delhi
4. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
5. Hindi Sahitya Ka Dusara Itihas: Bacchan Singh, Vani Prakashan, Delhi
6. Aadhunik Hindi Sahitya ka Itihas: Bacchan Singh, Lokbharti Prakashan, Delhi
7. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
8. Hindi Sahitya ka Sanchhipt Itihas:Viswanath Tirpathi, Orient Longman, Delhi
9. Sawtantrayotar Hindi Sahitya Ka Itihas: Dr Laxmisagar Vasney, Delhi
10. Hindi Sahitya Aur Samvedana Ka Vikas: Ramswaroop Chaturvedi, Lokbharti Prakashan
11. Bhasha, Yugbodh aur Kavita: Dr Ramvilas Sharma, Vani Prakashan, Delhi
12. Kavita ka Vartmaan: Dr P Ravi, Vani Prakashan, Delhi
13. Hindi Kvaya ka Itihas: Ramswaroop Chaturvedi, Lokbharti Prakashan, Delhi
14. Kavita ki Zameen aur Zameen ki Kavita: Namvar Singh, Rajkamal Prakashan, Delhi
15. Nayee Kavita aur Astitvawad: Ramvilas Sharma, Rajkamal Prakashan,Delhi
16. Chhayavad: Namvar Singh, Rajkamal Prakashan, Delhi
17. Kavita ke Naye Pratiman: Namvar Singh Raajkamal Prakashan, Delhi
18. Hindi Kavita ka Atit aur Vartmaan: Maneger Panday, Vani Prakashan, Delhi
19. Hindi Kavita Ki Tisari Dhara: Mukesh Manas, Swaraj Prakashan, Delhi
20. Effective Communication Skills, by Omkar N Kour
21. Prayojanmoolak Hindi- Madhav Sontakke, Rajkamal Prakashan Samooh, Delhi
22. Prayojanmoolak Hindi ki Nayee Bhoomika- Kailash Nath Panday, Rajkamal Prakashan Samooh, Delhi
23. Prayojanmoolak Hindi: Sidhant aur Prayog- Dangal Jhalte, Vani Prakashan, Delhi
24. http://www.hindisamay.com

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

BSE II.4B : KANNADA

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives*:*

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENT :

Unit I : Descriptive Grammar

Samasa and Alankara
Reference: Kannada Kaipidi, Prasaranga Publication, University of Mysore

Unit II : Functional Language

a. **News reporting** : Characteristics ï definition ï language of news reporting ï model of news report ï patterns ï role of media in news reporting ï exercises.

b. **Interview** : Characteristics ï definitions ï preparation for interview ï various types of interviews (business ï employment ï literary etc) ï exercises.

References:
a) Fundamentals of Journalism, Report Writing and Editing by R.Thomas Berner, Marquette Books LLC, Washington.
b) The Perfect Interview by Max Eggert, Random House, UK.

Unit III: Medieval Poetry

i) Enna Devange Jagavella Hennu Noada - Akkamahadevi
ii) Kaayuttirdanirulu Hagalennade-Raghavanka
iii) Parahimseyam Madi Manavam Baldapane - Laksheesha
(Kaavya Sanchaya – 3- Mysore University, Mysore).

Unit IV : Collection of Essays

i. Chatavannu kurithu ï B G L Swamy
ii. Samakalina Prajneï G S Shivarudrappa
iii. Namma Praachiinara Jiivana Moulyagalu ï T V Venkatachala Shasthri
iv. Janapada Geethe ï C P K

(Selected from Gadya Vihara Part III) Mysore University, Mysore

Suggested Activities
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

BSE II.4C : MALAYALAM

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Unit I. **Descriptive Grammar**
Samasa and Alamkara
(Ref : Bhashaa bhushanam and Kerala Paanineeyam , NBS , Kottayam)

Unit II : **Functional Language**

1. News reporting- Characteristics ï definition ï language of news reporting ï model of news report ï patterns ï role of media in news reporting ï exercises

2. Interview- Characteristics ï definitions ï preparation for interview ï various types of interviews (business ï employment ï literary etc) ï exercises.

References: a) Fundamentals of Journalism, Report Writing and Editing by R.Thomas Berner, Marquette Books LLC, Washington.

b) The Perfect Interview by Max Eggert, Random House, UK.

Unit III: Poetry - Medieval
VEENA POOVU By Kumaaran ashan, Published by Devi Book Stall, Kodungalloor

Unit IV:Collection of Essays
Lessons from ñ Bharatha Paryatanam By Kutti Krishna Maraar, Published by Maraar Sahitya Prakasha , Kozhikode

1. Yudhathinte parinaamam
2. Amba
3. Karnante arangettram
4. Markandeyante chiri

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

ABILITY ENHANCEMENT COURSE AEC 1B: LANGUAGE

BSE II. 4D: Tamil

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii)To internalize grammar rules so as to facilitate fluency in speech and writing
(iv)To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region

which remains embodied in the literary output of the region

Transaction mode:
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: Aspects of Style:
Styles of writing, Idioms, Phrases and Proverbs

Unit II: Functional Languages:
News Reporting: Characteristics-Definition-Language of news reporting- model of news reporting-patterns-role of media in news reporting- exercises**.**
Interview: Characteristics-Definition-preparation for interview-various types of interviews(business-employment-literary-etc)-exercises

Unit III: Medieval Poetry:
Periya Puranam -Selection of poems
Naladiyar-Selection of poems

Unit IV: Collection of Essays:
Ariviyal Tamilzhakkam-SV Shanmugam (First three Essays)- Tamil Nenjam-Dr Mu. Varatharajan (First three essays)

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the Teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc.,) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.,) =25
Total=50.

References:

1. An Anthology of Tamil Poetry (For first year degree classes), University of Mysore, Mysuru.
2. *Tamil Neengalum Thavarillamal Ezhuthalam* - Dr. Porko.
3. Ariviyal Tamilzhakkam- S.V. Shanmugam, New Century Book House(P) Ltd,41- B SIDCO Industrial Estate, Chennai-600 017.
4. Tamil Nenjam- Dr Mu.Varatharajan,) Pari Nilayam, 184, Broadway ,Chennai-108.
5. Fundamentals of journalism, Report writing and editing by R. Thomas Berner, Maruette Books LLC, Washington.
6. The perfect interview by Max Eggert, Random house, UK.

ABILITY ENHANCEMENT COURSE AEC 1B: LANGUAGE

BSE II. 4E Telugu

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs. **C 3:50**

Objectives:

(i) To enable the students to acquire basic skills in functional language.
(ii) To develop independent reading skills and reading for appreciating the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language.
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: Functional language:
Essay Writing: Characteristics ï Definition ï Format of Essays ï Types of Essays (Literary, Scientific, etc.,) ï Models ï Exercises.
Translation: Characteristics ï Definition ï Need of Translation ï Translation Models ï Exercises (From English to Regional Languages).

Unit II: Communication skills in language:
Conversation: Characteristics ï Definition ï Styles of conversation ï Higher order Skills-Telephonic conversation, Role Play, ï Models, etc., ï Exercises.
Debate: Characteristics ï Definition ï Need of Debate ï Technique to conduct Debates, etc. ï Exercise.

Unit III: **Ancient poetry and medieval poetry:**
Damayanthee Swayamvaram by Nannaya (First 18 Poems)
Sathyabhama Santhwanam by Nandi Timmana (Poems 82 to 104)
(From Telugu Sahithya Sravanthi, by Prsaranga, University of Mysore, Mysore).

Unit IV: Genre of literature: (Prose: Literary Work)
Andhrula Sanghika Acharamulu by Khandavalli Lakshmi Ranjanam.
Telugu Samethalu by Nayani Krishna Kumari
(From Telugu Sahithya Sravanthi, by Prasaranga, University of Mysore, Mysore).

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc.) =25
C2-10 (test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:

1. Government of Karnataka, *A Hand book of writing activities,* Prasaranga, University of Bangalore.
2. Government of India, *the Art of Translation (A Symposium)*, Ministry of Scientific Research and Cultural Affairs, New Delhi.
3. Gloria J. Galanes, *Effective Group Discussion – Theory and Practice*, Mc Graw Hill Company.
4. Rachamallu Ramachandra Reddy, *Anuvada Samsyalu*, Published by Visalandhra Books, Hyderabad.
5. Narasimha Rao, K V V L, *Aspects of Translation*, CIIL Publication, Mysore

Ability Enhancement Course AEC 2B : English

BSE II.5 : PROFICIENCY IN ENGLISH-1I

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives :

Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- examine authentic literary and non-literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: **Descriptive Grammar**
Function of Auxiliaries; Modals; Question form
Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Development of Language Competence
To be based on the use of multiple texts which address issues of multiculturalism, gender, racism and texts which relate with current issues and contemporary trends. Short stories, comic strips, cartoons and animations (both print and non-print media) to be used. Speeches of famous persons, diaries, travelogues can also be used.

Unit III: Writing for Functional Purposes
Letter-writing (Professional / Personal)

Unit III: Creative Skills in Writing
Writing dialogues, poems and essays

Unit IV: Basic Phonetics
Sounds of English language, intonation and transcription using IPA.

References:

1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA
2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2 nd Ed. New Harbinger Publications.
5. Merrriam, E. (1964). It Doesnôt Always Have to Rhyme. Atheneum.
6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
7. Graves,D (1992). Explore Poetry: The reading /writing teacherôs companion.Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.:Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.

PROFESSIONAL EDUCATION COURSES

BSE II.6: CONTEMPORARY INDIAN EDUCATION

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
The course enables the student teachers to:

- Understand different perspectives of Education.
- Analyse the concept of Education and its related terms
- Analyse the Aims of Education and their determinants
- Reflect on the educational ideas and systems of various thinkers and develop the ability to theorize educational practices;
- Collect evidences for the influence of socio-cultural aspects on Education
- Analyse the role of Education on society by gathering various evidences and illustrations
- Understand and appreciate the need of autonomy to teacher and learners
- See the relationship between autonomy, accountability, and commitment
- Arrive at a list of qualities of a committed teacher through discussions.

COURSE CONTENT:
Unit I: Education: Concept, Nature, and Purpose

Education as concept and its distinct nature; Classical, Liberalists and Progressivists view on Education; Analytical concept of education - education as a normative concept; Education as a family of Processes; Education as worthwhile activity; Cognitive and normative dimensions of education; Education and Educated person;
Education as System; Modes of education- formal, informal, non-formal;
Education and its related concepts- Training, Instruction and teaching
Education: Purpose(s) and Determinants - Determinants of Purpose-individual, Community, Religion, State and Market; Brief historical inquiry into purposes and determinants of education (from ancient India to contemporary India); social context of purposes of education
Education as a Discipline and Interdisciplinary in nature
Aims of Education from ancient to contemporary Indian society
Education as value development
Determinants of Aims of Education in emerging India

Unit II: Education and Socio-cultural context
Education as an instrument of social change; Influence of education on society and family; Socio-cultural influences on the aims of education; Emerging trends in societies and their influence on education
Education and Development
Globalization and Internationalization of education

Unit III: Educational thoughts and practices

Critical reflection on the educational thoughts of Indian and Western thinkers and on their relevance to the present education system

Indian: Mahatma Gandhi, Rabindranath Tagore, Aurobindo, Swami Vivekananada, Jiddu Krishnamurthy, Gijju Bhai Badheka; B R Ambedkar.

Western: Plato, Rousseau, John Dewey, Froebel, Montessori, Ivan Iliach, Paulo Frieri

Unit IV: Autonomy of Teacher and Learner

Autonomy: Meaning and extent

Teacher autonomy: Meaning, extent and nature; Teacher as autonomous professional; Areas of teacher autonomy: Their limit-situations - Curriculum making; Learning resources and material selection and use; Pedagogical practices; Assessment modalities; Limit-situations: Structures- Structured curriculum, and examination system; Time-tables;

Learner Autonomy: Meaning, extent and nature; Learning as an autonomous act; Meaning making and learnersôautonomy-opportunities and constraints

Autonomy and Accountability: Teacher Accountability; Teacher commitment

Sessional Activities:

- Presentations on Educational thoughts of Various thinkers
- Preparation of an Album or posters on different thoughts of great thinkers
- Analysis of aims of education from ancient Vedic times to modern times
- Collection of examples/evidences to show the influence of Education on social change and the socio-cultural influences on Educational aims
- Comparative study of National curriculum frameworks of NCERT on aims of education
- Readings on Position paper on ñAims of Educationò-NCF 2005
- Comparative study of Aims of Education of few countries
- Collection of case studies that exemplifies teacher accountability and commitment

References:

1. Alfred North Whitehead (1967), ôThe Aims of Education and Other Essaysô, The McMilan Company, New York. .
2. Debra Hayes, Martin Hills, Pam Christie & Bob Lingard (2007) Teachers & Schooling: Making a Difference, Allen and Unwin, Australia.
3. Dewey, John (1938) Experience and Education Kappa Delta Pi, Indianapolis, USA
4. Diane Tellman (2000), Living Values: An Educational Program, Sterling Publishing Private Limited, USA.
5. Freiri, Paulo (1968). Pedagogy of the Oppressed, Sea burry Press, New York, USA
6. Hirst, Paul (1970). The Logic of Education, Taylor & Francis, London
7. JJ Rousseau, (1956) Emile
8. John S Brubacher, (1969) Modern Philosophies of Education. Tata McGraw Hill Pub., Co.,Pvt., Ltd, New Delhi.
9. Krishna Murthy, J. (1947) On Education, Orient Longman, New Delhi.
10. Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore, New Book Society, New Delhi.
11. Manoj Das (1999). Sri Aurobindo on Education, National Council for Teacher Education, New Delhi.
12. Margaret (1999). The Open Classroom: A Journey through Education, Orient Longman, New Delhi.
13. Mathur S.S. (1988). A Sociological Approach to Indian Education, Vinod Prakashan, Agra.
14. NCERT (2013). Basics in Education, National Council of Educational Research and Training, New Delhi.

15. NCERT, (2005). National Curriculum Framework-2005. National Council of Educational Research and Training, New Delhi.
16. O'Connor,J (1958) Philosophy of Education, pub by Duke University Press on behalf of philosophical review.
17. Peters, R.S. (1967), The Concept of Education, Routledge, United Kingdom.
18. Peters, RS (1968). Ethics and education.(5th edn), George Allen & Unwin Ltd, London
19. Prema Clarke (2001). Teaching & Learning: The Culture of pedagogy, Sage Publication, New Delhi.
20. Scheffler, Israel (1966).Philosophy and Education: Modern Readings, Allyn and Bacon, Boston, US
21. Stella Van Petten Henderson (1960) Introduction to Philosophy, The University of Chicago press, Chicago.
22. Steven H. Cahn (1970). The Philosophical Foundation of Education, Harper & Row Publishers, New York.

BSE II.7: YOGA EDUCATION, SELF UNDERSTANDING AND DEVELOPMENT

Credits: 2 (1L+ 0T +1P) **Marks: 100**
Contact hrs per week: 3 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives :

The student teacher will be able to:

- Understand the meaning and importance of self-concept and self-esteem.
- Be aware of different factors related to self-concepts and self-esteem. Record a brief history of development of yoga through the ages. Discuss how yoga and yoga practices are important for healthy living.
- Explain some important principles of yoga.
- Explain the different limbs of *Astañga* yoga.
- State the different types of yoga.
- Derive how Hatha yoga and *Astañga* yoga are complementary to each other.
- Enable the student to have good health.
- Practice mental hygiene.
- Possess emotional stability.
- Integrate moral values.
- Attain higher level of consciousness.
- Demonstrate some important *asanas* and *pranayama*.

COURSE CONTENT :

Unit I : Introduction to Yoga and Yogic Practices

Yoga: meaning and initiation, What is Yoga? Conceptions of Yoga, History of development of yoga, The streams of Yoga: Astanga yoga Raja yoga, Yogic practices for healthy living

Unit II Introduction to Yogic Texts

Historicity of yoga as a discipline, Classification of yoga and yogic texts, Hatha yogic practices, Meditational processes

Unit III: Yoga and Health

Need of yoga for positive health, Role of mind in positive health as per ancient yogic literature, Concept of health, healing and disease: yogic perspectives, Potential cause of ill health, Yogic principles of healthy living

Unit IV: Personality Development and Stress Management through Yoga

Yogic Practices for Personality Development : Surya Namaskar, Asanas : Tadasana, Simhasana, Kukkutasana, Akarna Dhanurasana, Matsyasana, Prnayama, Anuloma-Viloma Pranayama, Bhastrika Pranayama, Banda, Uddiyana Bandha, Dhyana (Meditation), What is Stress, Yoga as a Way of Life for Stress Management: Ahara, Vihara, Achara, Vichara, Vyavahara, Yogic Practices for Stress Management; Asanas, Hastottanasana, Padahastasana, Trikonasana, Shashankasana, Ushtrasana, Ardhamatsyendrasana, Bhujangasana, Makarasana, Sarvangasana, Matsyasana, Shavasana; Pranayama, Bhramari Pranayama, Sheetali Pranayama; Yoga for Healthy Living, Shirshasana, Bakasana, Hamsasana, Mayurasana

PRACTICALS

Exam Duration: 3 hrs **C_3 : 50 marks**

Practicum

General guidelines for performance of the practice of yoga for the beginners
Guidelines for the practice of *āsanas, prānāyāma and meditation*

- Select yoga practices for persons of average health for practical yoga sessions

1. Supine position
2. Prone position
3. Sitting position
4. Standing position
5. Mudras
6. PrÜnÜyÜmas

*** In addition, school and community based activities may be organised.**

Evaluation Strategies

The evaluation will be done through practicals/ assessment of ability to develop and design softwares for selected contents.

References:

1. Adair, J. and Allen, M. (1999). *Time Management and Personal Development.* London: Hawksmere.
2. NCERT (2015). Yoga: A Healthy Way of Living Upper Primary Stage, New Delhi (Also available in Hindi)
3. NCERT (2015). Yoga: A Healthy Way of Living Secondary Stage, New Delhi. (Also available in Hindi)
4. Rohrer, J. (2002). *ABC of Awareness.* Oberurnen: UTD Media.
5. Simanowitz, V. and Pearce, P. (2003). *Personality Development.* Beckshire: Open University Press.
6. Stevens, N. (2008). *Learning to Coach.* United Kingdom: How to books.

THIRD SEMESTER

Core Course 1 C : Physics

BSE III.1A : ELECTRICITY AND ELECTROMAGNETISM

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To enable students to acquire a broad conceptual framework of electrostatics electromagnetic phenomena.

COURSE CONTENT:

Unit I: Electrostatics

Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gaussôs theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere and continuous charge distributions (charged rod, ring, disk). Calculation of electric field from potential.

Unit II: Electric Fields in Matter and DC circuits

Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Combination of capacitors, energy stored in a capacitor, Energy per unit volume in electrostatic field. Atomic view of dielectrics, Polarization, Displacement vector. Gauss's theorem in dielectrics. Dielectric constant, Parallel plate capacitor completely filled with dielectric. Polarizability and susceptibility, Clausius-Mossotti equation.
DC Circuits: Kirchhoffôs laws, Voltage and Current dividers, Mesh analysis and Loop analysis, RC circuits, Maximum power transfer theorem.

Unit III: Magnetism

Magnetostatics: Biot-Savartôs law and its applications- straight conductor, circular coil, solenoid carrying current. Magnetic force between two parallel current carrying conductors. The Divergence and Curl of **B**, Magnetic vector potential. Ampere's circuital law. Magnetic field due to a very long solenoid and a toroidal coil.
Magnetism in matter: Magnetic intensity, magnetic induction,, Magnetic susceptibility, permeability. Classification of magnetic substances- a brief introduction of dia-, para- and ferro-magnetic materials.

Unit IV: Electromagnetic Induction and AC Circuits

Electromagnetic Induction: Review of Faradayôs law of induction, Lenzôs law, Motional EMF. Inductance: Self inductance, energy in a magnetic field, magnetic energy density.

AC circuits: The *j* operator.sinusoidal voltage, current voltage relation in resistance, capacitance and inductance, Reactance and impedance, Power in AC circuits, RMS values, Power factor, LR and CR circuits. Series and parallel LCR circuits. Resonance. Mutual inductance and transformers.

Reference Books:

1. David J. Griffiths, Introduction To Electrodynamics, 4th Edition, Pearson
2. D C Tayal, Electricity and Magnetism, 1988, Himalaya Publishing House.
3. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6th Edition, John Wiley, Inc.
4. A N Matveev, Electricity and Magnetism, Mir Publishers, Moscow.
5. F.W.Sears, Electricity and Magnetism, Addison Wesley Co.
6. A F Kipp, Fundamentals of Electricity and Magnetism, McGraw Hill.
7. Edward M. Purcell, Electricity and Magnetism, McGraw-Hill Education, 1986.
8. J.H. Fewkes & J. Yarwood, Electricity and Magnetism, Vol. I, Oxford Univ. Press, 1991.
9. Ronald Lane Reese, University Physics, 2003, Thomson Brooks/Cole.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. To study the variation of Magnetic field along the axis of a circular coil.
2. To determine M & H using deflection magnetometer & vibration magnetometer.
3. To determine horizontal component of Earthôs magnetic field using a Tangent galvanometer.
4. To calibrate an ammeter using a potentiometer and Daniel cell.
5. Mapping of magnetic field due to a current carrying straight conductor.
6. Determination of resistance & resistivity using Meter Bridge.
7. Charging & Discharging of a Capacitor.
8. Deflection magnetometer-Tan A, Tan B positions.
9. Deflection magnetometer -Tan C Position-moment of moments.
10. Mapping of magnetic field lines for a current carrying solenoid.
11. Searleôs vibration magnetometer-moment & ratio of moments.
12. Box type vibration magnetometer- M &B_h.
13. Caparison of emf and determination of internal resistance of a cell using a

potentiometer.
14. Determination of resistance & resistivity using PO Box.
15. Comparison of capacitance by Desautyôs bridge using BG.
16. Determination of frequency of AC mains using Sonometer & electromagnet.
17. Variation of phase angle with capacitance for a RC circuit.
18. Conversion of Galvanometer to Voltmeter.
19. Unknown resistance by Carey Foster bridge.
20. Induced emf.
21. Maximum power transfer theorem.
22. To verify the Theveninôs and Nortonôs theorem

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

Core Course 1C : Botany

BSE III.1B :GYMNOSPERMS AND REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To acquaint students with the morphology, anatomy, reproduction and classification of Gymnosperms;
- To acquaint students with the structure, development and processes associated with Angiosperm embryology;
- To acquaint students with the techniques, branches and applications of plant tissue cultures.

COURSE CONTENT:

Unit I :

a) General characters, distribution, classification, affinities and economic importance of Gymnosperms
b) Study of morphology, anatomy and reproduction in Cycadopsida : Cycas, Cycadeoidea
c) Study of morphology, anatomy and reproduction in Coniferopsida : Pinus

Unit II:

a) Gnetopsida : Gnetum
b) Flower ï Review of structure, morphology, embryological perspective.
c) Microsporangium ï Development of wall layers, tapetal types, microsporogenesis, tetrad types.
d) Male gametophyte ï Development and structure; vegetative and generative cells; male gametes.
e) Megasporangium (ovule): Development, types, megasporogenesis, tetrad types.
f) Female gametophyte : Development, ultrastructure, mono, bi and tetrasporic embryo sacs.

Unit III :

a) Pollination and fertilization : Definitions, types of pollination, pollen-pistil interaction, self-incompatibility, double-fertilization.
b) Endosperm : Definition, types ï cellular, nuclear and helobial; endosperm haustoria.
c) Embryo : Classification, types, development of Crucifer type.

Unit IV :

a) Fruit and seed : Development, structure of monocot and dicot seeds, dispersal mechanisms, importance.
b) Brief account of apomixis and polyembryony.
c) Brief history, cellular totipotency, culture media and techniques.

d) Brief account of anther/ pollen culture, endosperm, embryo and protoplast culture, Applications of tissue culture.

References:

1. Sporne, K.R.,1974, Morphology of Gymnosperms, Hutchinson & Co., London.
2. Gangulee, S.C., Kar and Ashok Kumar, College Botany Vol.II, Central Book Agency, Calcutta.
3. Singh V., P.C.Pande & D K Jain 2006 Diversity and Systematics of Seed Plants, Rastogi Publications, Meerut.
4. Pandey, Mishra and Trivedi, 2000, A Text book of Botany Vol.II.
5. Chopra G.L.,1972, Gymnosperms, S. Nagin & Co., Jullandar.
6. Bhojwani S S and S P Bhatnagar, 2007. The Embryology of Angiosperms, Vikas Publishing House, Delhi.
7. Raven P.H, R.F.Evert and S.E.Eichhorn, 1999, Biology of Plants, 5th Ed., W.H.Freeman and Co., Worth Publishers, New York.
8. Swamy B.G.L. and K.V.Krishnamurthy, 1980, From Flower to Fruit, TMH Publishing House, New Delhi.
9. Johri B.M.(Ed.),1984, Embryology of Angiosperms, Springer-Verlag, Germany.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To develop skills of free hand sectioning, staining and mounting Gymnosperm plant materials and embryological materials.
- To observe and identify temporary and permanent slides of Gymnosperms and Embryology.
- To acquaint students with procedures in plant tissue culture.

COURSE CONTENT:

1. Study of morphology, anatomy and reproductive structures of genera of Gymnosperms included in theory syllabus.
2. Study of structure of anther, microsporogenesis and pollen grains using permanent slides and mounts.
3. Study of structure of ovules and embryosac development (monosporic type) using permanent slides.
4. Examination of a wide range of flowers for study of pollination.
5. In vitro germination of pollen grains.
6. Preparation of culture medium and familiarization with tissue culture procedures.
7. Mounting the endosperm of Cucumis and embryos of Crotalaria.

Core Course 2C Chemistry

BSE III.2 :ORGANIC CHEMISTRY – I

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To review the concept of isomerism and its types
- To develop an understanding of chemistry of hydrocarbons and their halogenated derivatives.

COURSE CONTENT:

Unit I: Stereochemistry of Organic Compounds

Review of Concept of Isomerism and Types of isomerism with examples.

Optical Isomerism: Structural changes responsible for properties: elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization and asymmetric synthesis.

Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

Geometric isomerism: Determination of configuration of geometric isomers. Cis ï trans and E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism: Difference between configuration and conformation. Conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono alkyl substituted cyclohexane derivatives. Review of Newman projection and Sawhorse formulae, Fischer and flying wedge formulae.

Unit II: Aliphatic Hydrocarbons

Alkanes: Review of IUPAC nomenclature of branched and unbranched alkanes. Isomerism in alkanes and industrial source. Methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation), physical properties and chemical reactions of alkanes (halogenation, nitration, sulphonation, oxidation and isomerisation reactions) Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

Cycloalkanes: Nomenclature, methods of formation (from acetoacetic ester / malonic ester and Dieckmann reaction), chemical reactions (halogenation), Baeyerôs strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.

Alkenes: Accounting for Reactions due to unsaturation in compounds. Nomenclature of alkenes, methods of formation (by dehydration, dehydrohalogenation and dehalogenation) with mechanism. Regioselectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes ï mechanism of hydrogenation, electrophilic and free radical additions, Markownikoffôs rule, hydroboration followed by oxidation, oxymercuration ï reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$. Polymerization of Alkenes. Substitution at the allylic and vinylic positions of alkenes.

Cycloalkenes: Methods of formation and chemical reactions of cycloalkenes.

Alkadienes: Nomenclature and classification of dienes: Isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions ï 1,2 and 1,4 additions. Diels-Alder reaction.

Alkynes: Nomenclature, structure and bonding in alkynes. Methods of formation (alkylation of acetylene and by elimination reactions). Acidity of alkynes. Chemical reactions of alkynes: Mechanism of electrophilic and nucleophilic addition reactions, hydroboration, oxidation, metal-ammonia reductions, oxidation and polymerization.

Unit III: Aromatic Hydrocarbons

Factors responsible for the characteristic reactions of Aromatic compounds. Nomenclature of benzene derivatives. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckel rule, aromatic ions.

Aromatic electrophilic substitution: General pattern of the mechanism, role of σ- and π-complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/ para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Methods of formation and chemical reactions of alkylbenzenes, alkynylbenzenes and biphenyl.

Unit IV:Alkyl and Aryl Halides

Alkyl halides: A study of Alkyl halides highlighting its synthetic applications. Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides S_N2 and S_N1 reactions with energy profile diagrams. Polyhalogen compounds: chloroform, carbon tetrachloride.

Aryl halides: Methods of formation of aryl halides, nuclear and side chain reactions. The addition- elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.

Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC.

References :

1. Organic Chemistry : Seyhand N Ege
2. Organic Chemistry : Morrison and Boyd

3. Organic Chemistry : I L Finar
4. Organic Chemistry : Hendricson, Cram and Hammond
5. Organic Chemistry : Stanley H. Pine

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objective:
To develop basic skills in organic synthesis and purification of organic compounds

COURSE CONTENT:

1. Calibration of Thermometer using naphthalene / acetanilide / urea
2. Determination of melting point of Benzoic acid / cinnamic acid / m ï dinitro benzene / p-dichlorobenzene
3. Determination of boiling point of aniline / nitrobenzene / chlorobenzene
4. Distillation of water ï alcohol mixture using water condenser; Distillation of chlorobenzene ï nitrobenzene mixture using air-condenser
5. Cystallization: Benzoic acid from hot water, naphthalene from ethanol
6. Sublimation of camphor / phthalic acid / succinic acid

Organic synthesis:

1. Preparation of Iodoform from ethanol / acetone using sodium hypochlorite and KI
2. Preparation of *m*-dinitrobenzene from nitrobenzene by nitration
3. Preparation of *p*-bromoacetanilide from acetanilide by bromination
4. Preparation of 2,4,6-tribromo phenol from phenol / 2,4,6-tribromoaniline from aniline
5. Preparation of Acetanilide from aniline by acetylation
6. preparation of benzoic acid from benzamide by base hydrolysis
7. preparation of aspirin from salicylic acid by acetylation
8. preparation of p-bromoaniline from acetanilide
9. preparation of 0-iodobenzoic acid from anthranilic acid
10. preparation of p-nitroacetanilide from acetanilide by nitration

References :

A Text Book of Qualitative organic Analysis, A .I . Vogel

Core Course 3 C : Mathematics

BSE III.3A : REAL ANALYSIS

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
At the end of the course students will be able to understand the concepts of real number system, real sequences, infinite series and the convergence tests. Also understand the concept of Riemann integration and its properties.

COURSE CONTENT:

Unit I:
The field axioms; Theorems about field properties, Order in R-Absolute value, Completeness, some important subsets, Intervals, Countable and Uncountable sets. Neighborhoods, Open Sets, Closed Sets, Limit points of a set, Closure of a set, Interior of a set, Compactness, Connectedness.

Unit II:
Introduction to sequences, Convergent sequences, Divergent sequences, Oscillatory sequences, Bounded sequences, Some important limit theorems, Cauchy sequences, Monotonic sequences, Cluster points of a sequence, Limit superior and limit inferior of a sequence, Subsequences.

Unit III:
Introduction to Infinite Series, Sequence of partial sums of a series, Convergent series, Cauchyôs general principle of Convergence for Series, A necessary condition for convergence, Series of positive terms, A fundamental result for series of positive terms, Geometric series, Comparison test, Cauchyôs nth root test, DôAlembertôs Ratio test, Raabeôs test, Maclaurinôs integral test.

Unit IV:
Riemann Integration: Upper and lower sums, Criterion for inerrability, Inerrability of continuous functions and monotone functions, Fundamental theorem of Calculus, Change of variables, Integration by parts, First and Second Mean Value Theorems of Integral Calculus.

References:

1. Real Analysis by J.M.Howie, Springer 2007.
2. Real Analysis by Malik, Wiley Eastern.
3. Mathematical Analysis by Shanthinarayan, S. Chand and Co. Ltd.
4. Mathematical Analysis by Malik and Savita Arora, New Age International Pvt. Ltd.
5. Real Analysis by Royden, Prentice Hall of India Pvt. Ltd.
6. Mathematical Analysis by T M Apostal, Addison Wesley, Narosa, New Delhi, 2nd Edition.

7. Introduction to Real Analysis by Bartle R G & Sherbert , Wiley India
8. Kumar Ajit & Kumaresan S, *Real Analysis,* CRC Press
9. Principles of Mathematical Analysis by Walter Rudin, 2nd Edition, McGraw Hill Book Company, 1984.
10. Analysis I and II, Torence Tao, Hindustan Book Agency, India, 2006.
11. Elementary Analysis ï The Theory of Calculus, Kenneth A Ros, Springer International Edition, 2004.
12. Real Functions by G. Goffman.
13. Principles of Real Analysis by Malik, New Age International Ltd.
14. Textbook of Mathematical Analysis by Leadership Project, Bombay University, Tata McGraw Hill Publishing Media Pvt. Ltd.

Core Course 3 C : Zoology

BSE III.3B : DIVERSITY OF ANIMALS–III AND COMPARATIVE ANATOMY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

OBJECTIVES*:*

- To acquaint students with the diversity that exists in vertebrates
- To understand their organizational hierarchies and complexities;
- To understand the external morphology and internal structure; identification and classification with examples;
- To enable them to understand various modes of adaptations in animals
- To compare the anatomy among different vertebrates
-

COURSE CONTENT:

UNIT I: Histology, Pisces and Amphibia

a) **Histology:** Epithelial, connective, muscular and nervous tissues

b) **Pisces:** General Characters and Classification of Superclass Pisces up to orders with examples; Comparison of chondrichthyes and Osteichthyes; External morphology of *Scoliodon*; Dipnoi and its affinities.

c) **Amphibia:** General characters and classification up to orders with examples, Parental care in Amphibia

UNIT II: Reptilia, Aves and Mammalia

a) **Reptilia:** General Characters and Classification of classes up to orders with examples; Evolution of Temporal fossae; Poisonous and non-poisonous snakes; Poison apparatus and biting mechanism in snakes.

b) **Aves:** General Characters and classification up to orders, Flight adaptation and migration in birds.

c) **Mammalia:** General Characters and Classification of the class Mammalia up to orders with examples, Affinities of Prototheria and Metatheria; Adaptations in Primates; Autonomic nervous system of mammals.

UNIT III: Comparative Anatomy of Vertebrates–I

Comparative study in chondrichthyes, amphibians, reptiles, birds and mammals:

a) Digestive system
b) Respiratory system
c) Structure of heart
d) Circulatory system
e) Aortic arches

UNIT IV: Comparative Anatomy of Vertebrates–II

a) Comparative study in Chondrichthyes, amphibians, reptiles, birds and mammals:

i) Nervous system (Brain, cranial nerves, spinal cord and spinal nerves)
ii) Sense organs (eye and ear)
ii) Urinogenital system

b) Integument: scales of fishes; feather-types and structure of quill feather; mammalian skin

References:

1. Modern Textbook of Zoology: Vertebrates by R.L. Kotpal ï Rastogi Publications, Meerut, 3rd edition, 2008.
2. A Text Book of Zoology Vol.II by Parkar and Hasswel ï (MacMillan).
3. A Text Book of Zoology Vol.II by R.D.Vidyarthiï (S. Chand & Co., Delhi).
4. Life of Vertebrates by J.Z.Young ï (Oxford University Press).
5. The Vertebrate Body by A.S.Romer ï (Vakils, Ferrer& Simons, Bombay).
6. Elements of Chordate Anatomy by Weichert ï (McGraw Hill).
7. The Birds by R.L Kotpal (4th edition) ï (Rastogi Publications, 2008).
8. Bird Migration by D.R. Griffin ï (Doubleday, Garden City, USA).
9. The Book of Indian birds by Salim Ali
10. Comparative anatomy of the vertebrates by George C Kent ï 3rd saint Louis: The C.V. Mosby Company, 1973.
11. Histology by A.K. Berry

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

To develop in students the skills of:

- Staining and mounting of materials (temporary and permanent);
- Microtechniques (fixing, embedding, section cutting, staining and mounting);
- Preparation of cultures of invertebrates by using common culture methods;
- Laboratory observation of animal specimens;

COURSE CONTENT:

1. Study of specimens of Chondrichthyes:
   a) *Stegostoma b) Sphyrna c) Narcine d) Trygon e) Torpedo*
2. Study of specimens of bony fish:
   a) *Echeneis b) Exocoetus c) Clarias d) Anabas*

e) Anguilla *f*) Lungfish g) *Hippocampus*

3. Mounting of fish scales:
   a) Placoid scales b) Ctenoid/Cycloid scales
4. Study of *Scoliodon*:
   a) Afferent and efferent branchial system.
   b) Cranial nerves (5th, 7th, 9th and 10th)
   c) Membraneous labyrinth (ear canal)
5. Study of specimens of Amphibians:
   a) *Ichthyophis* *b) Bufo* *c)Ambystoma* *d)*Axolotl larva
6. Study of specimens of Reptilia:
   a) Tortoise/Turtle/terrapin *b) Gecko* *c) Varanus*
7. Identification of poisonous and non-poisonous snakes:
   a) *Hydrophis* b) *Vipera russelli* c) *Naja naja* d) *Bungarus* e) *Dhaman*
   f) *Dryophis* *g) Typhlops*
8. Osteology:
   a) Study of skulls of Frog/Varanus/Bird/Rabbit
   b) Study of fore and hind limb bones of Frog, Varanus/Calotes, Bird and Rabbit
   c) Study of pectoral and pelvic girdles of Frog, Varanus/Calotes, Bird and Rabbit
   d) Study of different types of vertebrae of frog and mammal
9. Local field visit to identify and classify 10 common birds and mammals; submission of report
10. Study of tissues: Epithelial, muscular, T.S. of bone and cartilage
11. Microtomy: Fixing, Block making, Section cutting, Double Staining, mounting and submission of slides.

Ability Enhancement Course – AEC 1 C : Language

BSE III.4A : HINDI

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalise grammar rules so as to facilitate fluency in speech and writing .
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode :
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

Unit I: Modern Literary Genres:
Naveen Gadya Vidhavon Ka Janm Aur Hindi Gadya Ka Vikas

(i) **Nibandh-**Sardar PurnSingh- Aacharan Ki Sabhyata
(ii) **Yatra-Vritant-**Bhartendu Harishchandra-Saryu Par ki Yatra
(iii)**Sansmarn-**Mahadevi Verma- Gungiya
(iv)**Riportaj- Phaniswar Nath 'Renu' -** Rinjal-Dhanjal
(v) **Aatmkatha- Bharatendu Harishchandra -** Kuchh AapBeeti Aur Jag Beeti

Unit II: Criticism:
Hindi Aalochna Ka Aarambh Aur Vikas

Unit III: Novel:
Karmbhoomi by Premchand, Swaraj Prakashan, Delhi.

Unit IV: Communication skill:
Interview [Sachchatkar]
Characteristics ï Definition ï Types of Interviews ï Preparation for Interviewï Models ï Exercises.

References:

1. Hindi Nibandh Sahitya ka Sanskritik Addhyan: Dr Baburam,Vani Prakashan, Delhi
2. Hindi Gadhya-Vinayas aur Vikas: Ramswaroop Chaturvedi, Lokbharti Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
4. Hindi Sahitya ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
5. Hindi Sahitya Ka Itihas: Dr Nagendra , Mayoor Paperbacks, Delhi
6. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
7. Hindi Sahitya Ka Dusara Itihas: Bacchan Singh, Vani Prakashan, Delhi
8. Aadhunik Hindi Sahitya ka Itihas: Bacchan Singh, Lokbharti Prakashan, Delhi
9. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
10. Hindi Sahitya ka Sanchhipt Itihas:Viswanath Tirpathi, Orient Longman, Delhi
11. Sawtantrayotar Hindi Sahitya Ka Itihas: Dr Laxmisagar Vasney, Delhi
12. Aadhunik Hindi Ka Gadhya Sahitya: Ramchandra Tivari, Lokbharti Prakashan, Delhi
13. Hindi Aalochana Ka Vikas: Nandkishor Naval, Vani Prakashan, Delhi
14. Hindi Aalochana: Viswanath Tripathi, Vani Prakashan, Delhi
15. Upanyas aur Lokjeevan: Railph Fox, Vani Prakashan, Delhi
16. Upanyas ka Uadai: Aayan Waat, Hariyana Grantha Academy,Haryana
17. Upanyas ki Mahan Parmpara: Khagendra Thakur, Swaraj Prakashan, Delhi
18. Hindi Upanays ka Vikas: Madhuresh,Vani Prakashan,
19. Premchand aur Unka Yug: Ramvilas Sharma, Rajkamal Prakashan,Delhi
20. Pemchand-Virashat ka Sawaal: Shivkumar Mishra,Vani Prakashan, Delhi
21. Premchand aur Bhartiya Samaj: Namvar Singh, Rajkamal Prakashan, Delhi
22. Prayojanmoolak Hindi- Madhav Sontakke, Rajkamal Prakashan Samooh, Delhi
23. Prayojanmoolak Hindi ki Nayee Bhoomika- Kailash Nath Panday, Rajkamal Prakashan Samooh, Delhi
24. Prayojanmoolak Hindi: Sidhant aur Prayog- Dangal Jhalte, Vani Prakashan, Delhi
25. http://www.hindisamay.com

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment (C_1+C_2)

Assessment will be based on tutorials, (seminars, projectsetc), tests & assignments.

C1-10 (test) + (seminars, projects, assignments etc) =15

C2-10 (test) + (seminars, projects, assignments etc) =15

Total =50

BSE III.4B : KANNADA

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENT:

Unit I : Functional Language :

a) Letter drafting

Characteristics ï types of letters ï Emails - language of letters ï letters of famous people ï exercises.

b) **Essay writing** ï Characteristics ï Definition ï format of essay ï types of essays (literary, scientific etc) ï models, exercises

Reference: A Handbook of Writing Activities, Prasaranga, University of Bangalore.

Unit II : Translation from English to Regional Language.
Reference: a) About Translation by Peter Newmark, MultiLingual Motters, Clavedon, UK. b) Aspect of Translation by K V V L Narasimha Rao, CIIL, Mysore.c0 Bhashanthara kale by Dr.Pradhana gurudatt, B M Sri Memorial foundations , 54, 3rd cross, gavipuram extention , Bangalore

Unit III : Medieval and Folk Literature

i. Halatorege Bellada kesaru - Basavanna
ii. Chintayemuppu santhoshave javvana ï Rathnakaravarne
iii. Adava nama jola Ulidava Nama hadu ï Folk

(Selections from Kavya Sanchaya Part III), Mysore University, Mysore

Unit IV : Novel

Odalaala ï Devanuuru Mahadeva

Suggested Activities :
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc.,), tests & assignments.
C1-10 (Test) +15 (seminars, projects, assignments etc) =25
C2-10 (Test) +15 (seminars, projects, assignments etc) =25
Total =50

BSE III.4C MALAYALAM

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Unit I:Functional Language

1. Letter drafting- Characteristics ï types of letters ï language of letters ï letters of famous people ï exercises
2. Essay writing- Characteristics ï Definition ï format of essay ï types of essays (literary, scientific etc) ï models, exercises

Reference: A Handbook of Writing Activities, Prasaranga, University of Bangalore.

Unit II: Translation (English to Malayalam)
(Ref: Tharjama-Siddhanthavum Prayogavum Malayathil , Currrent Books, Trichur.)

Unit III: Poetry and Folk literature
Text : 1. Sishyanum makanum By Vallathol narayana menon, NBS , Kottayam
Text 2: Othenanum ponniyam pada nilatha angavum, Shantha Book stall, Kodungalloor

Unit IV: Novel
BALYA KALA SAKHI by Vaikkam Muhammed Basheer, DC Books, Kottayam

Suggested Activities
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials,(seminars, projects etc.,), tests & assignments.
C1-10 (Test) +15 (seminars, projects, assignments etc) =25
C2-10 (Test) +15 (seminars, projects, assignments etc) =25
Total =50

ABILITY ENHANCEMENT COURSE – AEC 1 C: LANGUAGE

BSE III. 4D: Tamil

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs. **C 3:50**

Objectives:

(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region

Transaction mode:
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: Medieval Poetry:
i) Thirukkural ii) Silappathikaram

Unit II: Novel:
Onpadhu Rupaai Nottu

Unit III: Communication skills (Effective speaking and effective writing) in language:
Precise writing- concept - importance - techniques - types - etc.-exercises
Book review – concept - importance of review - techniques-significance-types - etc.-exercises

Unit IV: Grammar:
Sol Elakkanam- Sol-Peyar Sol-Vinai sol-Edai Sol-Uri Sol

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the Teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.

C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25
Total=50.

References:

1. An Anthology of Tamil Poetry (For second year degree classes) University of Mysore, Mysore
2. *A handbook of writing activities,* Government of Karnataka, Prasaranga, University of Bangalore, Bangalore.
3. *Nannul-Ezhuthathikaram*, Prof. Soma Elavarasu, Manivasar Pathippagam, Parish, Cheennai ï 600 108
4. Porko, *Tamil Neengalum Thavarillamal Ezhuthalam*.
5. *Nannul-Sollathikaram*, Prof. Soma Elavarasu.
6. *Onpadhu Rupaai Nottu*, Thankar Pachan, Ekkattu Thangal, Chennai- 600 017.

ABILITY ENHANCEMENT COURSE – AEC 1 C: LANGUAGE

BSE III. 4E: Telugu

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs. **C 3:50**

Objectives:

(i) To enable the students to acquire basic skills in functional language.
(ii) To develop independent reading skills and reading for appreciating the literary works
(iii)To internalize grammar rules so as to facilitate fluency in speech and writing
(iv)To develop functional and creative skills in language.
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: Functional Language:
Book Review: definition-features of review-techniques of reviewing-reviewing different genres-examples-exercises.

Unit II: Selected Translated Stories: (From English to Telugu)
Selections from Shakspeare Kathalu

Unit III: Poetry:
Vamana Charitra
Subhadra Parinayamu
(Lessons from ñiTelugu Sahitya Sravanthi)

Unit IV: Novel:
Kalaatheetha Vyakthulu (by Dr P Sridevi)

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (Test) +15 (seminars, projects, assignments etc.) =25
C2-10 (Test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:

1. Government of Karnataka, *A Handbook of Writing Activities,* Prasaranga, University of Bangalore.
2. Government of Karnataka, *Telugu Sahitya Sravanthi,* Published by Prasaranga, University of Mysore, Mysore
3. Sreedevi P, *Kalaatheetha Vyakthulu,* Vishalandhra Publishing House, Hyderabad

Ability Enhance Course AEC 2C : English

BSE III.5 ENGLISH

Credits 4 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives :
Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the
- use of language for effective communication.
- analyse language in context to gain an understanding of grammar, vocabulary,
- spelling, punctuation and speech.
- examine authentic literary and non literary texts and develop insight and appreciation.
- gain an understanding of study and reference skills.
- plan, draft, edit and present a piece of writing.
- Transaction Mode:
- Lecture-cum-discussion, interactive session, group dynamics, role-play, peer-
- assessment, self-valuation.

COURSE CONTENT :
Unit I : PROSE
Walter Benjamin: Experience, Art In the Age of Mechanical Reproduction
Sylvia Townsend Warner: ôThe Phoenixô

Unit II : POETRY
1. P.B.Shelley - Ode to a Skylark

2. Alfred Lord Tennyson - Lotus Eatersï
3. E.D.Browning - How Do I Love Thee (from Sonnets from the Portugese)
4. Walter De La Mare ï The Ghost
5. Hopkins - Thou Art Indeed Just My Lord
6. Wilfred Owen - Anthem for Doomed Youth
7. William Shakespeare ï (Sonnet- 18)- Shall I Compare Thee to a Summer's Day?
8. Robert Browning ï Porphyriaôs Lover
9. R.S.Thomas - Song for Gwydion
10. Auden - Refugee Blues

Unit III : DRAMA

Anton Chekov : *The Bear*
Shakespeare : *Othello*

Unit IV : FICTION
Somerset Maugham *: The Razor's Edge*

Emile Bronte- *Wuthering Heights*

Continuous Assessment:
Assessment will be based on tutorials(seminars, projects Etc) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

Suggested Readings:
Merriam, E. (1964). It Doesnôt Always Have to Rhyme. Atheneum.
Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
Graves,D (1992). Explore Poetry: The reading /writing teacherôs companion. Heinemann
Stone Douglas (1999). Difficult conversations : How to discuss what Matters Most, New York.: Penguin Books.
Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.

Skill Enhancement Course- 1 Physics

BSE III.6A :BASIC INSTRUMENTATION SKILLS

Credits: 3 (2L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To get exposure with various aspects of instruments and their usage through hands- on mode.

COURSE CONTENT:

Unit I: Basic of Measurement

Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

Unit II: Cathode Ray Oscilloscope and its uses

Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation onlyï no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

Unit III:

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.

Unit IV:

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution.

References :

1. B L Theraja, A text book in Electrical Technology, S Chand and Co.
2. M.G. Say, Performance and design of AC machines, ELBS Edn. CBS Publishers & Distributors,2005.
3. Venugopal, Digital Circuits and systems, Tata McGraw Hill, 2011.
4. Shimon P. Vingron, Logic circuit design, Springer, 2012.
5. Subrata Ghoshal, Digital Electronics, Cengage Learning, 2012.
6. S. Salivahanan & N. S.Kumar, Electronic Devices and circuits, 3rd Ed., Tata Mc-Graw Hill, 2012.
7. U.Tietze, Ch.Schenk, Electronic circuits: Handbook of design and applications, Springer, 2008.
8. Thomas L. Floyd, Electronic Devices, Pearson India, 2008.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

To get exposure with various aspects of instruments and their usage through hands- on mode.

COURSE CONTENT:

(A minimum of EIGHT experiments to be selected from the following)

1. Circuit tracing of a given laboratory electronic equipment.
2. Use of Digital multimeter/VTVM for measuring voltages.
3. Winding a coil / transformer.
4. Study the layout of receiver circuit.
5. Trouble shooting a circuit.
6. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
7. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
8. To measure Q of a coil and its dependence on frequency, using a Q- meter.
9. Measurement of voltage, frequency, time period and phase angle using CRO.
10. Measurement of time period, frequency, average period using universal counter/ frequency counter.
11. Measurement of rise, fall and delay times using a CRO.
12. Measurement of distortion of a RF signal generator using distortion factor meter.
13. Measurement of R, L and C using a LCR bridge/ universal bridge

References:

1. B L Theraja, A text book in Electrical Technology, S Chand and Co.
2. M.G. Say, Performance and design of AC machines, ELBS Edn. CBS Publishers & Distributors, 2005.
3. Venugopal, Digital Circuits and systems, Tata McGraw Hill, 2011.
4. Shimon P. Vingron, Logic circuit design, Springer, 2012.
5. Subrata Ghoshal, Digital Electronics, Cengage Learning, 2012.
6. S. Salivahanan & N. S.Kumar, Electronic Devices and circuits, 3rd Ed., Tata Mc-Graw Hill, 2012.
7. U.Tietze, Ch.Schenk, Electronic circuits: Handbook of design and applications, Springer, 2008.
8. Thomas L. Floyd, Electronic Devices, Pearson India, 2008.

Skill Enhancement Course 1 - Botany

BSE III.6B :PLANT PROPAGATION, NURSERY AND GARDENING

Credits: 3 (2L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
After completing the course students will be able to:

- Plan and manage a garden
- Cultivate vegetables in kitchen gardens
- Multiply plants through appropriate techniques
- Identify seeds and garden plants

COURSE CONTENT:

Unit I
Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house.

Unit II
Nursery: Definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

Unit III
Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification.

Unit IV

A. Gardening: Definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

B. Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, ladyôs finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

COURSE CONTENT:

1. Identification of common agricultural tools and implements.
2. Demonstration and practice of different methods of plant propagation
3. Raising a floral nursery, soil bed preparation, transplantation and maintenance of garden
4. Identification of seeds of common garden plants, crop plants and vegetables.
5. Steps in the Preparation of pots for planting, maintenance of pots
6. Methods of breaking seed dormancy
7. Visit to Brindavan garden, Zoo garden and parks in Mysore for study and preparation of report.

References:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

Skill Enhancement Course 1 :Chemistry

BSE III.6C :INDUSTRIAL CHEMICALS AND ENVIRONMENT

Credits: 3 (2L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To understand the basic techniques of chemical industry
- To gain idea about the energy sources
- To understand the properties and application of lubricants
- To study the effects of green house phenomena
- To study the water quality parameter and waste water management
- To acquire the basic knowledge about commom pesticides

COURSE CONTENT:

Unit I:

Chemical Technology: Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by absorption and adsorption. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry. Introduction to clean technology.

Unit II:

Fuel Chemistry: Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.

Coal: Uses of coal (fuel and non fuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gasð composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro Gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications. Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.

Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.

Unit III:

Air Pollution: Pollutants and their sources, pollution by SO2, CO2, CO, NOx, H2S and other foul smelling gases. Methods of estimation of CO, NOx, SOx and control procedures. Green House effect and Global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and Halogens, removal of sulphur from coal. Control of particulates.

Water pollution and Water Quality Standards: Pollutants and their sources, Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluent from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, agro, fertilizer, etc. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Unit IV:

Pesticides General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil) , Anilides (Alachlor and Butachlor).

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To monitor the water quality parameters
- To prepare simple industrial products
- To analyse food adulterants

COURSE CONTENT:

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method.
   ($AgNO_3$ and potassium chromate)
6. Estimation of total alkalinity of water samples (CO_3, HCO_3) using double titration method.
7. Preparation of borax/ boric acid.
8. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
9. Preparation of simple organophosphates, phosphonates and thiophosphates
10. Preparation of Magnesium bisilicate (Antacid).
11. Preparation of soap.
12. Testing of mercuric powder, milk powders, mustard oil for adulterants.

References:

1. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.
4. G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, UK.
5. R. Cremlyn: Pesticides, John Wiley. 7. William O. Foye, Thomas L., Lemke , David A. William:
6. O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.
7. S. C. Bhatia: Chemical Process Industries, Vol. I & II, CBS Publishers, New Delhi.
8. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
9. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi. 10. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut.

Skill Enhancement Course 1 : Mathematics

BSE III.6D : COMBINATORICS, STATISTICS AND BASIC PROBABILITY

Credits : 3 (2L + 1T + 0P) **Marks: 100**
Contact hrs per week: 4 **C1 + C2: 50**
Exam Duration : 2 hrs **C3 : 50**

Objectives:
To enable the students to understand the basic concepts of combinatorics, statistics and probability, to obtain the skills and apply them in problem-solving and teaching.

COURSE CONTENT:
Unit I:
Partially ordered sets, Lattices, Complete lattices, Distributive lattices, Complements, Boolean Algebra, Boolean expressions, Application to switching circuits.

Unit II:
Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion. Solving real life problems based on them.

Unit-III:
Introduction to statistics, Mean, Mode and Median of grouped and ungrouped data, Graphical representations; Pie Charts, Line Graphs, Bar Graphs, Histographs, frequency polygon. Measures of dispersion; Range, Mean deviation, Variance and Standard deviation, Analysis of frequency distribution.

Unit-IV: Random experiment, Concept of probability, Sample space, Events- different kinds Probability definitions ï Mathematical or Classical or Statistical, Conditional probability, Independent events, Bayeôs theorem.
Random variable, Discrete and continuous random variables, Probability function, Probability density function, Distribution function. Mean Variance and standard deviation of a random variable.

References:

1. Elements of Discrete Mathematics by C. L. Liu , McGraw-Hill, 1986.
2. Discrete Mathematics and its Applications by Kenneth H. Rosen, McGraw-Hill, 2002.
3. Introduction to the Theory of Statistics by Alexander M. Mood and Others (1988), New York, McGraw Hill.
4. Introduction to Probability by Charles M. Grinstead and Laurie Snell J. (1991), Rhode Island, American Mathematical Society.
5. Fundamentals of Mathematical Statistics by Gupta S.C and Kapur (2011), New Delhi, Sultan Chand and Co.
6. Basic Probability Problems by Richard Serfozo (2003), London, Springer.
7. Introduction to Mathematical Statistics by Robert V. Hogg and Allen T. Craig (1978), McMillan Publishing Co.

Skill Enhancement Course 1: Zoology

BSE III.6E :APICULTURE

Credits: 3 (2L + 0T + 1P) **Max. Marks: 100**
Contact Hrs per Week:2 hrs **C1+C2: 50**
Exam. Duration: 2 hrs **C3: 50**

Objectives:

- Impart education about techniques in beekeeping,
- to inculcate and sharpen the observation skill to enjoy the wonders of nature
- to understand the social life of honey bees, management and their importance to man
- to learn the uses of hive products and biopesticides
- to learn the technique of processing and preserving of honey, its economic and medicinal value
- to understand the diseases of honeybees and propylatic measures.
- to develop enterpreneural skills in beekeeping

UNIT I :
Introduction to Apiculture, history, importance of bee keeping, b) Types of bee hives, floral calander, bee biology and behavior, c) Role of bees in Pollination.

UNIT II:
Study of morphology of honey bees (workers drones and queen bees), b) Reproduction in honey bees, Bee hives, types of beehive boxes, selection of bee hive equipment, Populating and management of bee colony.

UNIT III:
Composition and types of honey, Different methods of collecting honey. Harvesting quality honey, Hive products.

UNIT IV:
Bee pests, predators and diseases and propylatic methods, Economics of bee keeping, Medicinal importance of honey.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:
- To provide the hands-on experience in Bee Keeping practices
- To understand the importance of Honey Bees in environment
- To appreciate the modern technology employed in Bee Keeping

COURSE CONTENT:

1. Collect different species of honey bees
2. Study the morphology of worker drone and queen bees.
3. Study different types of hive boxes
4. Study the life cycle of honey bees
5. Extraction of honey ï different methods
6. Study on predators on Honey bees
7. Dealing with robber bees

Visit to Apiaries at Mysore and agriculture universities to study the new techniques in bee keeping

References:

1. The complete book on BEE keeping and honey Processing (2nd revised edition) NPCS Board , Published by: NIIR project consultancy services
2. A practical manual of beekeeping by David Cramp (spring Hill)
3. Beekeeping in India; Ghosh G K; APH Publishing 1994
4. Beekeeping in India; Sardar Singh; ICAR 1982
5. Bees for Development (2010). Beekeeping Training modules. Honey bee colony management. Monmouth- UK.
6. Dadant and Sons. (1992**)**. The Hive and the Honeybee. Extensively rivised. Dadant and Sons. Hamilton,Illinois.
7 ABC of Beekeeping problems and problem Beekeepers By William Dullas.
8. Fundamentals of Beekeeping by Clarence H Collison ;Pennsylvania State University
9. The biology of stingless Bees by Hayo H. W. Vethuis
10. Mugume, A.(2009). Beekeeping Training Notes. Kabarole DLG. Fortportal - Uganda.
11. Beescape of maliponines: Conservation of Indo- Malayan stingless bees By Abu Hassan Jalil, Ibrahim huib M B; B S (Malaya)

12 Diseases and hygienic Behavior in Honey bees and stingless bees by University of Sheffield.

13. National Bee keeping training and extension manual, 2012.

PROFESSIONAL EDUCATION COURSES

BSE III.7: UNDERSTANDING THE LEARNER

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student teacher will be able to:

- Understand the salient features and problems of growth and development during childhood to adolescence.

- Understand the dynamics of personality development in order to facilitate student traineesô and their studentsôpersonal growth.
- Develop the ability to apply the knowledge provided by Educational Psychology to classroom problems of various kinds.
- Understand the intra and inter individual differences in the learners and their Implications for organizing educational programmes.
- Acquire the skills of understanding the needs of all the learners in the classroom and meeting their needs.
- Appreciate the contribution of psychology in realizing the objectives of education.

COURSE CONTENT

Unit I : Nature of Human Development and Educational Implications

Concept and Branches of Psychology; Importance of Study of Psychology by Classroom Teachers, Meaning of Growth and Development. Differences between growth and development, importance of growth and development for the teachers. Principles of Development, Factors Influencing Growth and Development; Role of Heredity and Environment in Determining individual Differences in Development. Developmental Stages and Tasks, Development during Early Childhood, Late Childhood and Adolescence-Characteristics, Factors Influencing and Educational Implications:(a) Physical (b) Psychomotor (c) Intellectual (d) Language (e) Emotional (f) Social and (g) Moral and Value Development

Unit II : Management of Issues and Concerns of Adolescent Students

Factors Affecting Adolescent development; Issues and Concerns during Adolescence - Physical and Health concerns, Emotional Issues, Social Issues, Socio-cultural diversity, Adverse Life experiences, Identity Vs Role Confusion; Adolescent Cognition and its effect on Adjustment, Need and Importance of Adolescence Education, Significance of Life Skill Education for Adolescence, Role of Schools for the Balanced Personality

Unit III: Individual Differences in Learners

Individual Differences in - Psycho-Motor skills, Intelligence, Aptitude, Personality, Learning styles and Cognitive Preferences, Self concept and Self esteem, Social-Emotional Development, Aptitude, Interest, Attitude and Values and Study Habits.

Unit IV :Assessment of Individual and Intra Individual Differences in Learners

Tools and Techniques: Psychological Tests, Observation Schedules, Inventories, Checklists, Anecdotal Records, Cumulative Records, Sociometry, Interview Techniques, Achievement and Diagnostic Tests.

Meeting the Individual Differences in the Classroom- General Approaches; Remedial Instruction, Guidance and Counseling, Whole School Approach.

Practicum

Administering Group Tests
Conducting Case Studies
Diagnosing the deviations
Studying School Record and preparing Reports.
Getting Familiarised with Individual Psychological Tests.

References:

1. Bigge, M.L. (1982). *Learning Theories for Teachers,* (4th edition). New York, Harper and Row Publishers, pp. 89-90.
2. Bolles, R.C. (1975). *Learning Theory*. New York, Holt, Rinehart and Winston, pp. 18-19.
3. Chauhan, S.S. (1978). *Advanced Educational Psychology*, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Dandapani, S. (2001). *A textbook of Advanced Educational Psychology*. New Delhi: Anmol Publications.
5. Dunn, R. (1983). *Can students identify their own Learning Styles?* Educational Leadership, 40, pp. 60-62.
6. Dash, M. (1988). *Educational Psychology*. Delhi: Deep and Deep Publication.
7. Duric, L. (1975). *Performance of Pupils in the Process of Instruction*. Bratislava, SPN, pp. 54-90.
8. Duric, L. (1990). *Educational Sciences: Essentials of Educational Psychology*. International Bureau of Education, UNESCO, New Delhi, Sterling Publishers, p. 81.
9. Fontana, D. (1995). *Psychology for Teachers* (3rd edition). The British Psychological Society, London: McMillan in association with BPS Books.
10. Kumar, S. (2014). Child Development and Pedagogy, Pearson.
11. Kundu C.L. and Tutoo, D.N. (1993). *Educational Psychology*, Sterling Publishers Pvt. Ltd.
12. Lindgren, H.C. (1967). *Educational Psychology in Classroom* (3rd edition). New York: John Wiley and sons.
13. Mohan J. and Vasudeva P.N. (1993). *Learning Theories and Teaching, In Mohan Jitendra (ed.) Educational Psychology*, New Delhi, Wiley Eastern Limited, P. 146.
14. Murthy, CGV and Rao, AVG. (2005). *Life skills Education: Training Package*, Mysore: Regional Institute of Education.
15. NCERT (2013) *Training and Resource materials in Adolescence Education*, New Delhi
16. Oza, D.J. and Ronak, R.P. (2011). *Management of behavioral problems of children with mental retardation*. Germany: VDM publication.
17. Papalia D.E., and Sally, W.O. (1978). *Human Development*. McGraw Hill Publishing Company.
18. Phens, J.M., and Evans, E.D. (1973). *Development and Classroom Learning: An Introduction to Educational Psychology*. New York: Holt Rinehart and Winston Inc.
19. Tessmer, M., and Jonassen, D. (1988). *Learning Strategies: A New Instructional Technology*. In Harris Duncun (1988) Education for the New Technologies, World Year Book of Education. London: Kogan page Inc.
20. Skinner, E.C. (1984). *Educational Psychology*-4th Edition. New Delhi: Prentice Hall of India Pvt. Ltd.
21. Spinthall, N., and Spinthall, R.C. (1990). *Educational Psychology* 5th Edition. McGraw Hill Publishing Company.

Web Resources

- Animated Videos from Study.com, http://study.com/academy/course/educational-psychology-course.html
- Seifert, K. and Sutton, R. 2011). Educational Psychology Third Edition http://www.oercommons.org/courses/educational-psychology/view
- Introduction to Psychology, Open Textbook, http://open.lib.umn.edu/intropsyc/
- Generic Issues, NCERT, http://www.ncert.nic.in/departments/nie/dse/activities/advisory_board/PDF/generic.pdf
- www.aeparc.org

BSE III.8 : Gender, School and Society

Credits: 2 (1L+ 1T +0P) **Marks: 100**
Contact hrs per week: 3 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
This course enables the student teachers to

- Understand and contextualize ideals of the Constitution of India;
- Appreciate humanistic agenda of the Constitution of India;
- Value and recognize the role of education in realizing the ideals of the Constitution;
- Analyse various educational contexts to see whether the childôs rights are ensured
- Understand and develop positive attitudes towards various forms of exclusions;
- Appreciate the measures taken at the national level to universalize elementary and secondary education;
- Analyse the contextual examples to understand the gender issues and concerns;
- Develop positive attitude and values towards promoting gender equality;
- Evolves strategies and mechanisms as a teacher to ensure equality in school and learning contexts

COURSE CONTENT:

Unit I: Education as Fundamental Right

Constitution of India : Fundamental rights; Education as Fundamental right; Human Rights: Meaning, Nature, and classification; Rights of Children: International covenants and Indian Constitution; Education as Fundamental Right of Children: 2009, Rights of girl child

Unit II: Policy framework for public Education in India and its implementation

Education in Post-Independent India: Significant recommendations of commissions and committees, National Policy on Education-1986,Revised 1992, Delors Report: learning the treasure within, Universalization of elementary education: Need and significance; Government schemes and efforts with special focus on Sarva Shiksha Abhiyan, Issues in implementing RTE-2009: A critical understanding. Issues that affect and negate the childrenôs right to education(Child labour: Street children, abandoned and orphans; Differently abled children; Attitude towards the girl child and her participation in schooling; Punishment, abuse and violence in schools). alternative schooling, Secondary education: Universalization of secondary education; universal access, universal enrollment, universal retention, universal

success; interventions of RMSA, Initiatives and measures taken at national level to improve teacher education at secondary level: Role of NCTE and NCERT

Unit III: Contemporary Indian Schooling: Concern and Issues

Equality of Educational Opportunity: Meaning and nature; Forms of inequality: Caste, Gender, Transgender, regional, religious and other marginalized groups;

Inequality in Schooling: Public- private schools, Rural-urban schools, Mass-elite schools, single teachersô schools and many other forms of in equal school systems. Positive discrimination: concept and issues and policy intervention;

Understanding Exclusion in schooling: Exclusion: Meaning, and nature; Forms of Exclusion:

Physical/physiological Exclusion; Different kinds/types of differently abled children: Measures to address the issues of leaning of differently abled children and professional preparedness of institutions;

Socio-cultural and economic exclusion

Understanding different forms of socio-cultural and economic exclusion in schoolingð Caste, Class, Gender, Minority, and other Marginalized sections of the society;

Critical understanding of óscribed identitiesôon educational opportunities;

Unit IV: Gender: Issues and concerns

Basic Gender concepts: Difference between Gender and Sex; Social construction of Gender; Gender roles as viewed in Indian context; Concept of Transgender

Gender roles in society through various institutions such as family, caste, religion, culture, media and popular culture (films, advertisements, songs etc), law and State; stereotype in gender roles

Issues related to women/girl child: female infanticide and feticide, sex ratio, honour killing, dowry, child marriage, property rights, divorce, widowhood.

Gender bias in school enrolments, household responsibilities, societal attitude towards girlôs education

Issues related to gender in school: sexual abuse, sexual harassment, perception of safety at school, home and beyond

Representation of gendered roles, relationships and ideas in textbooks and curricula.

Role of schools, peers, teachers, curriculum and textbooks in challenging gender inequalities or reinforcing gender parity

The Indian constitution and provisions accorded to women; womenôs rights; legal aspects related to women, indecent representation of women (Prohibition act), cybercrime:

Educational and Employment provisions for Transgender: Legal aspects; social recognition

Sessional activities

- A critical study, with the help of survey and observational study, of alternative schools- child labour schools, night schools, mobile schools and boat schools.
- Critical analysis of different committees and commissions on Education
- Readings on National Policy on Education, RTE Act 2009, Delors Report

- Survey of schools to see the implementation of various incentives of government to equalize educational opportunities
- Textbook analysis for identifying integration of gender issues.
- Prepare presentation on laws related to women harassment, early marriage, property inheritance, trafficking etc.
- Prepare presentations on constitutional provisions and other government measures to promote girl childôs education
- Presentation of Case study reports on girl childôs problems in schools and at home.

Suggested Readings

- Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society, NCERT, New Delhi.
- Govt. of India (1986). National Policy on Education, Min. of HRD, New Delhi.
- Govt. of India (1992). Programme of Action (NPE). Min of HRD.
- Mistry, S.P. (1986). Non-formal Education-An Approach to Education for All, Publication, New Delhi.
- Mohanty, J., (1986). School Education in Emerging Society, sterling Publishers.
- Mukherjee, S.N. (1963). Secondary School Administration, Acharya Book Depot, Baroda.
- Mukherji, S.M., (1966). History of Education in India, Acharya Book Depot, Baroda.
- Naik, J.P. & Syed, N., (1974). A Studentôs History of Education in India, MacMillan, New Delhi.
- NCERT (1986). School Education in India ï Present Status and Future Needs, New Delhi.
- Salamatullah, (1979). Education in Social context, NCERT, New Delhi.
- Sykes, Marjorie (1988): The Story of Nai Talim, Naitalim Samiti: Wardha.
- UNESCO; (1997). Learning the Treasure Within.
- Dr. Veda Mitra. Education in Ancient India, Arya book Depot, New Delhi ï 1967
- Reports of SSA and RMSA
- NCTE (2009) National curriculum framework for teacher education
- Agarwal, N (2002). Women and Law in India. New Delhi: New century Pub
- Sen,S.(2013). Womenôs rights and empowerment. New Delhi: Astha Pub.
- Siddiqi, F.E.& Ranganathan,S.(2001). Handbook on women and human rights, New Delhi: Kanishka Pub

Web Resources: Video on improving Gender Equality- EFA Crowdsourcing Challenge, 2012, UNESCO, Pub by The Pearson Foundation, 3 minutes.

BSE III.9 : School Attachment Programme 1

Credits : 2 **Marks: 100**
Duration: 2 Weeks **C1+C2 : 50**
C3 : 50

Objectives

- To familiarize the student teachers to school environment, its structure, functions and processes.
- To provide field experience of assessment practices including record maintenance and report cards followed in schools at elementary and secondary levels.

COURSE CONTENT:

- The student teachers will visit the neighbourhood schools for two weeks to get acquainted with the school environment and its functions and processes and submit the report.
- The student teachers will familiarize themselves with school structure and administration.
- The student teachers will visit schools and interact with teachers to know about the assessment practices like CCE, grading patterns and reporting the performance of students and submit the report
- Students will analyse the assessment records and the report cards to study the models of assessment and procedures followed in reporting studentsôperformance. The students will attend the PTA meetings where feedback about studentsôperformance is given by the teachers and submit the report.

Evaluation: All assessments are internal

C1 ï Report 1
C2 ï Report 2
C3 ï Presentation through PPT.

FOURTH SEMESTER

Core Course 1D :Physics

BSE IV.1A :OPTICS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To enable students to

- understand that light is a wave phenomenon.
- apply the understanding of wave phenomenon to light.

COURSE CONTENT:

Unit I: Nature of Light and Scattering
Brief discussion on theories of light. Dual nature of electromagnetic radiation, electromagnetic spectrum, energy and momentum of em wave. Electromagnetic nature of light. Definition and Properties of wave front. Huygenôs Principle.
A brief discussion on Tyndall, Rayleigh and Raman scattering of light. A qualitative account of fluorescence and phosphorescence, the Raman Effect experiment and its explanation, intensity and polarisation of Raman lines, some applications of Raman Effect.

Unit II: Interference
Definition of Coherence, Methods of production of Coherent sources by division of wavefront and division of amplitude. Theory of interference (condition for constructive and destructive interference). Youngôs double slit experiment, Lloydôs Mirror and Fresnelôs Biprism. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newtonôs Rings: measurement of wavelength and refractive index.
Michelson and Fabry-Perot interferometers: determination of wavelength of light. Wavelength difference, Refractive index and Visibility of fringes

Unit III: Diffraction
Fraunhoffer Diffraction, Diffraction at a single slit, double slit, multiple slits, Diffraction grating, Resolving power ï Rayleighôs criterion, Resolving power of a grating and telescope.
Fresnel diffraction, half period zone, zone plate, diffraction at a circular aperture and at a straight edge, a slit and a wire using half-period zone analysis.

Unit IV: Polarisation
Polarization by reflection, Brewsterôs law, Malus law, Double refraction, Production and detection of linearly, circularly and elliptically polarized light, Quarter and half wave plates, Polariods, Discussion on use of Polaroid sheets in preparing tinted sunglasses, Optical activity, Fresnelôs theory, Rotatory polarization, use of biquartz.

Reference Books:

1. F A Jenkins and H E White, Fundamentals of Optics, McGraw-Hill, 1976.
2. B.K. Mathur, Principles of Optics, Gopal Printing, 1995.
3. H.R. Gulati and D.R. Khanna, Fundamentals of Optics, R. Chand, 1991.
4. Eugene Hecht,Optics, Pearson Education India, 2012.
5. N. Subramaniam, Brijlal, and M. N. Avadhanulu Textbook of Optics, S. Chand Limited, 2004.
6. A K Ghatak, Optics, Tata McGraw-Hill Education, 2009.
7. Ariel Lipson,Stephen G. Lipson, Henry Lipson, Optical Physics, Cambridge University Press, 2010.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. To determine the refractive index (n) of a liquid by Liquid Lens.
2. Determination of ôRôof a Lens using the Newtonôs ring arrangement.
3. Determination of thickness of a paper foil using Air wedge setup.
4. Refractive index (n) of the material of Prism by Spectrometer- measuring angle of minimum deviation.
5. To determine the refractive index (n) of glass & water by apparent depth method.
6. Specific rotation of sugar solution using Polarimeter.
7. Spectrometer- i_1- i_2 curve.
8. Refractive index of glass prism (i-d curve).
9. Spectrometer-solid prism- Dispersive power.
10. Wavelength of sodium D1 & D2 lines using Diffraction grating.
11. Newtonôs rings-wavelength of sodium light.
12. Cauchyôs constants A & B using spectrometer.
13. pï n junction diode characteristics.
14. Half wave Rectifier
15. Construction of full wave, Centre tapped and Bridge rectifiers

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt.

Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments 7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

Core Course 1 D :Botany

BSE IV.1B : PLANT ANATOMY AND ECOLOGY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
Å To acquaint students with development, organization and functions of tissues in plants;
Å To understand the histological complexity in plants;
Å To understand the dynamics of environment and its delicate balance;
Å To understand the influence of human beings on quality of environment.

COURSE CONTENT:

Unit I :
a) Meristems ï characteristics, classification, theories of meristemetic activity, organization of shoot-apex.
b) Epidermis : Structure and functions, stomatal types, trichomes.
c) Simple tissues : Definition, types ï parenchyma, collenchyma, sclerenchyma - structure, functions.

Unit II:
a)Vascular tissues : Structure of xylem and phloem, functions, primary and secondary vascular tissues, types of wood.
b) Review of anatomy of stem, root and leaf of dicot and monocot.
c) Secondary growth in root and stem. Brief account of anomalous secondary growth ï Bougainvillea, Dracaena.

Unit III:
a) Ecological Factors : Brief account of edaphic, climatic, physiographic and biotic factors and their ecological importance.
b)Ecosystem : Structure, abiotic and biotic components, bio-energetic approach, food chain, food web, ecological pyramids, bio-geo-chemical cycles of carbon, nitrogen and phosphorus.
c) Community ecology : Community characteristics, frequency, density, cover, life forms.

d) Plant succession : General features, events in succession, brief account of xerarch succession.

Unit IV:

a) Morphological, anatomical and physiological adaptations of plants to environment ï hydrophytes, xerophytes, halophytes.
b) Biodiversity : General account, types and characteristics, biodiversity conservation efforts, WCU, Red databook, brief account of Intellectual Property Rights (IPR) and patent laws.
c) Environmental pollution ï a brief account of causes, effects and remedies of air, water, soil, radioactive and noise pollution.

References:

1. Esau, K., 1977, Anatomy of Seed Plants, 2nd Ed., John Wiley & Sons, New York.
2. Fahn, A. 1974, Plant Anatomy 2nd Ed., Pergamon Press, Oxford.
3. Mouseth J.D.,1988, Plant Anatomy. The Benjamin/cummings Publishing Co. Inc., California, USA.
4. Singh V., P.C.Pande & D K Jain 2006, Angiosperms, Rastogi Publications, Meerut.
5. Vashishta, P.C. A Text book of Plant Anatomy, Predeep Publications, Jullandar.
6. Gangulee S.C. & Kar.1980, College Botany Vol.I, Central Book Agency, Calcutta.
7. Sharma, P.D., 2006, Environmental biology, Rastogi Publications, Meerut.
8. Mitra, J.N., An Introduction to Systematic Botany and Ecology, World Press, Calcutta.
9. Odum, E.P. 1983, Basic Ecology, Saunders, Philadelphia.
10. Kormondy, E.J. 1996, Concepts of Ecology, Viva Books Pvt. Ltd., New Delhi.
11. Misra, R. 1968, Ecology Work Book, Oxford & IBH, New Delhi.
12. Moore P.W. and S.B.Chapman, 1986, Methods in Plant Ecology, Blackwell Scientific Publications.
13. Krebs, C.J.1989, Ecological Methodology, Harper and Row, New York.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives :

Å To develop the skill of free hand sectioning, staining and mounting of plant parts for anatomical study.
Å To observe and identify different types of tissues using temporary and permanent slides.
Å To perform simple experiments in ecology.

COURSE CONTENT:

1. Study of a common dicot and monocot stem, root and leaf to understand the body plan, tissue systems and modular type of growth.
2. Study of L.S. of shoot tip to understand cyto-histological zonation.
3. Study of epidermal tissue system, stomata and trichome types.
4. Study of density, diversity, frequency of herbaceous species by quadrat method and to compare the frequency distribution with Raunkairôs Standard Frequency Diagram.
5. To estimate Importance Value Index on the basis of relative frequency, relative density

and relative biomass.

6. To determine moisture content and water holding capacity of soils.
7. To estimate transparency, pH and temperature of different water bodies.
8. To estimate salinity of different water samples.
9. Study of ecological anatomy of hydrophytes, xerophytes, halophytes, epiphytes and parasites.
10. Field study of diversity in leaf shape, size, thickness and surface properties.

Core Course 2 D : Chemistry

BSE IV.2 : THERMODYNAMICS, EQUILIBRIUM AND SOLUTIONS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To understand that conservation of energy is the central concept which governs all the changes and to appreciate its role in various thermochemical equations.
- Explain the origin of the driving force of physical and chemical changes and evolution of second law of thermodynamics and related concepts.
- Apply the concept of equilibrium to construct and interpret the phase diagrams.
- To understand the colligative properties of solutions and the behaviour of immiscible liquids.

COURSE CONTENT:

Unit I: Thermodynamics – I

Concept of Energy, Historical perspectives, Generalisation of laws of Thermodynamics based on human experience with Nature and natural Processes. Language of thermodynamics : system, surroundings, etc. Types of system, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics **:**Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule, Jouleï Thomson coefficient and inversion temperature. Calculation of w.q. dU and dT for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry : Standard state, standard enthalpy of formation. Hessôs Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy, Kirchhoffôs equation.

Unit II : Thermodynamics – II

Discussion of experiential knowledge to account for the spontaneity in changes around us.: need for the Second law of thermodynamics , different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature.

Concept of Entropy : Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical changes, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities. A and G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.
Third law of thermodynamics : Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data.

Unit III : Chemical Equilibrium and Phase Equilibria
Recognising a system at Chemical Equilibrium. Attributes of Chemical Equilibrium, Thermodynamic derivation of law of mass action, Equilibrium constant and free energy. Factors that affect the chemical equilibrium and Le Chatelierôs principle. Calculations involving equilibrium constant Ionic equilibria in aqueous solutions, sparingly soluble salts, solubility product common ion effect, selective precipitation, applications in qualitative analysis.
Ionisation of water, pH scale, weak acids and bases, hydrolysis, buffer solutions, acid base indicators, acid base titrations and multi stage equilibria. Reaction isotherm and reaction isochore.
To establish a systematic way of discussing the changes systems undergo when they are heated and cooled and when their composition is changed. Clapeyron equation and Clausius ï Clapeyron equation, applications.
Statement and meaning of the termsï phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component systemï water, CO_2 and Sulphur systems. Phase equilibria of two component systemï solid-liquid equilibriaï simple eutecticï Biï Cd. Pb-Ag Systems, desilverisation of lead. Simple eutectics, systems forming compounds with congruent melting points.

Unit IV: Solutions
To unify the equilibrium properties of simple mixtures on the basis of chemical potential. Solutions of Gases in liquids. Henryôs law and its applications, solutions of solids in liquids. Distribution law, application of distribution law to association, dissociation and extraction.
Dilute Solution : Colligative properties, Osmosis, Osmotic pressure, Vant Hoff Theory, Lowering of Vapour Pressure, Depression in Freezing point and Elevation in Boiling Point, Vant Hoff Factor.
Solid solutions ï compound formation with congruent melting point (Mg ï Zn) and incongruent melting point (NaClï H_2O), ($FeCl_3$ï H_2O) and ($CuSO_4$ï H_2O) system. Freezing mixtures, acetone dry ice.
Liquid ï liquid mixtures: Ideal liquid mixtures, Raoultôs and Henryôs law. Non-ideal system ï Azeotropesï HCï H_2O and ethanolï water systems.
Partially miscible liquidsï Phenol-water, trimethylamineï water, nicotineï water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature.
Immiscible liquids, steam distillation. Nernst distribution law ï thermodynamic derivation, applications.

References :

1. Principles of physical chemistry : Puri,Sharma and Pathania, 47th edition
2. Physical Chemistry : Atkins
3. Phase rule: Gurdeep Raj, Goel Publishing house.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To study the energetics of chemical reactions
- To find out the equilibirium constants of selected systems
- To study the behaviour of immiscible liquid systems
- To appreciate the physical properties of liquids and liquid mixtures

COURSE CONTENT:

1. Determination of heat of neutralization of acids and bases .Verification of Hessôs law of constant heat summation.
2. Determination of solubility of sparingly soluble salt at various temperature, calculation of enthalpy of solution.
3. pH titration of acid versus base (observation of change in pH
4. Determination of equilibrium constant of hydrolysis of an ester(ethyl acetate/methyl acetate)
5. Determination of dissociation constant of a weak acid.
6. Determination of solubility product constant (K_{sp}) of a sparingly soluble salt
7. Determination of dissociation constant of phenolphthalein/methyl orange by colorimetric method.
8. Determination of molecular weight of a given liquid by steam distillation.
9. Determination of percentage composition of the given NaCl solution by miscibility temperature method (phenol-water system).
10. Determination of distribution coefficient of benzoic acid between water and toulene or acetic acid between water and 1-butanol.
11. Determination of transition temperature of a given salt hydrate by thermometric method.
12. Determination of molecular weight of a given substance by Rastôs method.
13. Determination of density, coefficient of viscosity and surface tension of the given liquid.
14. Determination of refractive index of pure liquids and liquid mixtures.

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References :

Systematic Experiments in Chemistry by Arun Sethi.

Core Course 3D :Mathematics

BSE IV.3A :DIFFERENTIAL EQUATIONS

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
By the end of the semester the students will be able to understand the concept of ordinary and partial differential equations, and their uses in solving real life problems.

COURSE CONTENT:

Unit I:
Definition, Formation of a differential equation, Solution of a differential equation, Equations of the first order and first degree, Variables separable, Integrating factors, Homogeneous form ï Reducible to homogeneous form, Linear equations, Bernoulliôs equation, Exact equations, Equations reducible to exact equations.

Unit II:
Equations of the first order and higher degree, Clairautôs equation solvable for x and y and p, Orthogonal trajectories in polar and Cartesian form, Operator D, Rules for finding the particular integral, Cauchy-Euler differential equation, Legendreôs differential equations, Simultaneous differential equations.

Unit III:
Equations which do not contain x, Equation whose one solution is known, Equations which can be solved by changing the independent variable and dependent variable, Variation of parameters, Total differential equation :$Pdx + Qdy + Rdz = 0$, Simultaneous equations of the form $dx/P = dy / Q = dz / R$.

Unit IV:
Formation by elimination of arbitrary constants, Formation by elimination of arbitrary functions, Solution by direct integration, Lagrangeôs linear equations $Pp + Qq = R$, Standard types of first order non-linear partial differential equations, Charpitôs method, Homogeneous linear equations with constant coefficients, Rules for finding the complementary functions, Rules for finding the particular integral, Separation of variables.

References :

1. Higher Engineering Mathematics by Grewal, Wiley Eastern Ltd.
2. An Introduction to Partial Differential Equations by Stephenson, ELBS.
3. A Short Course in Differential Equations by Rainville and Bedient, IBH.
4. Advanced Engineering Mathematics by Kreyszig, Wiley Eastern Ltd.
5. Introductory Course in Differential Equations by Murray, Orient Longman.
6. Differential Equations by Simmons, TMH.

7. Differential Equations by Ayres, Schaum Publishing Company.
8. Ordinary and Partial Differential Equations by Raisinghania, S. Chand and Co.
9. Differential Equations by Vasishta and Sharma, Krishna Prakashan Mandir.
10. A Textbook of Differential Equations by Mittal, Har Anand Publications

Core Course 3D : Zoology

BSE IV.3B :ECOLOGY, BIOGEOGRAPHY AND WILDLIFE

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To enable students to understand the energy sources, flow of energy and conservation;
- To understand the recycling of minerals and nutrients in ecosystems;
- To understand the dynamics of population;
- To acquaint with the zoogeographic realms of the world;
- To understand wildlife and suggest measure to conserve wildlife

COURSE CONTENT:

Unit I: Environment and Pollution

a) **Environment**ï Atmosphere, lithosphere and hydrosphere as habitats and ecological factors
b) **Abiotic factors**: Temperature and light ï as ecological factors; limiting factors; Liebig ï Blackmanôs law of limiting factors; Shelfordôs law of tolerance, Factor ï compensation
c) **Biogeochemical cycle** ï Phosphorus, nitrogen and sulphur cycles; recycling of organic nutrients
d) **pollution and environmental hazards**ï air, water, soil ï pollution,causes and remedial measures, replenishment; Global warming and climate change ï El Nino, La Nino, Koyota Protocol of Ozone depletion, a brief study of bioremediation

Unit II: Population and Community

a) **Population**: Definition and attributes ï density, mortality, natality, vital index, age distribution, growth patterns, migration, dispersal and dispersion; Environmental resistance, carrying capacity of environment
b) **Biotic community**: Definition and structure, Ecotone, edge effects, niche, community stability. Intra and Interspecific interaction ï animal associations

Unit III: Habitat Ecology

a) **Ecosystem**ï Types, structure, functions and examples; Dynamics of Ecosystem-Ecological pyramids, energy flow in ecosystem (food chain, food web), productivity
b) **Aquatic Ecosystem**: Types and examples. Physico-chemical properties and biotic

communities of lake and sea (adaptation of plankton, nekton and neuston)

c) **Terrestrial ecosystem**ï Types and physico-chemical properties; biomes ï forest, desert and grassland

d) **Ecological succession**

Unit IV: Biogeography

a) **Biogeography:** Biogeographical realms of the world with emphasis to Indian region. Forest types, flora and fauna, Discontinuous distribution.

b) **Fauna types in India**: Ecological characteristics and important animals of western and southern Ghats.

c) **Wildlife**: Biodiversity and its importance; Red data book; Endemic species, keystone species, Causes of extinction of wildlife; National parks, sanctuaries and bio reserves of India, Hotspots, National and International efforts for conservation of wildlife

References:

1. Fundamentals of Ecology by E.P. Odum ï W.B. Saunders, Philadelphia
2. Environmental Studies by S.V.S. Rana ï (Rastogi Publications, 2008).
3. Animal Ecology by S.P. Singh, 6th Revised Edition ï (Rastogi Publications, 2008).
4. Basic Ecology by E.P Odum (Holt, Rinehart & Winston, New York).
5. Limnology by Welch (McGraw Hill)
6. http://www.iucn.org (for wildlife and Red Data Book)

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To analyse for the physico-chemical and biological factors of water and soil samples;
- To identify and estimate quantitatively the aquatic and terrestrial organisms and their adaptation;
- To observe the population growth pattern;
- To have the skill of conducting experiments for observing animals behaviours.

COURSE CONTENT:

a) Estimation of dissolved oxygen in the pond water.
b) Estimation of dissolved alkalinity in the pond water.
c) Estimation of dissolved salinity in the pond water.
d) Gut content analysis in fish ï status in food chain (herbivore, carnivore, omnivore)
e) Qualitative analysis of marine plankton to identify the most common mero- and holo-plankton
f) Identification of the most common Nekton in aquatic environment (marine and fresh water)
g) Population study of ciliates in the culture medium and local insects for growth pattern (logistic and exponential curves)
h) Collection and qualitative and quantitative analysis of soil organisms ï Depiction of histogram and pie diagram
i) Animal adaptation in different habits and habitats ï a) Fossorial b) Arboreal c) Volent d)

Cursorial e) Aquatic

The students will undertake biological study tour to study, identify different specimens and economically important species

The students will visit sanctuary/park/reserve to study wildlife and endangered species and submit report

Ability Enhancement Course

BSE IV.4A : HINDI

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalise grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode :

Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I : Media Studies:
Television, Cinema Aur New Media

Unit II: New Literary Discourses
Stri Vimarsh Aur Dalit Vimarsh

Unit III: Drama:
Hanoosh by Bhishm Sahani Published by Rajkamal Prakashan, Delhi

Unit IV: Communication skill:
Debate [Vaad-Vivad]
Characteristics ï Definition ï Need of Debate ï Technique to conduct Debates, etc. Exercise

Reference:

1. Fundamentals of Journalism, Report Writing and Editing by R. Thomas Berner, Marquette Books, LLC, Washington.
2. Media Samgra- Jagdishwar Chaturvedi, Swaraj Prakashan, Delhi
3. Media Vimarsh- Sudhish Pachauri, Vani Prakashan, Delhi

4. Hindi Cinema Ka Sapharnama- Bhaskar Rao, Delhi
5. Yatharthvad Aur Hindi Dalit Sahitya: Dr Sarvesh Mourya, Swaraj Prakashan, Delhi
6. Dalit Vimarsh Ki Bhoomika: Kaval Bharti, Sahitya Upkram, Allahabad
7. Dalit Sahitya Ki Awdharna: Kaval Bharti, Sahitya Upkram, Allahabad
8. Dalit Sahitya Ki Bhoomika: Harpal Singh Arush, Vagdevi Prakashan, Delhi
9. Dalit Strivad Ka Svar: Vimal Thorat, Anamika Prakashan, Delhi
10. Samkaleen Dalit Strivad: Rajni Tilak, Swaraj Prakashan, Delhi
11. Aurat Hone Ki Saja: Arvind Jain,Vani Prakashan, Delhi
12. Ek Aurat Ki Notebook: Sudha Arora, Vani Prakashan, Delhi
13. Stri Sangharsh Ka Itiha: Radha Kumar, Vani Prakashan, Delhi
14. Stritva Ka Maanchitra: Anamika, Vani Prakashan, Delhi
15. Hindi Natak-Udbhav aur Vikas: Dasrath Ojha, Rajpal and sons, Delhi
16. Bhishm Shahnai ki Katha Bhasha: Kiran Kishra, Swaraj Prakashan, Delhi
17. Natyashastra ki Bhartiya Parmpara aur Dasroopak: Hajari Prasad Divedi, Rajkamal Prakashan, Delhi
18. Rangmanch ke Sidhhant: Mahesh Aanand, Devendraraj Ankur, Rajkamal Prakashan, Delhi
19. Rangmanch ka Saundryashastra: Devendraraj Ankur, Rajkamal Prakashan, Delhi
20. Antrang Bahirang: Devendraraj Ankur, Rajkamal Prakashan, Delhi
21. Darshan Pradarshan: Devendraraj Ankur, Rajkamal Prakashan, Delhi
22. Aaj Ki Kala: Prayag Shukla, Rajkamal Prakashan, Delhi
23. Rangmanch ka Jantantra: Hrishikesh Sulabh, Rajkamal Prakashan, Delhi
24. Rang Arang: Hrishikesh Sulabh, Rajkamal Prakashan, Delhi
25. Natya Darpan: Mohan Rakesh, Rajkamal Prakashan, Delhi
26. Aadhunik Bhartiya Natya-Vimarsh: Jaydev Taneja, Rajkamal Prakashan, Delhi
27. Rang-Darshan: Nemichand Jain, Rajkamal Prakashan, Delhi
28. http://www.hindisamay.com

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:
Assessment will be based on tutorials (seminars, projects etc) tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

BSE IV.4B : KANNADA

Credits 3 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

COURSE CONTENT :

Unit I : Functional Language

a. **Book Review** : Characteristics ï definition ï format ï models ï exercises.

b. **Precis-writing**: Characteristics ï definitions ï steps to précis writing ï models ï exercises.

Reference: A Handbook of Writing Activities, Prasaranga, University of Bangalore.

Unit II : Technical Writing

a. Definition ï characteristics ï format ï models ï Language used in the writing ï Terminology ï Process of writing ï Planning of document ï Styles of writing ï Techniques of writing ï exercises.
b. Creative Writing: Poem Writing, Essay Writing

Reference: (a) Technical Writing by Richard W.Smith, Barnes and Noble Inc., New York**, (b)** Technical Report Writing Today ï Danel G.Riordan, 19-A, Ansari Road, New Delhi 110 002.

Unit III : Ancient Poetry

1. Melpu balpanaligum- Pampa
2. Paligum paapakkamanjadavar eegeyyar- Nagachandra
3. Muktiyanolisuven-Janna

(Kaavya Sanchaya-3 ï Mysore University, Mysore)

Unit IV : Drama

Sankraanthi-Lankesha

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:

Assessment will be based on tutorials(seminars, projects etc) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

BSE IV.4C: MALAYALAM

Credits 3(2L+1T) **Max. Marks: 100**
Contact Hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs **C 3:50**

Unit I: Functional Language

1.Book Review- Characteristics ï definition ï format ï models ï exercises.

2. Precis-writing: Characteristics ï definitions ï steps to précis writing ï models ï exercises.

Unit II:Technical Writing
Definition-characteristics-format-models-Language used in the writing-Terminology-Process of writing planning of document-Styles of writing-Technologies of writing-exercises.

Unit III: Ancient Poetry
Text : Karna Parvam (Krishna Darshanam) By Ezhuthachan, NBS , Kottayam

Unit IV: Drama
SAKETHAM by C. N. Sreekantan Nair, Current Books , Trichur

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

Continuous Assessment:
Assessment will be based on tutorials (seminars, projects etc) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

ABILITY ENHANCEMENT COURSE - AEC 1D: LANGUAGE

BSE IV. 4D: Tamil

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs. **C 3:50**

Objectives:

- To develop the students to acquire basic skills in functional language
- To develop independent reading skills and reading for appreciation the literary works
- To internalize grammar rules so as to facilitate fluency in speech and writing
- To develop functional and creative skills in language
- To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region

Transaction mode:
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: New Genres & Media Studies:
a) Travellogue: Nadanthai Vaazhi Kaveri- Janakiraman
b) Cinema, TV, Newspaper and New Media: significance of media-role of media in society- values-etc.

Unit II: Drama
Tanneer Tanneer

Unit III: Poetry: Ancient Poetry
1. Nedunalvaadai
2. Kalithogai

Unit IV: Grammar: Porul, Yappu, Ani- Agam, Puram- Venpa, Aasiriyappa-Uvamai, Uruvagam, Vettumai, Vettuporul, Tharkurippettam.

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the Teacher. Test, assignments and small projects works may be given.

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25
Total=50.

References:

1. An anthology of Tamil poetry (for second year Degree class), University of Mysore, Mysore.
2. Thandiyalangaaram, Thirunelveli Saiva Chithaantha Noorpathippu Kazhagam, 522, DDK Road, Chennai-18.

3. Purapporul venpa maalai, Thirunelveli Saiva Chithaantha Noorpathippu Kazhagam, 522, DDK Road, Chennai-18.
4. Udagangalin ethirkalam, Dr. Neelakanda pillai, no 17, Tagur street, Sidlapakkam, Chennai-64.
5. Nadanthai vaazhi Kaveri- Janakiraman. Kaiachuvadu pathippagam, 669, K.P. Road, Nagercoil-629001.
6. Tanneer Tanner. Komal Swaminathan, Vanathi pathippagam, 13 Deenadayalu street, T. Nagar, Chennai-600 017.

ABILITY ENHANCEMENT COURSE - AEC 1D: LANGUAGE

BSE IV. 4E TELUGU

Credits 3 (2L+1T+0P) **Max. Marks: 100**
Contact hours per week: 4 **C1+C2:50**
Exam duration: 2 Hrs. **C 3:50**

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating the literary works
- To internalize grammar rules so as to facilitate fluency in speech and writing
- To develop functional and creative skills in language.
- To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: Functional Language
1.Analytical writing; definition-how to analyze a poem-a story- a novel and an essay-different approaches to observe-examples-exercises
2. Precise-writing: Characteristics ï definitions ï steps to précis writing ï models ï exercises.

Unit II: Technical Writing
Definition-characteristics-format-models-language used in the writing-terminology-process of writing-planning of document-styles of writing-technologies of writing-exercises.

Unit III: Ancient Poetry
Padmavyuha bhedanam-Tikkana (Sree Madaandhra Mahabharatham)
Ruthu varnanalu ï Srikrishna devaraya (Amuktha Malyada)
Lessons from ñTelugu Sahitya Sravanthiò.

Unit IV: Short stories:

(i) *Nannu gurinchi katha vrayavoo*-Buchchibabu

(ii) *Lakshmi* - Rachakonda viswanatha sasthry

(Selections from Telugu Katha, by Central Sahithya Academy, New Delhi.)

Suggested Activities:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment:

Assessment will be based on tutorials (seminars, projects etc.) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc.) =25
C2-10 (test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:

1. Government of Karnataka, *A Handbook of Writing Activities,* Prasaranga, University of Bangalore.
2. Kodavati Ganti Kutumba Rao, *Science Vyasalu,* Published by Vishalandhra Publications, Abids, Hyderabad.
3. Government of Karnataka*, Telugu Sahitya Sravanthi,* Published by Prasaranga, University of Mysore, Mysore
4. *Amuktha Malyada,* Sanjeevani Vyakhya, Emesco Publishers, Hyderabad.

ABILITY ENHANCEMENT COURSE – AEC 2D ENGLISH

BSE IV.5 ENGLISH

Credits 4 (2L+1T) **Max. Marks: 100**
Contact Hours per week: 6 **C1+C2:30**
Exam duration: 3 Hrs **C 3:70**

Objectives :

Students develop proficiency in English which equips them to:

- understand the demands of audience, subject, situation and purpose and the
- use of language for effective communication.

- analyse language in context to gain an understanding of grammar, vocabulary,
- spelling, punctuation and speech.

- examine authentic literary and non literary texts and develop insight and
- appreciation.

- gain an understanding of study and reference skills.

- plan, draft, edit and present a piece of writing.

Transaction Mode :

Lecture-cum-discussion, interactive session, group dynamics, role-play, peer-assessment, self-valuation.

COURSE CONTENT :

Unit I : PROSE

1. J.B.Priestley : Travel by Train.
2. Bertrand Russell : Knowledge and Wisdom

Unit II : POETRY

T.S.Eliot : Hollow Men
Wordsworth : The Solitary Reaper
Pablo Neruda : The Portrait in the Rock
William Shakespeare : True Love.
William Blake : A Poison Tree.
William Wordsworth : Lucy Gray.
Robert Frost : The Road Not Taken
Emily Dickinson : There is a certain slant of light

Unit III : DRAMA
Ionesco : *Rhinoceros*
Harold Pinter : *The Dumb Waiter*

Unit IV : FICTION
D.H.Lawrence : *Sons and Lovers*
Gabriel Garcia Marquez : *One Hundred Years of Solitude*

Continuous Assessment:
Assessment will be based on tutorials(seminars, projects Etc) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

Suggested Readings:

1. Cambridge Companion to British Romanticism
2. Pelican Guide to English Literature ï Dickens to Hardy to Lyrical Ballads
3. Norton's Anthology, Volume.2 1-7, 139
4. Mathew Arnold- Culture and Anarchy
5. Dickens- Novel ó Changing Face of Cityô
6. Meenakshi Mukherjee - Jane Austen
7. William Congrev- Excerpts from London Gazette
8. Brown, John Russel, and Harris, Bernard(ed.)- Restoration Theatre (London, 1965)
9. Richetti, John, The Cambridge Companion to Eighteenth Century Novel (Cambridge, 1996)
10. Addison and Steele - Spectators Papers
11. Cambridge Companion to English Poetry- Donne to Marvel
12. Restoration Theatre - ed. Brown, John Russel

13. Background Prose Reading - papers 6,7 & 8: Worldview, an Imprint of
14. Book Land Publishing co.

Skill Enhancement Course - SEC 2 Physics

BSE IV.6A :COMPUTATIONAL PHYSICS

Credits: 3 (2L + 0T +1P) **Marks: 100**
Contact hrs per week: 4 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

The course aims to emphasize the role of computer programming and numerical analysis in solving problems in Physics.

- To use of computational methods to solve physical problems.
- To use computer language as a tool in solving physics problems (applications).

COURSE CONTENT:

Unit I: Introduction

Importance of computers in Physics, paradigm for solving physics problems for solution. Algorithms and Flowcharts, Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples (Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal).

Unit II: Scientific Programming

Concept of high level language, steps involved in the development of a Program, Compilers and Interpreters. Development of C, Basic elements of C. Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Data types, Type declaration of variables, Symbolic constants, Arithmetic operators, Increment and decrement operators, Conditional operator, Bitwise operators, Hierarchy, Arithmetic expressions, Logical operators and expressions, Assignment operators, Arithmetical and assignment statements, Mathematical functions, Input/output statements (unformatted/ formatted), Relational operators, Decision making and branching, Go to, if, ifé else, switch statements, Looping, While, do and for, Arrays (Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Handling characters and strings, Functions and voids, structures, Pointers (elementary ideas only), File operations(defining and opening, reading, writing, updating and closing of files, Enough examples from physics problems.

Unit III: Scientific word processing

Introduction to LaTeX: TeX/LaTeX word processor, preparing a basic LaTeX file, Document

classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages. Equation representation: Formulae and equations, Figures and other floating bodies, Lining in columns- Tabbing and tabular environment, Generating table of contents, bibliography and citation, Making an index and glossary, List making environments, Fonts, Picture environment and colors, errors.

Unit IV: Visualization

Introduction to graphical analysis and its limitations. Introduction to Gnuplot. importance of visualization of computational and computational data, basic Gnuplot commands: simple plots, plotting data from a file, saving and exporting, multiple data sets per file, physics with Gnuplot (equations, building functions, user defined variables and functions), Understanding data with Gnuplot.

References:

1) S.S. Sastry, Introduction to Numerical Analysis, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2) V.Rajaraman, Programming in C, PHI Learning Pvt. Ltd., 1994.
3) Yashavant P. Kanetkar, Let Us C, Infinity Science Press, 2008.
4) J.H.Rice, Numerical methods-software and analysis, McGraw Hill, 1983.
5) J.B.Scarborough, Numerical mathematical analysis, Oxford and IBH, 6th edition, 2010.
6) F. B. Hildebrand, Numerical analysis, 2nd edition, Courier Corporation, 2013.
7) Brian P. Flannery, Saul Teukolsky, William H. Press, and William T. Vetterling, Numerical Recipes in C, The art of scientific computing, Cambridge University Press
8) Leslie Lamport, LaTeXï A Document Preparation System, 2nd edition, Addison-Wesley, 1994.
9) Philip K Janert, Gnuplot in action: understanding data with graphs, Manning Publications, 2010.
10) R. C. Verma, et al., Computational Physics: An Introduction, New Age International Publishers, New Delhi, 1999.
11) U.M. Ascher and C. Greif, A first course in Numerical Methods, 2012, PHI Learning.
12) K.E. Atkinson, Elementary Numerical Analysis, , 3rd edition, 2 007, Wiley India.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

The course aims to emphasize the role of computer programming and numerical analysis in solving problems in Physics and to provide hands on training on the Problem solving on Computers.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. To print out all natural even/ odd numbers between given limits.

2. To find maximum, minimum and range of a given set of numbers.
3. Calculating Euler number using exp(x) series evaluated at x=1
4. To compile a frequency distribution and evaluate mean, standard deviation etc.
5. To evaluate sum of finite series and the area under a curve.
6. To find the product of two matrices
7. To find a set of prime numbers and Fibonacci series.
8. To write program to open a file and generate data for plotting using Gnuplot.
9. Plotting trajectory of a projectile projected horizontally.
10. Plotting trajectory of a projectile projected making an angle with the horizontally.
11. Creating an input Gnuplot file for plotting a data and saving the output for seeing on the screen. Saving it as an eps file and as a pdf file.
12. To find the roots of a quadratic equation.
13. Motion of a projectile using simulation and plot the output for visualization.
14. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs for visualization.
15. Motion of particle in a central force field and plot the output for visualization.

References:

1. S.S. Sastry, Introduction to Numerical Analysis, 5th Edn, 2012, PHI Learning Pvt. Ltd.
2. V.Rajaraman, Programming in C, PHI Learning Pvt. Ltd., 1994.
3. Yashavant P. Kanetkar, Let Us C, Infinity Science Press, 2008.
4. J.H.Rice, Numerical methods-software and analysis, McGraw Hill, 1983.
5. J.B.Scarborough, Numerical mathematical analysis, Oxford and IBH, 6th edition, 2010.
6. F. B. Hildebrand, Numerical analysis, 2nd edition, Courier Corporation, 2013.
7. Brian P. Flannery, Saul Teukolsky, William H. Press, and William T. Vetterling, Numerical Recipes in C, The art of scientific computing, Cambridge University Press
8. Leslie Lamport, LaTeXï A Document Preparation System, 2nd edition, Addison-Wesley, 1994.
9. Philip
10. in Numerical Methods, 2012, PHI Learning.
11. K.E. Atkinson, Elementary Numerical K Janert, Gnuplot in action: understanding data with graphs, Manning Publications, 2010.
12. R. C. Verma, et al., Computational Physics: An Introduction, New Age International Publishers, New Delhi, 1999.
13. U.M. Ascher and C. Greif, A first course Analysis, 3rd edition, 2 007, Wiley India.

Skill Enhancement Course - SEC 2 Botany

BSE IV.6B :UTILIZATION OF PLANTS AND HERBAL TECHNOLOGY

Credits: 2(1L+0T+1P) **Max Marks: 100**
Contact Hours per week: 3 **C1+C2 = 50**
Exam duration: 2 hrs. **C3 = 50**

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

- Appreciate the wealth and potential of medicinal plants in our country
- Identify important plants that are useful to us
- Familiarise with phytochemical and micropropagation techniques

COURSE CONTENT:

Unit I: Utilization of plants

Brief account (botanical name, family, extraction/ processing where necessary) and uses of the following :

a) Cereals and Pulses : Rice, wheat, maize, millets, pigeon, pea, Bengal gram, green gram, black gram.
b) Fibres : Cotton, jute, linen, coir.
c) Vegetable oils : Groundnut, coconut, sunflower, safflower, castor.
d) Timber and bamboos : Rosewood, teakwood, honne, canes and bamboos.
e) Beverages : General account, coffee, tea, cocoa.
Spices and condiments : General account, cardamom, clove, pepper, ginger, cinnamon, saffron, turmeric, mustard.
f) Rubber : General account, *Hevea, Ficus*.
g) Pharmacognosy:Uses of *Rauwolfia, Phyllanthes, Catharanthus, Ocimum, Tylophora, Zingiber,* Trigonella, and other locally available medicinal plants.

Unit: II

Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

Unit III:

Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; Catharanthus roseus (cardiotonic), Withania somnifera (drugs acting on nervous system), Clerodendron phlomoides (anti-rheumatic) and Centella asiatica (memory booster).

Unit IV:

a) Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds)
b) Medicinal plant banks micro propagation of important species (Withania somnifera, neem and tulsi- Herbal foods-future of pharmacognosy)

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

COURSE CONTENT:

1. Identification and study of plants of economic importance included in theory.
2. Methods of cultivation and micropropagation of medicinal plants
3. Familiarisation with basic phytochemical techniques
4. Submission of a report on local medicinal plants
5. Preparation of 2 herbarium sheets of medicinal plants
6. Visit to medicinal plants garden and herbal extraction companies

References:

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
4. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
5. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
6. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

Skill Enhancement Course - SEC2 Chemistry

BSE IV.6C : INDUSTRIAL INORGANIC MATERIALS

Credits : 3 (1L + 0T +1P) **Marks: 100**
Contact hrs per week: 3 **$C_1 + C_2$: 50**
Exam Duration : 2 hrs **C_3 : 50**

Objectives :

- To understand the production, handling and storage of indusrial gases
- To gain knowledge about the manufacture, application and hazardous in handling the inorganic chemicals
- To know the composition, properties and application of silicate minerals in indusry
- To acquire the knowledge of simple fertilizers, surface coatings, alloys, and chemical explosives

COURSE CONTENT

UNIT I : Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

Inorganic Chemicals: Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate. Industrial Metallurgy - Preparation of metals (ferrous and nonferrous) and ultra pure metals for semiconductor technology.

UNIT II : Silicate Industries

Glass: Glassy state and its properties, classification (silicate and non silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Ceramics: Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, super conducting and semi conducting oxides, fullerenes carbon nanotubes and carbon fiber.

Cements : Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

UNIT III :

Fertilizers: Fertilizers: Different types of fertilizers. Manufacture of the following fertilizers: Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Super phosphate, Compound and mixed fertilizers Potassium Chloride, Potassium sulphate.
Surface Coatings: Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings (electrolytic and electroless), metal spraying and anodizing

UNIT IV:
Alloys: Classification of alloys, Ferrous and Non-Ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, Page 39 of 80 demanganization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.
Chemical Explosive: Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction of rocket propellant.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To analyse the chemical composition, properties of simple fertilizer and alloys
- To familiarise with the preparation of inorganic salts, dyes and pigments

COURSE CONTENT:

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Estimation of Cu-Zn in brass
5. Determination of composition of dolomite (by complexometric titration).
6. Analysis of Cu-Ni or (Cu, Zn) in alloy or synthetic samples.
7. Analysis of Cement.
8. Preparation of pigment (zinc oxide).
9. Estimation of Available Oxygen in Hydrogen Peroxide.
10. Determination of phosphoric acid in commercial sample of phosphoric acid.
11. Preparation of chrome alum.
12. Preparation of potash alum from aluminium scarp
13. Preparation of mthyl orange.

References:

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. J. A. Kent: Riegelôs Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
5. A. K. De, Environmental Chemistry: New Age International Pvt, Ltd, New Delhi.
6. S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New

Skill Enhancement Course –SEC 2 : Mathematics

BSE IV.6D :DATA HANDLING

Credits : 2 (2L + 1T + 0P) **Marks: 100**
Contact hrs per week: 4 **C1 + C2: 50**
Exam Duration : 2 hrs **C3 : 50**

Objectives:
On completion of this course, the students will be able to:

- understand the types of educational data, procedures of data validation and its analysis.
- appreciate the analysis of educational data by using statistical tests.
- Develop skill of using the application software for data analysis and computation of various statistical measures.
- Compute the different statistical measures by using computerized application software.
- Drawing meaningful conclusions based on the interpretation of analysed data.

Unit I: Data Collection- Nature and types of data
Data collection- primary sources and secondary sources; Scales of measurement (NOIR)
Coding: Variable names; Coding responses; Coding open-ended questions
Tabulation, Constructing frequency distribution table, Graphical representation of data ï Pie diagram, Histogram, frequency curve.

Unit II : Descriptive Analysis of Data-1
Measures of dispersion ï Range; Quartile deviation; Standard deviation; Coefficient of dispersion; Skewness and Kurtosis.

Unit III: Descriptive Analysis of Data-2
Normal Probability Curve ï Meaning, Purpose and Applications, Derived Scores (Z & T Scores).
Measures of Relationships: Meaning of Correlation and Methods of computing correlation - Product Moment Correlation; Rank Difference Method of Correlation

Unit IV: Inferential Statistics
Sampling Procedures ï Random sampling, Systematic Random sampling, (with and without repetitions), Stratified random sampling, Cluster sampling, Snow ball sampling.
Hypothesis ï Meaning and types; testing of hypothesis ï one sample t-test, independent samples t-test, paired samples t-test, Chi-square test.

Practicum:

1. Collect data live ï class test scores/ survey data and generate frequency distribution table and represent it graphically.
2. Collect test scores of any school subject of any class and compute Mean, Quartile Deviation and Standard Deviation.
3. Compute coefficient of correlation among language subject papers and core subject papers like ï English and History, Mathematics and Science, etc.
4. Study the sampling procedures adopted by taking various school contexts like selecting a team for school reports, team for debate competition, etc.

Skill Enhancement Course SEC 2: Zoology

BSE IV.6E :SERICULTURE

Credits: 3 (1L + 0T + 1P) **Max. Marks: 100**
Contact Hrs per Week: 3 hrs **C1+C2: 50**
Exam. Duration: 2 hrs **C3: 50**

Objectives

- To understand the importance of sericulture
- To provide the hands-on experience in sericulture practices
- To enhance the skill of practicing silk production
- To appreciate the modern technology employed in sericulture practices

COURSE CONTENT:

Unit I: Introduction to Silkworm Practices
Sericulture: Definition, history and present status
Silkworms: Types of silkworms, their food plants and distribution
Non-Mulberry Silkworm: Tasar *(Antherea*: Distribution, life cycle, food plant and marketing
Muga silkworm: Distribution, Food plants and Life cycle, marketing
Eri Silkworm: Distribution, life cycle and food plants, marketing.
Prospectus of Sericulture in India : Sericulture industry in different states, employment
Central Silk Board (CSB): Role of Central Silk Board and Directorate of Sericulture in extension and development.
Moriculture: Salient features and economic importance of the genus *Morus*; Anatomy of mulberry leaf, stem and root
Soil: Physical and chemical properties; Soil nature; Soil moisture; Climatic conditions: Temperature, photoperiod, humidity and rainfall

Unit II: Silkworm Taxonomy And Distribution
Classification and Taxonomic characters: Phylum, class, order, family, genus and species;
Moultinism and voltinism: Univoltine, bivoltine and multivoltine races; Distribution and Races; Geographical distribution in the world and India;
Life cycle: Egg, larvae, pupa and adult, life span

Unit III: Silkworm Morphology
Egg: External and internal morphology and colour change;
Larvae: Mouth parts, legs, prolegs, spiracles, eyes, claspers and integumentary hair and sexual markings;
Pupa: Male and Female Morphology and sexual dimorphism;
Adult: Mouth parts, antenna, wings, external genitalia.
Silk glands: Structure, development and mechanism of silk synthesis
Endocrine glands: Endocrine glands in lava and pupa; Hormonal control on metamorphosis, diapause, silk synthesis. Pheromone: sex attractants and their role in mating.

Unit IV: Silkworm Rearing Technology and Diseases

Rearing: Rearing appliances, Rearing trays, ant-wells, rearing stands and racks, paraffin papers, rubber foam pads, net, chopsticks and feathers; Mountages

Disinfectants appliances: Disinfect ants - Formalin, bleaching powder, RKO, Disinfectant appliances: Sprayers and dusters

Seed: Collection of disease-free layings (DFLs), cards, loose eggs, incubation; Hatching and Brushing: Uniform hatching and Brushing methods for I instar larvae

Basic concepts of silkworm diseases: Viral and Protozoan diseases (Nuclear polyhydrosis virus (NPV); *Nosema bombycis* (Pebrine disease) and Preventive measures

Bacterial diseases: Bacterial septicemia (*Bacillus sp*.); Fungal Diseases (white muscardine (*Beauveria bassiana*),

Silkworm pestsð Tachinid Fly (Uzifly), Dermistid beetles; Vertebrate and other silkworm pests and their control.

References

1. Narasingabba, M. N. (1988) Manual of silkworm and its production by Central Silk Board, Bangalore.
2. Tasar culture. Dr. M. S. Jolly et. al., CSB, 1974.
3. Silkworm Rearing Techniques in the Tropics, Dr. S. Omura, Japan International Cooperation Agency, 1980.
4. Muga Silk Industry by S. N. Choudhary, Directorate of Sericulture and weaving, Govt. of Assam, 1982.
5. Studies on soils of India, S. V. Govind Rajan and H. G. Gopala Rao (1970), Vikas Publ. House Pvt. Ltd., New Delhi.
6. Boraiah, G. (1986) Mulberry Cultivation. Lectures on Sericulture.
7. Manual on Sericulture; Food and Agriculture Organisation Rome 1976.
8. Appropriate Sericultural Techniques Ed, by M. S. Jolly Director, CSR & TI, Mysore.
9. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. Ltd., Tokyo, Japan1972.
10. A Guide for Bivoltine Sericulture: K. Sengupta, Director, CSR & TI, Mysore 1989.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives

- To provide the hands-on experience in sericulture practices
- To enhance the skill of practicing silk production
- To appreciate the modern technology employed in sericulture

COURSE CONTENT:

1. Preparation of a map showing extension of sericulture in the world.
2. Preparation of a map showing extension of sericulture in India.
3. Graphical representation of cocoon and silk production by various silkworms in India.

4. Moriculture: a) Soil sampling and analysis of pH and moisture content. b) External morphology of root, stem and leaf. c) Methods of propagation by cutting.
5. Morphology ï Egg, last instar larva, pupa, adult, sexual dimorphism, mouthparts, antennae, legs, prolegs, wings.
6. Anatomy ï Dissection of silk gland of larva and adult.
7. Study of appliancesð Types of trays and racks, types of mountage, Cellule, humidity and temperature devices, dusters and sprayers.
8. Life cycle of Silkworm
9. Silk productsð Silk wastes, spun yarn and other byproducts.
10. Single cocoon reelingð determination of average filament length and denier
11. Visit to various sericulture department/centres.
12. Collection of mulberry disease sample and preservation.
13. Study of mulberry fungi, viruses and bacteria causing diseases.

PROFESSIONAL EDUCATION COURSES

BSE IV.7: LEARNING AND TEACHING

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

The student teacher will be able to:

- Gain an understanding of the process of learning.
- Understands the Conditions Essential for Facilitating Learning and Retention.
- Apply the Principles and Strategies of Major Approaches to Learning in Classroom Environment.
- Understands the Process of Effective Teaching and Qualities of Effective Teachers.
- Understands various Approaches to Teaching and will be able to apply them in the relevant situations.
- Understands the Principles and Strategies for Creating Conducive Classroom Environment.
- Appreciates the role of a teacher as leader, organizer, a facilitator & a humane reflective practitioner.
- Realize the difficulties in learning and teaching.

COURSE CONTENT

Unit I : Concept and Nature of Learning

Factors Associated with Learning

Maxims of Learning and their Educational Implications

Approaches to Learning(Concept, Associated Concepts Basic Principles and Educational Implications)-Habitual Learning, Associative Learning (Classical and Instrumental Conditioning), Spatial Learning/Cognitive Maps, observational Learning, Learning by Insight, Information Processing Approach, Humanistic Approach, Constructivist Learning Approach

Types of Learning-Concept Learning, Skill Learning, Verbal Learning, Learning of Principles and Problem Solving (Meaning, Nature, Stages, Principles and Approaches/Strategies)

Unit II: Understanding Components of Learning

Attention-Meaning, Factors Influencing Attention, Strategies for Enhancing Attention;
Perception-Meaning, Laws of Perceptual Organization (Gestalt PsychologistsôView) and Educational Implications.
Process of Memory- Sensory Registration, Retention(Storing), Recognition, Recall;
Factors Influencing Retention; Strategies for Enhancing Memory.
Transfer of Learning- Concept, Types, Theories; Strategies for Enhancing Positive Transfer of Learning
Achievement Motivation- Concept, Intrinsic and Extrinsic Motivation; Strategies for enhancing Achievement Motivation in Students.

Unit III: Understanding the process of Teaching-Learning

Teaching as a Profession
Teaching as an Art and Science.
Understanding the Process of Teaching as a Profession
Identifying the need and importance of classroom teaching-learning
Reflective teaching/practice
Skillful teaching
Applying the knowledge of Maxims of Teaching
Role of teacher in identifying classroom related problems

Unit IV: Teacher and Teaching as a profession

Various Approaches to Teaching: Behaviourist, Cognitivist, Constructivist, Connectionist, Participatory, Cooperative, Collaborative, Personalized, and Holistic
Teacher as a Facilitator and Guide/Philosopher/Friend
Teachers commitment towards fulfilling Felt Need of Learners

Professional Characteristics of Teacher in Classroom Management.
Skills & Competencies of a Teacher Communication: Meaning,ômode::input/process/output
Basic Model of Communication: Sender, Message, Medium, Receiver & Reach; Factors facilitating communication
Effective Classroom Management-Principles and Strategies

Leadership Qualities in Teachers

Practicum

Conducts Projects on ï

Identifying the Learning Difficulties of Students in Different School Subjects and the Possible Reason for them;

Providing Remedial Instruction to the Students with Learning Difficulties;

Study the Qualities of Effective Teachers through observation, interview, case study etc.,

Visiting Model Schools and Prepare Reports

References:

- Benjamin S., Bloom et al. (1964). *Taxonomy of educational objectives*. Longman Group.
- Bruce Joyce (1985) *Models of teaching* (2nd ed.) Prentice Hall**.**
- Encyclopaedia of Modern Methods of Teaching and Learning (Vol. 1-5).
- Gage N.L. Scientific Basis of art of Teaching
- Gavriel Salomon (1981) *Communication and education* Sage.
- Lieberman, M. (1956) *Education as a profession*. Prentice Hall, Inc.
- Karthikeyan, C. (2004). *A Text book on instructional technology,* RBSA.
- Kumar, S. (2014). Child Development and Pedagogy, Pearson.
- Ohles, J.F. (1970). *Introduction to Teaching*. New York: Random House, INC.
- Siddiqui, Mujibul Hasan (2005). *Techniques of classroom teaching* A.P.H
- Skinner, E.C.(1984). *Educational Psychology. 4th Edition***.** New Delhi: Prentice Hall of India Pvt. Ltd.
- Snowman & Baihler (2006). *Psychology Applied to teaching*. Boston: Houghton Mifflin Company.
- Stephens, L.M. & Evans, E.D. (1973). *Development and Classroom Learning: An Introduction to Educational psychology*. New York: Holt, Rinehart and Winston, Inc.
- Tanner, L.N. & Lindgren, H.C. (1971). *Classroom Teaching and Learning*. New York: Holt, Rinehart and Winston, Inc.

Web Resources

- Courses on Communication Skills, http://nptel.ac.in/courses/109104030/
- Jane Ciumwari Gatumu, Reflective Teaching, http://oer.avu.org/bitstream/handle/123456789/155/REFLECTIVE-TEACHING.pdf?sequence=1
- School leadership (2011), http://azimpremjifoundation.org/pdf/learning-curve-16.pdf

BSE IV.8 :DRAMA AND ART EDUCATION

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives :

The student teacher will be able to:

- Understand the efficacy of different art forms in education
- Understand the use of ódramaôas a strategy
- Use órole playôtechnique in the teaching learning process.
- Understand the importance of dramatic way of presentation.
- Integrate singing method in teaching learning process.
- Understand various ódance formsôand their integration in educational practices.
- Use art of drawing and painting in teaching learning process.
- Develop creativity through different creative art forms.
- .

COURSE CONTENT

Unit I : Drama and its Fundamentals

Creative writing ï Drama writing, Drama as a tool of learning, Different Forms of Drama Role play and Simulation, Use of Drama for Educational and social change (Street play, Dramatization of a lesson), Use of Drama Techniques in the Classroom: voice and speech, mime and movements, improvisation, skills of observation, imitation and presentation

Unit II: Folklore Music (Vocal & Instrumental)

Sur, *Taal and Laya (Sargam),* Vocal - Folk songs, Poems, Prayers, Singing along with ñ*Karaoke*ò, Composition of Songs, Poems, Prayers, Integration of *Vocal & Instrumental* in Educational practices

Unit III: The Art of Dance

Various Dance Forms - Bharat Natyam, Kathakali, Kuchipudi, Yakshagana- Folk dance and various other dances; integrate movement and rhythm
Integration of Dance in educational practices
(Action songs, *Nritya Natika*)

Unit IV: Drawing and Painting

Colours, Strokes and Sketching- understanding of various means and perspectives, Different forms of painting- Worli art, Madhubani art, Glass painting, Fabric painting and various forms of painting, Use of Drawing and Painting in Education -Chart making, Poster making, match-stick drawing and other forms, Model making ï Clay modeling, Origami, Puppet making, Decorative ï Rangoli, Ekebana, Wall painting (Mural), Kalameshuthu or any other local art

Transactional Strategies

Lecture cum Discussion for each Unit (Unit 1 to 4) followed by simulated/ authentic practices, Workshop schedule, Slide / Film show, Project work, Demonstration, Simulation, Group work and field trips involving meetings with folk singers and other skilled practitioners will especially form part of the transaction scheme. In addition to the above any one or more of the following:

Practicum

Suggestive List:

1. Developing a script of any lesson in any subject of your choice to perform a Play / Drama.
2. Developing a script for the street play focusing on ñGirlôs education and Women empowermentò.
3. Preparing a pictorial monograph on ñVarious folk dance of South India.
4. Preparing a pictorial monograph on ñVarious Classical Dance forms in Indiaò.
5. Preparing a calendar chart on ñVarious Musical Instruments in Indiaò.
6. Develop an Audio CD based on newly composed Poems of any Indian language.
7. Preparing some useful, productive and decorative models out of the waste materials.
8. Visit the Faculty of Performing Arts in your city and prepare a detailed report on its multifarious functioning.
9. Development a Review of a theatre programme if possible
10. Organize a competition on some Decorative / Performing Art forms in the school during your School Internship programme and prepare a report on it.
11. Organizing a workshop on some selected Creative Art forms in the school during your School Internship programme and prepare a report on it.

*** In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc.Action research based on teaching learning and school and community could be conducted.**

Evaluation Strategies

Sessional, practicum, unit test project work related presentations.

Suggested Readings

1. Natyashastra by Bharathamuni
2. Deva, B.C. (1981). An Introduction to Indian Music. Publication Division, Ministry of Information and Broadcasting, Government of India.
3. NCERT (2006). Position Paper by National Focus Group on Arts, Music, Dance and Theatre
4. Theory of Drama by A. Nicoll
5. Folklore and School Education. Regional Institute of English Publication, 2007.

Web Resources

Position Paper National Focus Group on Arts, Music & Dance, NCERT
http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/art_education.pdf
Arts in school education, (2012), http://azimpremjifoundation.org/pdf/LCXVIII.pdf
Online courses on Arts, http://www.dsource.in/course/index.php

Learning Indicators and Learning Outcomes at the Elementary Stage, (2014), NCERT http://www.ncert.nic.in/departments/nie/dee/publication/pdf/LI_Final_Copy_Revised_29.12.14.pdf

BSE IV.9 : School Attachment Programme 2

Credits : 2 **Marks: *100**
Duration : 2 weeks **C1 + C2:50**
C3: 50

Objectives:

- To familiarize student teachers with classroom processes and skills employed in teaching-learning process
- To familiarize the student teachers with different types of schools existing in the community**.**

COURSE CONTENT:

- The student teachers will observe minimum 3 classes of regular teachers for understanding the skills and strategies used in teaching by them.
- The student teachers will visit different types of schools such as Government, Government aided and private schools to study their governing norms, regulations and participation in the community.
- The student teachers will visit the schools run by community/NGO or other organizations like minority run schools, schools in SC/ST dominated areas, schools in slum areas, special and inclusive schools and submit the report.

Evaluation:* All assessments are internal
C1 ï Report 1
C2 ï Report 2
C3 ï PPT

FIFTH SEMESTER

Core Course 1 E : Physics

BSE V.1A :ATOMIC AND MOLECULAR PHYSICS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

COURSE CONTENT:

Unit I: Atomic Physics-I

The Electron: Determination of e/m of an electron by Thomson method, Determination of charge of an electron by Millikanôs oil drop method.
Atomic Spectra: Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus, Rydberg constant in terms of reduced mass, Excitation and Ionization potentials, Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, relativistic mass correction, vector model of an atom, Electron spin, space quantisation, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory.

Unit II: Atomic Physics-II

Spin-orbit interaction and Fine structure of spectral lines. Quantum numbers and selection rules. Pauliôs exclusion principle. Electronic configuration of atoms. Valence electron and a brief mention of L-S and J-J coupling for multi electron atoms. Fine structure lines of Sodium Zeeman effect. Explanation of Zeeman effect on the basis of vector model of atom, Expression for Zeeman shift and experimental details. Mention on anomalous Zeeman effect, A qualitative mention of Paschen ï Back and Stark effects.

Unit III : Molecular Spectra

Molecular formation, the molecular ion, H_2 ï molecule. Salient features of molecular spectra. Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules. Theory of pure rotation and rotation- vibration spectra, Raman and Infrared (IR) spectra, simple applications. UV-Visible, Fourier Transform IR, Nuclear Magnetic resonance (NMR) and Laser Raman spectra of organic molecules and their interpretations.

Unit IV: X-Rays

Electromagnetic spectrum, production of X-rays, X-ray spectra, Continuous X-ray spectra Characteristic X-ray. Duanne and Hunt limit. Moseleyôs law and its significance, X-ray energy levels. Braggôs law and Bragg spectrometer. A brief mention of different types of crystals. Structures of NaCl and KCl crystals. Compton Effect, Expression for Compton Shift.X-ray diagnostics and imaging

Reference Books:

1. H. S. Mani and G. K. Mehta, Introduction to Modern Physics, Affiliated East-West Press, India, 1990.
2. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition edition.
3. J.R. Taylor, C.D. Zafiratos, Modern Physics, M.A. Dubson, PHI Learning, 2009.
4. R.A. Serway, C.J. Moses, and C.A.Moyer, Modern Physics, Cengage Learning, 2005.
5. G. Kaur and G.R. Pickrell, Modern Physics, McGraw Hill, 2014.
6. Rich Meyer, Kennard, Coop, Introduction to Modern Physics, Tata McGraw Hill, 2002.
7. R. Murugeshan and K. Sivaprasath Modern Physics, S. Chand Publisher, 1994.
8. J. R. Reitz, F. J. Milford, and R. W. Christy, Foundations of Electromagnetic Theory, Addison-Wesley; 4 edition, 2008.
9. Banwell and E. Mccash, Fundamentals for Molecular Spectroscopy, McGraw Hill Education; 4 edition, 1994.
10. H. E. White, Atomic Spectra ï , McGraw-Hill, 1954.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. Franck-Hertz experiment.
2. Study of sodium lines using discharge tubes.
3. Study of hydrogen lines using discharge tubes.
4. Study of helium lines using discharge tubes.
5. Dissociation energy of Iodine.
6. Hartmannôs formula for wavelength.
7. Benzene IR spectrum.
8. Rydberg Constant ï Solar Spectrum
9. Excitation of Brass spectrum using Arc method
10. Rutherford model ï Simulation technique.
11. Zener diode characteristics.
12. Transistor characteristics and transfer characteristics in Common Base configuration-

current gain.

13. Transistor characteristics and transfer characteristics in Common Emitter configuration-current gain.
14. CE Transistor Amplifier-Frequency response.
15. Basic operational amplifier.
16. Energy gap of a semiconductor.
17. Bi-prism experiment.
18. Resolving power of grating.
19. Current balance experiment- the effects of a magnetic field on a current carrying conductor.
20. Resolving power of a telescope.

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

Core Course 1 E :Botany

BSE V.1B : BOTANICAL NOMENCLATURE, ANGIOSPERM TAXONOMY AND UTILIZATION OF PLANTS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
ÅTo understand the principles of plant nomenclature;
ÅTo appreciate the evolution of taxonomic thought and the various systems of classification;
ÅTo understand the diversity that exists among angiosperms;
ÅTo make detailed study of selected families;
ÅTo appreciate the utility of plants and plant products in human welfare.

COURSE CONTENT

Unit I :
ICBN, principles and aims; type concept, concept of genus and specific epithet, Principle of priority, units of classification.
Brief account of regional, national and international herbaria, significance of herbaria; identification keys and floras.
Brief history, development of taxonomic thought, outlines of artificial, natural and phylogenetic systems of classification.
Salient features and outline classification of Bentham and Hooker and Cronquist.

Unit II :
Study of the diagnostic features, salient vegetative and floral characteristics and economically important plants of following families : i)Magnoliaceae ii)Capparidaceae, iii)Malvaceae, iv) Fabaceae, v)Rutaceae, vi)Apiaceae, vii)Euphorbiaceae, viii)Amarantaceae

Unit III :
Study of the diagnostic features, salient vegetative and floral characteristics and economically important plants of following families : i) Apocyanaceae ii)Asclepiadaceae, iii)Acanthaceae, iv)Solanaceae, v) Lamiaceae, vi)Liliaceae, v)Poaceaex, vi)Arecaceae

Unit IV:
Brief account (botanical name, family, extraction/ processing where necessary) and uses of the following :

a) Cereals and Pulses : Rice, wheat, maize, millets, pigeon, pea, Bengal gram, green gram, black gram.
b) Fibres : Cotton, jute, linen, coir.
c) Vegetable oils : Groundnut, coconut, sunflower, safflower, castor.
e) Timber and bamboos : Rosewood, teakwood, honne, canes and bamboos.
f) Beverages : General account, coffee, tea, cocoa.
g) Spices and condiments : General account, cardamom, clove, pepper, ginger, cinnamon, saffron, turmeric, mustard.
h) Rubber : General account, Hevea, Ficus.
i) Medicinal plants : Brief account of ethnobotany, uses of Cinchona, Rauwolfia, Phyllanthes, Catharanthus, Ocimum, Tylophora and other locally available medicinal plants.

References:

1. Jones, A.B. and A.Luchsinger, 1979, Plant Systematics, McGrow Hill Book Co., New York.
2. Priti Shukla and Misra, 1988, Taxonomy of Angiosperms, Vikas Publishing House, New Delhi.
3. Hutchinson, J., The families of Flowering Plants, Clarendon Pres, Oxford.
4. Davis, P.H. and V.H.Heywood, 1963, Principles of Angiosperm Taxonomy, Oliver and Boyd, London.
5. Heywood, V.H. and D.M.Moore (Ed.)1984, Current concepts in Plant Taxonomy, Academic Press, London.
6. Singh, G.1999, Plant Systematics : Theory and Practice, Oxford and IBH Pvt. Ltd., New Delhi.
7. Stace, C.A. 1989, Plant Taxonomy and Biosystematics (2nd Ed.), Edward Arnold, London.

8. Singh V. and D.K.Jain, 2005, Taxonomy of Angiosperms, Rastogi Publications, Meerut.
9. Kochhar S.L.1981, Economic Botany in the Tropics, MacMillan India Litd., Delhi.
10. Vashista P.C. 1980, Taxonomy of Angiosperms, Sultanchand & Co., New Delhi.
11. Lawrence, G.H.M. 1950 Taxonomy of Vascular Plants, MacMillan, London.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:
- To acquaint students with the technical terms and identification keys for describing and identifying angiosperms.
- To familiarize with local plants belonging to families included in the study.
- To be able to describe the vegetative and floral characteristics, draw floral diagram and write floral formulae of angiosperms.
- To familiarize with common plants/plant products of economic importance.
- To develop the skill of undertaking field study and preparing herbarium sheets.

COURSE CONTENT :
1. Study of selected technical terms and their definitions (used in the description of plant).
2. Detailed study of at least one plant specimen per family as given in theory syllabus.
3. Field study (3-5 days) to a nearby forest, for collection, identification and submission of 5 herbarium sheets;
4. To recognize the botanical name, family, part used and products of economic importance as per theory syllabus;
5. Preparation and submission of an illustrated inventory of 5 medicinal plants used in indigenous systems of medicine and allopathy (Write their botanical name, family, part used, active principle and diseases/disorders for which they are prescribed).

Core Course 2EChemistry

BSE V.2 :TRANSITION ELEMENTS, COORDINATION COMPOUNDS AND CHEMICAL KINETICS

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
- To develop an understanding of Principles of Chemical Kinetics and Surface Chemistry.
- To explain the properties of d and f block elements and their compounds in terms of their electronicconfiguration and bonding.
- To understand the properties of coordination compounds in terms of bonding theories.

COURSE CONTENT:

Unit I: d-block and f-block elements

To relate the electronic configuration to the properties and structure of transition metals and their compounds. Characteristic properties of d-block elements.

Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry. Powder metallurgy ï extraction of tungsten. Position of lanthanides and actinides in the periodic table, lanthanide contraction and its consequences, spectral and magnetic properties of lanthanides, separation of lanthanides and actinides. General properties of actinides:

Extraction of Thorium, Uranium and Plutonium from burnt nuclear fuels.

Unit II : **Coordination Compounds**

To apply theories that explain certain properties and structure of transition metal complexes. Wernerôs coordination theory and its experimental verification, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Limitations of VBT. Elementary treatment of crystal field theory, splitting of d-orbitals in square planar, tetrahedral and octahedral complexes, factors affecting crystal field parameters, Explanation of magnetic behavior and color of complexes using CFT, effective atomic number concept. Metal carbonyl, 18 electron rule, Preparation, structure and reactions of $Ni(CO)_4$, $Fe(CO)_5$ and $V(CO)_6$, nature of bonding in metal carbonyls.

Unit III: Chemical Kinetics

Understanding the factors that influence a chemical reaction and rationalising them on the basis of known theories of reaction rates. Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction ï concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions ï zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction ï differential method, method of integration, method of half-life period and isolation method. Radioactive decay as a first order phenomenon.

Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy, Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Unit IV :Surface Phenomena

Adsorption: Introduction-Absorption and adsorption(definition, examples and differences) types of adsorptions-physical and chemical(definition, examples and differences between them), factors influencing the adsorption of gases on solids. Adsorption isotherms: definition, Mathematical expression for Freundlich and Langmuir's adsorption isotherms. applications of adsorptions.

Catalysis: Definition, general characteristics, action of catalytic promoters and inhibitors. Homogeneous catalysis (definition and examples),Heterogeneous catalysis(definition and examples) mechanism of heterogeneous catalysis(based on adsorption theory) enzyme catalysis (definition and examples) Mechanism of enzyme catalysed reaction(lock and key mechanism)

References :

1. Inorganic Chemistry : James Huhey
2. Essentials of physical chemistry Arun Bahl,B.S. Bahl,G.D. Tuli
3. Concise Inorganic Chemistry J.D.Lee 5th edition,Wiley publishers.
4. Advanced Inorganic Chemistry Satya Prakash G.D. Tuli S.K. Basu, R.D. Madan S.Chand and company pvt. Ltd.
5. Principles of Physical Chemistry Puri,Sharma and Pathania.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To understand the kinetics of chemical reactions
- To familiarise with the analysis of ores
- To prepare and analyse inorganic complexes
- To study the adsorption phenomena

COURSE CONTENT:

1. Iodination of Acetone by titration and Colorimetry.
2. Acid Hydrolysis of Ester
3. Reaction between Potassium Peroxydisulphate and Potassium Iodide.
4. Base Hydrolysis of an Ester by Titration and Conductometry
5. Iodine clock reaction
6. Solvolysis of Tertiary Butyl Chloride by Titrimetry, conductometry and pH metry
7. Inversion of Cane Sugar
8. Colorimetric study of kinetics of oxidation of Indigo carmine by Chloromine-T.
9. To study the adsorption of acetic acid on activated charcoal
10. To determine the relative strength of Hydrochloric acid and sulphuric acid by studying the kinetics of hydrolysis of ethyl acetate.
11. To study kinetically the reaction rate of decomposition of iodine by hydrogen peroxide.
12. Determination of Copper by colorimetric method using ammonia as the complexing agent.
13. Determination of Ferric ion by colorimetric method using potassium thiocyanate as the complexing agent.
14. Estimation of Manganese in pyrolusite by volumetric method
15. Preparation of a complex: potassium trioxalato aluminate(III) trihydrate or potassium trioxalato cobaltate(III)
16. To determine the rate constant for the inversion of sucrose using polarimeter.

References :

1. Advanced practical inorganic chemistry by Gurdeep Raj, Goel Publication House, Meerut-India.
2. Systematic Experiments in chemistry by Arun Sethi, New age International Pvt.Ltd, New Delhi.

Core Course 3E : Mathematics

BSE V.3A :MULTIVARIATE CALCULUS & VECTOR CALCULUS

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
To enable the students to understand the concepts of multi-variate calculus and vector calculus, and also to compute the areas of plain regions, surfaces and volume of solids.

COURSE CONTENT:

Unit I:
Definition of a line integral and basic properties, Evaluation of line integrals, Definition of double integral, Conversion to iterated integrals, Evaluation of Double integral, change of variables, Surface areas. Definition of a triple integral, Evaluation, Volume as a Triple integral.

Unit II:
Improper integrals of the first and second kinds, Convergence, Gamma and Beta functions, Connection between Beta and Gamma functions, Application to Evaluation of Integrals, Duplication formula, Sterling formula.

Unit III:
Quadratic Curves, surfaces, sphere, cylinder, cone, Ellipsoid, Hyperbloid, Parabloid, Ruled surfaces.

Unit IV:
Vectors, Scalars, Vector field, Scalar field, Vector differentiation, The Vector Differential operator del, gradient, curl, Vector integration, The Divergence theorem of Gauss, Stokeôs Theorem, Greenôs Theorem in plane.

References

1. Calculus by Lipman Bers, Vols 1 and 2.
2. First Course in Calculus by Serge Lang
3. Calculus ï Single and Multivariable by Hughes Hallet
4. Calculus and analytic geometry by Thomas and Finny.
5. Advanced Calculus by David Widder

Core Course 3 E : Zoology

BSE V.3B : DEVELOPMENTAL BIOLOGY AND APPLIED ZOOLOGY AND ETHOLOGY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To comprehend the modern concepts of developmental biology;
- To understand the developmental sequences in vertebrates;
- To compare the development of organs and systems in vertebrates with evolutionary significance;
- To identify the economically important animals and also to acquire knowledge with regard to control measures of economically harmful animals.

COURSE CONTENT:
UNIT I: GAMETOGENESIS AND DEVELOPMENT-I

a) **Gametogenesis**ï Structure and types of sperm, Spermatogenesis; Structure and types of eggs, Oogenesis
b) **Fertilization**ï Types, mechanism and its significances. Parthenogenesis
c) **Cleavage**ï Characters, types, patterns of cleavage, planes of cleavages, factors influencing cleavage, fate map
d) **Gastrulation:** Morphogenetic movements
e) **Organizer phenomenon**ï Organizer concept of Spemann, induction; competence, determination and differentiation

UNIT II: DEVELOPMENT-II

a) Development of chick up to three germ layers and neurulation .
b) Salient features of chick embryos of different ages ï 19 hrs, 24 hrs, 33 hrs and 48 hrs, 72 hrs and 96 hrs of incubation
c) Extra-embryonic membranes of chick ï development, structure and functions of amnion, chorion, yolk sac and allantois
d) Placenta in mammalsï Structure, classification and types
e) Regeneration: Morpholaxis and epimorphosis

UNIT III: APPLIED ZOOLOGY

a) **Beneficial animals**: Basic principles: i) Sericulture ii) Apiculture iii) Aquaculture - fish, prawn and shell fish .
b) **Harmful animals**: Pests ï morphology, life cycle, damages caused and control measures of common insect pests of stored food grains and crops, nematode pests of crops, insect vectors (each two); Control ï biological control (pheromone traps) and integrated pest management (IPM)

UNIT IV: ETHOLOGY

Definition and objectives of Ethology ; Concept of motivation and releaser in behaviour; Innate behaviour, taxes, reflexes, instinctive behaviour (3); Learning, imprinting and its significance; biological clocks; Social behaviour in honey bees and monkey; Aggressive behaviour, Control of behavior.

References:

1. Developmental Biology by K.V.Sastry& Vinita Shukla ï (Rastogi Publications, 2008)
2. Introduction to Embryology by B.I. Balinsky ï (W.B. Saunders, Philadelphia)
3. A Hand Book of Sericulture by Iyonemura & M.N.RamaRao.
4. Bee keeping by J.E.Eckert and F.R.Shaw.
5. Economic Zoology by G.S. Shukla & V.B. Upadhya
6. Chordate Embryology by Verma PS &Agarwal VK ï Chand & Co.
7. Animal Behaviour by V.G.Dethier and E Stellar -(Prentice hall of India, New Delhi)
8. The study of Instinct by N Tinbergen.
9. The Dancing Bees by K V Frisch
10. Learning and Instincts in Animals by W H Thorpe and W Homan

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

OBJECTIVES:

- To develop the skills of staining and mounting of embryos of chick;
- To understand the developmental patterns of chick and Frog;
- To acquire the skill of culturing silk worm, honey bees and fish;
- To acquire skill for effective control measures of economically harmful animals

COURSE CONTENT:

1. Study of different types of eggs (Insect, Frog, Hen)
2. Study of permanent slides of different developmental stages in Frog
   a) egg, b) early cleavage, c) morula, d) blastula, e) gastrula.
3. Study of permanent slides/different developmental stages of a) neural plate, b) neural fold, c) Early tadpole, d) hind limb stage, e) hind limb and fore limb stage, f) short tailed stage, g) young Frog.
4. Preparation of window on henôs egg to study development of embryo.
5. Incubation of fertilized egg of chick, preparation of permanent mounting of embryo from incubated egg and identification of age of the embryo.
6. Study of permanent slides of chick embryos of
   a) 13 hrs, b) 19 hrs, c) 24 hrs, d) 33 hrs, e) 48 hrs of incubation
7. Study of common insect pests of stored grains and crops.
8. Study of common insect vectors.
9. Study of economically important
   a) Fishes, b) crustaceans, c) molluscans.

10. Study of metamorphosis of Anuran tadpole larva
11. Study of Preferences: a) Preening behaviour in birds, b) Photoï, chemoï, and Geotaxes in *Drosophila*
12. Stimuli eliciting aggressive displays in male Siamese fighter fish; b) colour change in female Siamese fighter fish
13. Experiments with maze for studying behavioural motivation in rat

Sericulture Project – Moriculture, Collection of laying, incubation, black boxing, brushing, rearing, moulting, spinning, harvesting cocoons, reeling, raw silk (study of some economic traits ï fecundity, larval duration, cocoon weight, shell weight and silk weight).

PROFESSIONAL EDUCATION COURSES

BSE V.4 :ASSESSMENT OF LEARNING

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
This course is designed to help student teachers to:

* Understand the nature of assessment and evaluation and their role in teaching- learning process.
* Understand the importance of assessment in continuous and comprehensive manner
* Plan assessment tasks, techniques, strategies and tools to assess learnerôs competence and performance in curricular and co-curricular areas,
* Devise marking, scoring and grading procedures,
* Analyse, manage and interpret assessment data.
* Devise ways of reporting on student performance
* Develop the skills of reflecting-on and self-critiquing to improve performance.

COURSE CONTENT:

Unit I: Introduction to Assessment & Evaluation

(a) Concept of test, measurement, Assessment, examination, appraisal and evaluation in education and their inter relationships.
(b) Purpose and objectives of assessment/ Evaluation- for placement, providing feedbacks, grading promotion, certification, diagnostic of learning difficulties.
(c) Importance of assessment & evaluation for Quality Education ï as a tool in Pedagogic decision making (writing instructional objectives, selection of content, teaching learning resources, methodology, strategies & assessment procedures followed).
(d) Forms of assessment : -
    (i) (Formative, Summative, diagnostic; prognostic, placement; Norm referenced; Criterion referenced based on purpose)
    (ii) (Teacher made tests Standardized tests: based on nature & scope)

(iii) (Oral, written, performance: based on mode of response)
(iv) (Internal, External, self, peer, & teacher, group Vs individual- based on context)
(v) Based on nature of information gathered (Quantitative, Qualitative)
(vi) CCE, school based assessment ; Standard Based- based on Approach

(e) Recent trends in assessment and evaluations:
- Assessment for learning, assessment of learning and assessment as learning; Relationship with formative and summative, Authentic assessment.
- Achievement surveys- State, National and International; Online assessment; On demand assessment/ evaluation.
- Focus on Assessment and Evaluation in Various Educational commissions and NCFs

Unit II: Developing Assessment Tools, Techniques and Strategies -1

(a) Concept of Cognitive, Affective, Psychomotor domain of learning
(b) Relationship between educational objectives, learning experiences and evaluation.
(c) Revised taxonomy of objectives (2001) and its implications for assessment and stating the objectives-
- Knowledge dimensions:- factual, conceptual, procedural and meta-cognition.
- Cognitive, Affective, Psychomotor domains ï Classification of objectives

(d) Stating objectives as learning out comes: General, Specific.
(f) Construction of achievement tests- steps, procedure and uses (Teacher made test/Unit Tests)
- Constructing table of specifications & writing different forms of questions ï (VSA, SA, ET & objective type, situation based) with their merits and demerits; assembling the test, preparing instructions, scoring key and marking scheme; and question wise analysis

(g) Construction of diagnostic test ï Steps, uses & limitation; Remedial measures- need types and strategies
(h) Quality assurance in tools ï Reliability: Meaning &Different methods of estimating reliability (Test-retest; equivalent forms, split- half); Validity: Meaning &Different methods of estimating reliability (Face, content, construct), Objectivity and Practicability/ Usability
(i) Inter dependence of validity, reliability and objectivity

Unit III: Developing Assessment Tools, Techniques and Strategies -II

(a) Concept of CCE, need for CCE its importance; relationship with formative assessment and problems reported by teachers and students
(b) Meaning & construction of process-oriented tools- Interview; Inventory; observation schedule; check-list; rating scale; anecdotal record;
(c) Assessment of group processes-Nature of group dynamics; Socio-metric techniques; steps for formation of groups, criteria for assessing tasks; Criteriaôs for assessment of social skills in collaborative or cooperative learning situations.
(d) Promoting Self assessment and Peer assessment ï concepts and criteriaôs
(e) Portfolio assessment ï meaning, scope & uses; developing & assessing portfolio; development of Rubrics

Unit IV: Analysis, Interpretation, Reporting and Communicating of student's performance

a) Interpreting studentôs performance
   (i) Descriptive statistics (measures of central tendency & measures of variability, percentages, rank correlation)
   (ii) Graphical representation (Histogram, Frequency Curves)

(b) Grading ï Meaning, types, and its uses

(c) Norms ï Meaning, types, and its uses

(d) Reporting studentôs performance ï Progress reports, cumulative records, profiles and their uses, Portfolios, Using descriptive Indicators in report cards

(e) Role of feedback to stake holders (Students, Parents, Teachers) and to improve teaching ï learning process; Identifying the strengths & weakness of learners.

Sessional Works

1. Discussion on existing assessment practices in schools and submitting the report.
2. Constructing a table of specification on a specific topic (subject specific)
3. Constructing a unit test using table of specifications and administering it to target group and interpreting the result.
4. Construction of any one of the process oriented tools and administering it to group of students & interpreting it.
5. Analysis of question papers: teacher made and various Boards
6. Analysis of report cards-State and Central (CBSE)
7. Analysis of various education commission reports and NCFs for knowing various recommendations on Assessment and Evaluation

References:

1. Ebel, R.L. and Fresbie, D.A. (2009).Essentials of Educational Measurement. New Delhi: PHI Learning PVT. LTD.
2. Garrett, H.E. (2008). Statistics in Psychology and Education. Delhi: Surjeet Publication.
3. Gupta, S.K. (1994). Applied Statistics for Education. Mittal Publications.
4. Mehta, S.J. & Shah, I.K. (1982).Educational Evaluation. Ahmedabad: Anand Prakashan (Gujarati).
5. NCERT (2015) Learning Indicator, New Delhi
6. NCERT (2015) CCE Packages, New Delhi
7. Rani, P. (2004).Educational Measurement and Evaluation. New Delhi: Discovery Publishers.
8. Rawat, D.S. (1970). Measurement, Evaluation and Statistics in Education. New Delhi: New Raj Book Depot.
9. Reynolds, C.R., Livingston, R.B., and Willson, V. (2011).Measurement and Assessment in Education. New Delhi: PHI Learning PVT. LTD.
10. Ten Brink, T.D. (1974). Evaluation ï A Practical Guide for Teachers. New York: McGraw Hill Book Co.
11. Thorndike, R.M. (2010). Measurement and Evaluation in Psychology and Education. New Delhi: PHI Learning Pvt. Ltd.
12. Yadav, M.S. and Govinda, R. (1977). Educational Evaluation, Ahmedabad: Sahitya Mudranalaya.
13. Linn, Robert and Norman E Gronland (2000); Measurement and Assessment in

teaching, 8th edition, by Prentice Hall, Inc, Pearson Education, Printed in USA
14. Ved Prakash, et.al. (2000): Grading in schools, NCERT, Published at the publication Division by the secretary, NCERT, Sri Aurobindo Marg, New Delhi
15. Tierney, R. J., Carter, M. A., & Desai, L. E. (1991). Portfolio Assessment in the Reading ï Writing Classroom. Norwood, MA: Christopher-Gordon Publishers
16. Glatthorn, A. A. (1998). Performance Assessment and Standards-based Curricula: the Achievement Cycle. Larchmont, NY: Eye no Education
17. Gredler, M. E. (1999). Classroom Assessment and Learning. USA: Longman.
18. Likert, R. (1932). A technique for the Measurement of Attitudes. Archives Psychology, 40.
19. Mehrens, W. A. & Lehmann, I. J. (1991). Measurement and Evaluation in Education and Psychology (8th ed.): Chapter 10: Describing Educational Data.
20. Oosterhof, A. (1994). Classroom Applications of Educational Measurement (Second Edition). New York: Macmillan College Publishing Company Inc.
21. Payne, D.A (2003).Applied Educational Assessment. Australia: Wadsworth: Thomson Learning.
22. Popham, W.J. (1981). Modern Educational Measurement. New Jersey, Engle Wood Cliffs: Prentice-Hall Inc.
23. Popham, W. J. (2002). Classroom Assessment: What teachers need to know (Third Edition). Boston: Allyn& Bacon.

Web Resources

1. Assessment in school education, (2013) http://azimpremjifoundation.org/sites/default/files/userfiles/files/Issue%20XX%20Section%20C.pdf
2. Compendium of Tools, (2013), CBSE
3 http://cbse.nic.in/ePub/webcbse/webcbse/Revised%20Compendium%20of%20Tools/Revised% 20Compendium%20of%20Tools/docs/Revised%20Compendium%20of%20Tools.pdf
4. http://www.cbse.nic.ib/cce/index.html
5. www.ncert.nic.in
6. http://nroer.in/home/

BSE V.5 :Pedagogy of Physical Science 1

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

Student teachers will be able to

- Explain the nature of science.
- Specify the goals and objectives of science teaching.
- Review the contributions of major scientists.
- Explore several methods of teaching science.
- Apply various theories science learning and analyze the implications for teaching science.
- Review the science curriculum, syllabus, and text books.
- Explore constructivist practices in teaching of science.
- Create unit plans, lesson plans in an artistic and scientific way.
- Explore the inter-relation between science and other subjects.

COURSE CONTENT:

Unit I: Nature of Science

Nature and scope of science -Scientific method, how science works.

Science as a process and product. Science as a way of thinking: inquiry, observation, problem-solving, rational thinking, reasoning, science as an empirical body of knowledge. Structure of knowledge: facts, concepts, principles, generalizations, theories.

Historical development of physical science with illustrations from topics such as structure of atoms, laws of chemical combinations, stoichiometry, equivalent mass, models of the universe, nature of light, electricity and magnetism etc.

Contributions of Indian and international figures in science to the knowledge domain of physical science.

Basic branches of physical science and applications of physical science to human life. Evolution of Physical Science as a knowledge field; science and technology; science and society;

Correlation between science and other subjects, role of science teacher.

Unit II:

a. Aims and learning objectives of Physical Science

Aims of teaching physical science in the school curriculum.

Development of process skills of science, scientific attitude and temper by learning Physics and Chemistry as experimental sciences.

Nurturing curiosity, creativity and aesthetic sense.

Science and societyï relating physical science with the natural and social environment and technologies relating science to daily life

Values through science teaching-open mindedness, objectivity, truthfulness, critical thinking, logical thinking, development of problem solving skill, social learning.
Ethics of using the knowledge of science and technology.

b. Physical Science Curriculum

Recommendations of major commissions in India and policies on science teaching.
The school science curriculum with regard to NCF 2005: major themes in secondary school science.
Brief study of famous curricular reform projects such as Nuffield, STEM, PSSC, Chemical Bond Approach, CHEMSTUDY etc.
Comparison of international secondary schools science syllabus- Singapore, Oxford, CIE (Cambridge).

Unit III: Pedagogical shift, Approaches and Strategies of learning Physical Science

Role of prior knowledge in constructing new knowledge (Ausubel), Piagetôs theories of learning (schema- disequilibrium).
Development of concepts in Science- Real-life as the basis of conceptions; personal vs. verified knowledge of science. Conceptions, alternate concepts, and misconceptions in science, naïve concepts.
Teaching concepts and generalizations: inductive approaches, using advance organizers, problem solving approach, investigatory approach, project method, cooperative learning method.
Vygotskyôs theories of role of language and context in learning.
Van Glasersfeldôs theory. Development of constructivist practices in science teaching, 5E learning model, 7E model, conceptual change model of teaching, challenges in using constructivism in the classroom.

Approaches in teaching Science : Cooperative and Collaborative learning approach, problem solving approach, concept mapping, experiential learning, cognitive conflict, inquiry approach, analogy strategy.
Facilitating learning: Teacherôs role as a facilitator, grouping students, multiple learning experiences, discussing and negotiating ideas, scaffolding, consolidating studentsô ideas, questioning-techniques and strategies, higher order and metacognitive questioning.
Maintaining positive learning environment.
Catering to children with varied needs and abilities.
Scope and importance inclusiveness in science class room.
Gender and Science
Role of learner: each learner as unique individual, involving learner in learning process, role of learner in negotiating and mediating learning, encouraging learner to raise and ask questions.

Unit IV: Planning for Physical science Teaching-learning

Importance of planning, unit plan and lesson plan.

Anderson and Krathwohlôs revised Bloomôs taxonomy: knowledge domains and cognitive processes, action words. Types of knowledge- factual, conceptual, procedural and metacognitive knowledge.
Identification and organization of concepts.
Elements of physical science lesson plan: learning Objectives, introduction, development,

assessment, extended learning, assignment.
Designing learning experiences, pre-existing knowledge, selecting approach/strategy, arrangement of teaching learning materials, group learning, formation of groups, organizing activities.
Planning the lesson by using ICT applications and laboratory materials.
Reflective planning; unit plan; developing lesson plans on different topics and through various approaches taking examples form upper primary, secondary and higher secondary stage (physical and chemical changes, redox reaction, light, magnetic effect of electric current, etc.).
Important skills required to teach in Constructive mode.

Sessional Activities:

- Presentation on historical development of science concepts with a view to understand the nature of science.
- Pedagogical analysis (units for pedagogic analysis: any unit from VIII, IX or X physical science textbook).
- Drawing concept-maps for secondary level concepts.
- Presentation on the contributions of Physicists and Chemists to physical science.
- Readings on curriculum initiatives in secondary science with a special reference to NCF 2005.
- Comparison of different science curricula.
- Lab demonstration/exploration of science experiments.
- Exploring common mis-concepts in Physical Science by observing science classes or interviewing science teachers or using VIII and IX textbooks.
- Stating learning objectives for teaching a topic in science.
- Demonstration of different methods of teaching of Physical Science.
- Experimentation of different methods of teaching of Physical Science.

Practicum on teaching skills in integrated and Constructivist form to be carried out in the Block hours allotted.

References :

1. Pedagogy of Physical Science, Text book for B.Ed, Part I, NCERT
2. Pedagogy of Physical Science, Text book for B.Ed, Part II, NCERT
3. National Curriculum Framework 2005, NCERT, New Delhi.
4. Steve Alsop, Keith Hicks (2007). Teaching Science : A Handbook for Primary and Secondary School Teachers, Kogan Page, New Delhi.
5. Judith Bennett (2003) Teaching and Learning Science : A guide to recent research and its applications, Continuum, London.
6. Robin Millar (1984) Doing Science : Images of Science in Science Education, The Falmer Press, London.
7. State Textbook in Physics and Chemistry for classes VIII, IX and X.
8. Nathan S Washton (1967). Teaching Science Creatively, Saunders Company, London.
9. History of Physics in the 20th Century, Internet Browsing.
10. Novak D J and D Bob Gowin (1984) Learning how to learn, Press Syndicate of the University of Cambridge, Ohio.111

11. Carin A and B R Sund (1964), Teaching Science through Discovery, Charles E. Merrill Books Inc.,
12. Columbus Ohio. 11. Ralph Martin, Colleen Sexton, Kay Wagner, Jack Gerlovich (2000) Science for All Children: Methods for Constructing Understanding, Allyn and Bacon, London.
13. School Science Review, The Association for School Education, College Lane, Hatfield, Hertfordshire, AL 109 AA, UK.
14. Physics Education, Institute of Physics Publishing, Dirac House, Temple Block, Bristol BS1 6BE, UK.
15. Physics Teacher, American Association of Physics Teachers, Department of Physics and Astronomy, University of Maryland, College Park, MO 20742.
16. Kamala Mukunda, 2009. What did you ask at school today? A Handbook on Child Learning.
17. Donald Schon,(1983) The reflective practitioner, How professionals think in Action Basic Books, ISBN 0465068782
18. Donald A. Schon, (1987) Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions. San Francisco, Jossey-Bass, 1987 ISBN: 978-15-5542-220-2

BSE V.6A : Pedagogy of Mathematics 1

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
On completion of the course the students will have
* understanding of nature of mathematics and its branches
* ability to analyse the relationship of mathematics within itself and with other subjects
* ability to categories mathematical knowledge into factual, conceptual, procedural and meta cognitive knowledge
* Appreciates the contributions made by Indian and other country mathematicians contribution
* ability to apply logical reasoning and problem solving ability in solving various mathematical problems

Unit I: Knowledge about Mathematics
Nature of mathematics- abstractness, preciseness, brevity, language and symbolism; Nature of mathematical propositions; Quantifiers- necessary and sufficient conditions(one and two way); structure of mathematics- undefined terms, defined terms, definitions, axioms, postulates and theorem; mathematical theorem and its variants- converse, inverse and contra positive; Pure and Applied mathematics; branches of mathematics- Arithmetic, algebra, geometry and their diversities; mathematization through- observation, conjecturing, hypothesing, testing and verifying; creation of conceptual knowledge and its importance; creation of procedural knowledge- derivation of laws/ theorems/ generalizations in mathematics; relationship of mathematics among different branches of science; relationship within and among branches of mathematics; Contribution of Indian and other Mathematician-

Aryabhatta, Bhaskara, Raman jam, Guass, Euclid, Descarte, Cantor, Pythagoras;
Organization of Mathematical content- horizontal and vertical linkage (within and between classes IX and X); linkage between upper primary, secondary and senior secondary mathematics.

Unit II: Aims and objectives of teaching Mathematics

Aims of mathematics- Cultural, disciplinary, moral, social and utilitarian aims; General objectives of teaching mathematics Vis-a-Vis the objectives of secondary education; Major shifts in classroom teaching (societal and technological influence); characteristics of a good instructional objectives; Writing specific objectives of different content categories in mathematics; Unit plan and Lesson plan-its importance and writing unit plan and lesson plan for mathematics lessons using the format.

Unit III: Strategies for learning mathematical concepts

Nature of concepts, types of concept, process of concept formation; Moves in teaching concepts- a) Exemplar moves- giving examples and non-examples (with or without reasoning); comparing and contrasting ; giving counter example b) Characterization move-definition, stating necessary and/or sufficient condition; concept Attainment Model (Bruner); Advance Organizer Model (Ausubel); Planning and implementation of strategies for teaching various mathematical concepts(secondary level maths).

Important skills required to teach in Constructivist mode.

Unit IV: Teaching of Generalization

Teaching by exposition- Moves in teaching generalization:- Introductory move, focus move, objective move, motivation move, assertion move, application move, interpretation move, justification move; Planning for expository strategies of teaching generalization.
Teaching by guided discovery- nature and purpose of learning by- discovery, inductive, deductive, guided discovery strategies; maxims for planning and conducting discovery strategies; planning strategies involving either induction or deduction or both.

Sessional work:

Analysis of secondary level mathematics text books to identify various categories of mathematical knowledge presented and its horizontal and vertical linkage among 8, 9 and 10 standard text books.
Analysing the structure of mathematics present in selected chapter/unit.
Writing a unit plan for selected unit
Writing of specific instructional objectives for selected unit
Writing a lesson plan on selected content area
Writing a plan for teaching a concept of a generalization using the appropriate moves to teach them.

- Practicum on teaching skills in integrated and constructivist form to be carried out in Block hours allotted.

References:

1. Butler and Wren (1965), The Teaching of Secondary Mathematics- Fourth Edition, London, McGraw Hill Book company
2. Cooney T J and others (1975), Dynamics of Teaching Secondary School Mathematics, Boston: Houghton Miffilin
3. Focus Group Report (2005), Teaching of Mathematics, New Delhi, NCERT
4. Iglewiez, Boris and Stoyle, Judith (1973), An Introduction to Mathematical Reasoning, New York, the McMillan company
5. John Stillwell(1989), Mathematics and its History- undergraduate Texts in Mathematics, Newyork,Springer-Verlag New York Inc
6. NCERT, A textbook of Content-Cum-Methodology of Teaching Mathematics, New Delhi, NCERT
7. NCERT(2012), Pedagogy of Mathematics- textbook for Two year B.Ed course, New Delhi
8. Polya george (1957), How to solve it, Garden city, New York, Doubleday
9. Robert B Davis (1984),Learning Mathematics-The cognitive approach to Mathematics Education, Sydney, Croom Helm Australia Pty Ltd
10. Servas W and T varga, Teaching school Mathematics- UNESCO source book
11. T V Somashekar, G Viswanathappa and Anice James (2014), Methods of Teaching Mathematics, Hyderabad, Neelkamal publications Pvt Ltd

BSE V.6B : Pedagogy of Biological Science 1

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
At the end of the programme, students are able to

- explain the nature of science
- specify the goals and objectives of science teaching
- demarcate science from other pursuits of knowledge
- get a glimpse of the major turning points in the history of biology
- review the contributions of major biologist
- apply the learning theories in teaching of biological science
- review the science curriculum, syllabus, and text books
- perform content analysis of secondary school biological units
- write instructional objectives using revised taxonomy
- plan and develop unit and lesson plans

COURSE CONTENT:
Unit I: Nature of Science
Science as a way of thinking: Inquiry, observation, problem-solving, rational thinking, reasoning and scientific attitude; Science as a way of investigation: scientific method, science process skills; Science as an empirical body of knowledge: Structure of Knowledge, Facts, Concepts, principles, Generalisations, theories; Process and Product of Science
Historical development of biological Science with special reference to those included in the school curriculum; evolution of biological science as a knowledge field; theories contributing

to modern biology (cell theory, theory of evolution by natural selection, gene theory, and homeostasis),
Contributions of Indian and International biologist to the knowledge domain of biological science, basic branches of biological science and applications of biology to human life.
Science and technology ; Science and society ; inter-relation between Science and other subjects

Unit II: Theoretical basis of science teaching
Applying Learning theories in teaching of biological science: process of concept formation; Development of conceptions in Science, Conceptions, alternate conceptions and misconceptions in science,
Role of prior knowledge in constructing new knowledge (Ausubel), Piagetôs theories of learning (schema- disequilibrium), Vygotskyôs theories-role of language, ZPD and scaffolding in learning, Van Glasersfeldôs theory; Spiral curriculum and discovery learning (Bruner),
Metacognition, development of constructivist practices in science teaching, conceptual change model of teaching.

Unit III: Biological Science Curriculum
Aims of teaching biological science in secondary schools
Recommendations of major commissions and policies on science teaching
The school science curriculum with regard to NCF: major themes in secondary school science
Brief study of famous curricular reform projects such as Nuffield, BSCS, and Project 2061
Biological science syllabus of secondary schools
Analysis of science text books

Unit IV: Planning for Biology Teaching
Content Analysis; An analysis of the major themes of secondary school science (facts, concepts, laws, theories); Concept mapping: role and procedure, studying linkages between concepts within the same subject and across subjects
Objectives of teaching science using revised Bloomôs taxonomy: Knowledge domains and cognitive processes, Types of knowledge- factual, conceptual, procedural and metacognitive knowledge, and action words.
Principles of teaching biological science: Science as inquiry, development of process skills of Science, scientific attitude and critical thinking, relating Science to daily life, Science and society.
Unit plan and Lesson plan: stating objectives, selecting the content, designing learning experiences, selecting approach/strategy, questioning, assessment and evaluation.
Important Skills required to teach in Constructivist mode.

Sessional Activities
- Developing timelines of development of biological knowledge/contributions of biologist
- Historical development of Science concepts- Poster presentation/concept maps
- Analysis and presentation of biological theories and models
- Timelines of current trends and future predictions of biological science
- Background readings on history of science, philosophy of science
- Observation of a biology classroom

- Exploring common misconceptions in Physical Science by observing Science classes or interviewing Science teachers/ from VIII and IX textbook

- Viewing and discussion on documentary on various biologist
- Performing textbook analysis using specified criteria
- Analysis of secondary school science textbook
- Content analysis of selected secondary school biology unit
- Concept analysis and mapping of the selected unit in biology
- Critical review of a few curricular reforms
- Developing a unit plan for a selected biology unit
- Lesson planning using various approaches including BSCS 5E model
- Practicum on teaching skills in integrated and constructivist form to be carried out in Block Hours allotted.

References

1. Amanda Berry, et.al. (2015). Re-examining Pedagogical Content Knowledge in Science Education (Teaching and Learning in Science Series). Routledge: New York
2. Carin A and B R Sund (1964), Teaching Science through Discovery, Charles E. Merrill Books Inc.,
3. David Sang & Robert Frost (2005). Teaching Secondary Science Using ICT
4. DK Publishing (2013). Timelines of Science
5. Don P. Kauchak,& Paul D. Eggen (2013). Introduction to Teaching: Becoming a Professional (5th Edition)
6. Ernst Mayr (1985).The Growth of Biological Thought: Diversity, Evolution, and Inheritance
7. J. A. Cover, Martin Curd, & Christopher Pincock (2012).Philosophy of Science: The Central Issues (Second Edition)
8. Jeffrey Bennett (2014). On Teaching Science: Principles and Strategies That Every Educator Should Know. Big Kid Science: Boulder,CO
9. John Gribbin.(2004).The Scientists: A History of Science Told Through the Lives of Its Greatest Inventors. Random House:New York
10. Judith Bennett (2003) Teaching and Learning Science : A guide to recent research and its applications, Continuum, London.
11. Lois N. Magner (2002).A History of the Life Sciences, Revised and Expanded
12. Michael F. Fleming (2002).Biology Teacher's Survival Guide: Tips, Techniques & Materials for Success in the Classroom
13. Michael Reiss (2012). Teaching Secondary Biology (Ase Science Practice). Hodder Education: London
14. Nathan S Washton (1967). Teaching Science Creatively, Saunders Company, London.
15. National Curriculum Framework 2005, NCERT, New Delhi.
16. Novak D J and D Bob Gowin (1984) Learning how to learn, Press Syndicate of the University of Cambridge, Ohio.111
17. BSCS (2009)The Biology Teacher's Handbook, 4th Edition
18. Ralph Martin, Colleen Sexton, Kay Wagner, Jack Gerlovich (2000) Science for All Children: Methods for Constructing Understanding, Allyn and Bacon, London.
19. Robert J. Marzano.(2007). The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction (Professional Development). ASCD:Alexandria, VA
20. Rodger W. Bybee, et.al. (2007). Teaching Secondary School Science: Strategies for Developing Scientific Literacy (9th Edition)
21. Sally McKeown (2012). Brilliant Ideas for Using ICT in the Inclusive Classroom.

Routledge:New York
22. Samir Okasha (2002).Philosophy of Science: A Very Short Introduction. Oxford UnversityPress:Oxford
23. Sandra K Abell,& Mark J Volkmann. (2006). Seamless Assessment in Science: A Guide for Elementary and Middle School Teachers
24. Stephen P. Gordon. (2003). Professional Development for School Improvement: Empowering Learning Communities
25. Steve Alsop, Keith Hicks (2007). Teaching Science: A Handbook for Primary and Secondary School Teachers, Kogan Page, New Delhi.
26. Susan Loucks Horsley et.al. (2009). Designing Professional Development for Teachers of Science and Mathematics. Sage:New Delhi
27. Thomas S. Kuhn (2012). The Structure of Scientific Revolutions: 50th Anniversary Edition. University of Chicago Press:Chicago
28. WestEd, & WGBH Boston (2003).Teachers as Learners: A Multimedia Kit for Professional Development in Science and Mathematics

BSE V.7 :School Attachment Programme - 3

Credits : 2 **Marks: *100**
Duration : 2 weeks **C1 + C2:50**
C3: 50

Objectives:

The student teachers will

- Understand learners coming from diverse backgrounds
- Analyze the availability of physical and learning facilities which function as the curriculum resources at secondary level.
- Analyze the relevance of principles of curriculum organization and transaction to actual implementation process of curriculum in schools

Course Content

The student teachers will perform the activities listed below and prepare reflective diary and the reports on the tasks performed separately level wise. They will present their reports in the seminar organized after the completion of school attachment programme.

During this phase student teachers are expected to begin developing their own understanding about facilities available in school, learners and their learning context, curriculum transactions in school. Student teachers gain understanding being into actual school environment by observation, gathering information and interaction with students, teachers and school Head.

The following tasks centered on school, learner contexts and teacher context are suggested to be carried out by student teachers in this phase.

- Analyze how the curriculum proposed at the national /state levels are translated into class room practices by observing teacherôs classes of any one subject
- Identity the resources and facilities used by the teacher for teaching a lesson and interact with teacher to identify the resource mobilization.
- Study of the availability of facilities and resources catering to curriculum transaction at upper primary and secondary levels - labs, library, activity rooms, learning resources, art and craft resources and resources for physical education and yoga

- Study of the facilities and scope for inclusiveness in school environment
- Observation of classes to understand the learning processes ; Study the learners coming from diverse back grounds and their interaction in classrooms - social context of learners; Individual differences; learning facilities for Inclusive children
- Observation of learners in various contexts (participation in school activities, play ground, lunch time, participatory role in school functioning, maintenance of class room and school surroundings, responsibilities taken in various club activities etc.)

Records to be submitted for assessment

- Report on the analysis of school and the class room practices in realizing the curricular expectations evolved at national/state level.
- Report on availability and utility of resources in school.
- Report on learners diversities.

Evaluation:* All assessments are internal

- C1 ï Report 1
- C2 ï Report 2
- C3 ï PPT

SIXTH SEMESTER

Core Course 1F : Physics

BSE VI.1A :CLASSICAL & QUANTUM MECHANICS AND SPECIAL THEORY OF RELATIVITY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives: To enable students to understand the essentials of classical mechanics, quantum mechanics, quantum statistics and relativity.

COURSE CONTENT:

Unit I: Lagrangian formulations of Classical Mechanics

Constraints- sclerenomic and rheonomic constraints, holonomic and non holonomic constraints, Generalized co-ordinates and velocities, Principle of virtual work, DôAlembertôs principle, Euler- Lagrange equations, Cyclic co-ordinates, Conservation laws and symmetry properties, applications of Lagrangian formulation (simple pendulum). Canonical momenta & Hamiltonian of a system. Hamilton's equations of motion. Hamiltonian for a harmonic oscillator.

Unit II: Special Theory of Relativity

Galilean transformation, Earth as an inertial frame of reference, Constancy of speed of light, Ether hypothesis, Michelson-Morley experiment, Postulates of Special Theory of Relativity, Lorentz transformations. Simultaneity and order of events. Length contraction, Time dilation, Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum.

Unit III: Origin of Quantum Theory

Qualitative discussions on inadequacies of Classical Physicsï black body radiation and photoelectric effect, Planckôs hypothesis and explanation of black body radiation, Einsteinôs explanation of photoelectric effect with derivation, Wave-particle duality, de Broglieôs hypothesis of matter waves, concept of group velocity and phase velocity and their relationship, experimental evidence for matter wavesï Davisson and Germer experiment, electron diffraction experiment. Uncertainty Principle.

Unit IV: Development and application of Schrodinger Equation

Wave function, interpretation of wave function, postulates of quantum mechanics, probability density, Eigen functions and eigen values, expectation values, Normalization of wave functions, development of time dependent and time independent Schrodinger wave equation, operator method of deriving Schrodinger equation. Applications of Schrodinger wave equationï one dimensional infinite potential well, finite potential well, phenomenon of tunneling, one dimensional harmonic oscillator, hydrogen atom (only qualitative discussion).

Reference Books:

1. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition edition.
2. H.Goldstein, C.P. Poole, J.L. Safko, Classical Mechanics 3rd Edn., Pearson Education, 2002.
3. L. D. Landau and E. M. Lifshitz, Mechanics, Pergamon, 1976.
4. P.S. Joag, N.C. Rana, Classical Mechanics 1st Edn., McGraw Hall.
5. R. D. Gregory, Classical Mechanics, Cambridge University Press, 2015.
6. L. I. Schiff, Quantum Mechanics, 3rd Edn., Tata McGraw Hill, 2010.
7. R. Shankar, Principles of Quantum Mechanics 2nd edition, Springer, 2014.
8. David J Grifith, Introduction to Quantum Mechanics, Addison Wesley; 2 edition, 2004.
9. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2nd edition, McGraw Hill, 2010.
10. R. Eisberg and R. Resnick, Quantum Mechanics, 2nd edition, Wiley, 2002.
11. G. Aruldhas, Quantum Mechanics, 2nd edition, PHI Learning of India, 2002.
12. C. Reed, Quantum Mechanics, Jones and Bartlett Learning, 2008.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. Stefanôs constant.
2. Planckôs constant using LEDôs (3no.s).
3. Absorption spectra.
4. Photoelectric effect.
5. Variation of resistance with temperature of copper wire (10 mts).
6. Laser Diffraction.
7. Laser-wavelength using transmission grating.
8. Photo conductivity using LDR.
9. Photovoltaic cells.
10. Numerical aperture of an optical fibre by semiconductor laser.
11. BG Absolute Capacity.

12. BG-High resistance by leakage method
13. BG Mutual inductance
14. e/m of electron.
15. Verification of inverse square law for light using photodiode.
16. Diffraction of light. Determination of wavelength λ.
17. Characterization of photo diode.

Reference Books:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-HallPhysics Laboratory Experiments7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

Core Course 1 F Botany

BSE VI.1B :PLANT PHYSIOLOGY AND METABOLISM

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
- To acquaint students with the sub-cellular physiological phenomena in plants;
- To understand the water relations in plants;
- To understand the functioning of plant from the physiological point of view;
- To understand various facets of growth, differentiation and physiology of flowering in angiosperms.

COURSE CONTENT:

Unit I :
a) Importance of water to plant life, properties of water.
b) Review of diffusion, osmosis and imbibition ï definitions, concept of water potential, osmotic potential, pressure potential, solute potential, role of aquaporins.
c) Absorption of water : Root as an absorbing organ, mechanism and pathways of water movement from root hair to root xylem - symplast, apoplast and trans-membrane pathways.

d) Ascent of sap : Vertical pathway of water in plants, structural properties of xylem, root pressure theory, cohesion ï tension hypothesis.

Unit II :

a) Transpiration: Definition, types, mechanism of stomatal opening and closing (role of K+ and Abscisic acid), antitranspirants, factors and significance of transpiration, guttation.
b) Cellular Respiration: Introduction, respiratory quotient, aerobic and anaerobic respiration, structure of mitochondrion, glycolysis, synthesis of acetyl CoA, Krebs cycle, oxidative phosphorylation, electron carrier complexes, chemiosmotic hypothesis, proton pump theory, synthesis of ATP (Paul Boyerôs hypothesis), pentose phosphate pathway.

Unit III:

a)Photosynthesis: Introduction, brief history, ultrastructure of chloroplast, photosynthetic pigments, absorption and action spectra, photochemical (light) reaction, photophosphorylation, Z-scheme, Calvin cycle, C4 pathway, CAM pathway, photorespiration, factors and significance of photosynthesis.
b)Transport of Organic Substances : Ultrastructure and functions of phloem, (sieve tube), mechanism of phloem transport, source ï sink relationship, theories and factors affecting photosynthesis.
c)Mineral Nutrition: Major and micro-nutrients, absorption of mineral salts, mechanism and theories of mineral uptake; passive absorption ï mass flow, Donnan equilibrium: active absorption ï carrier concept, cytochrome pump hypothesis.
Role of N, P, K, Ca, Mg, Fe, N and Zn in plant metabolism, Mineral deficiency symptoms.

Unit IV :

a) Growth and Development : Definitions, phases of growth and development, photomorphogenesis, brief account of phytochromes ï discovery, physiological role and mechanism of action.
b) Plant growth Regulators : General account, discovery, chemical nature, physiological effects and applications of auxins, kinins, gibberellins, ethylene and abscisic acid. Brief account of plant movements.
c) Physiology of flowering : (i) Brief account of photoperiodism, short day, long day and day-neutral plants, night interruption phenomenon, florigen concept, role of phytochromes (ii) Brief account of vernalization.

References:

1. Taiz,L. and E.Zeiger, 1998, Plant Physiology (2nd Ed.), Sinauer Associates Inc. USA.
2. Salisbury, F.B. and C.W.Ross, 1992, Plant Physiology (4th Ed.) Wadsworth Publishing Co.USA.
3. Leo, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons, England.
4. Hopkins, W.J.1995, Introduction to Plant Physiology, John Wiley and Sons, Inc., New York.
5. Lehninger A.B.,1982, Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
6. John, J.L., 1994, Fundamentals of Biochemistry, Sultanchand & Co., New Delhi.
7. Srivastava, H.S., 2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Meerut.
8. Srivastava H.S. and N Shankar, 2006, Plant Physiology and Biochemistry, Rastogi Publications, Meerut.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives :

- To understand the functioning of a plant from the physiological point of view.
- To enable students to handle glasswares and equipment to set up physiology experiments.
- To study responses of plants by manipulating the variables.

COURSE CONTENT :

1. Preparation of different types of solutions ï molal, molar, percent and normal solutions.
2. To study the effect of temperature and organic solvents on permeability of plasma membrane.
3. Determination of osmotic potential by plasmolytic method.
4. Determination of water potential of potato tuber.
5. Calculation of stomatal index, frequency and area of stomatal aperture in the two surfaces of leaves.
6. Determination of the rate of transpiration in two surfaces of leaf by cobalt chloride method.
7. Demonstration of transpiration pull.
8. Separation of photosynthetic pigments by paper chromatography.
9. Comparison of rate of photosynthesis under different environmental conditions.
10. Demonstration of necessity of light, CO2 and chlorophyll for photosynthesis.
11. Plotting the absorption spectrum of chlorophylls.
12. Quantitative estimation of chlorophylls by colorimetry.
13. Demonstration of aerobic and anaerobic respiration.
14. Demonstration of phototropism and geotropism.
15. Study the distribution of growth in roots.
16. Observation of cyclosis in plant materials.
17. Testing the germinability of seeds using TTC.

Core Course 2FChemistry

BSE VI.2 : ORGANIC CHEMISTRY – II

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To develop an understanding of the chemistry of Functional groups and mechanism of Organic Reactions.

COURSE CONTENT:

Unit I: Alcohols and Phenols

Monohydric alcohols: Nomenclature, methods of formation (reduction of aldehydes, ketones, carboxylic acids and esters). Hydrogen bonding, Acidic nature. Reactions of alcohols (oxidation, esterification, dehydration).
Dihydric alcohols: Nomenclature, methods of formation (from alkenes and alkyl dihalides), chemical reactions of vicinal glycols-oxidative cleavage [$Pb(OA_c)_4$ and HIO_4] and Pinacol-pinacolone rearrangement.
Trihydric alcohols: Nomenclature and methods of formation(from alkenes and alkenals), chemical reactions of glycerol (with nitric acid, oxalic acid and HI).
Phenols: Nomenclature, structure and bonding, Preparation of phenol, resorcinol and 1 and 2- naphthols (one method each). Physical properties and acidic character of phenol. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols: Electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Houben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

Unit II: Carbonyl Compounds
Aldehydes and Ketones
Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic addition to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Use of acetals as protecting group. Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. An introduction to σ, β unsaturated aldehydes and ketones.

Carboxylic Acids and their Derivatives
Nomenclature, structure and bonding. Preparation of carboxylic acids ï by oxidation, using Grignard reagents and hydrolysis of nitriles. Physical properties, acidity of carboxylic acids, effect of substituents on acid strength. Reactions of carboxylic acids: HVZ reaction, synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions hydroxy acids ï malic, tartaric and citric acids.

Unsaturated monocarboxylic acids: Methods of formation and chemical reactions
Dicarboxylic acids: Methods of formation and effect of heat and dehydrating agents.
Carboxylic acid derivatives: Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides. Preparation of carboxylic acid derivatives, chemical reactions. Mechanism of esterification and hydrolysis (acid, base conditions).

Unit III: Organic synthesis via Carbanions

Synthesis of ethyl acetoacetate by Claisen condensation and diethyl malonate. Acidity of Ŭï hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthetic applications of

malonic ester: dicarboxylic acids ï succinic acid and adipic acid; Ů,ƃ ï unsaturated acids ï crotonic acid and cinnamic acid; barbituric acid.
Synthetic applications of acetoacetic ester: dicarboxylic acids ï succinic acid and adipic acid; Ů, ƃ ï unsaturated acids ï crotonic acid and cinnamic acid; antipyrine, uracil and acetyl acetone. keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes, Alkylation and acylation of enamines.

Unit IV: Organic Compounds of Nitrogen

Nitro Compounds: Introduction, Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.
Aliphatic and Aromatic amines: Structure and nomenclature of amines, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitrites), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Reactivity, physical properties, stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines (Hinsbergôs method). Structural features effecting basicity of amines. Amine salts as phase ï transfer catalysts. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts and azo coupling.

References :

1. Advanced organic chemistry Arun Bahl and B.S. Bhal
2. Organic Chemistry:Reagents and Reactions Agrawal, Goel Publishing House 53rd edition 2015
3. Organic Chemistry John Macmumy 9th Edition 2016.
4. Organic Chemistry J.Clayden,N.Greeves and S.Warren 2nd Edition 2012 Oxford University Press.

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objective:

- To develop basic skills of separation of organic compounds and evolve a scheme of analysis of organic compounds based on properties of functional groups for identification
- To develop skills of separation techniques

COURSE CONTENT:

1. Qualitative organic analysis

1. Separation of organic mixtures containing two solid components using water , $NaHCO_3$, NaOH

2. Analysis of an organic compound: Detection of extra elements (N,S and X) and functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, alcohols, amines, amides, nitro and anilides) in simple organic compounds. Identification of

organic compound based on functional group analysis, determination of physical constant (mp / bp).

2. Chromatographic Techniques

(i) Thin Layer Chromatography

(a) Determination of R_f values and identification of organic compounds:
(b) Identification of plant pigments by thin layer chromatography
(c) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone / 2-butanone using toluene : light petroleum (2:3 ratio)
(d) Separation of mixture of dyes

(ii) Paper Chromatography

Determination of R_f values and identification of organic compounds:
(a) Separation of mixture of amino acids
(b) Separation of mixture of D-galactose and D-fructose using n-butanol:acetic acid:water 4:5:1) ; Spray reagent: anilinehydrogenphthalate

(iii) Column Chromatography

Separation and identification of ortho and para nitro anilines

References :

1. A Text Book of Qualitative Organic Analysis, A I Vogel
2. A Text Book of Quantitative Organic Analysis, A I Vogel
3. Systematic experiments in Chemistry Arun Sethi, New Age International(P) Ltd.

Core Course 3F Mathematics

BSE VI.3A :GROUPS AND RINGS

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

By the end of the semester the students will be able to develop understanding of the abstract concepts of groups and rings, and special classes of rings and to appreciate modern mathematical concepts.

COURSE CONTENT:

Unit I:

Groups, Examples, Properties and types, Sub-groups. Cyclic groups and properties, Cosets, Lagrangeôs theorem and its Consequences, Dihedral groups, Normal subgroups, Quotient groups.

Unit II:

Homomorphism and Isomorphism of groups, Kernel of a Homomorphism, , Fundamental theorem of Homomorphism, Cauchyôs theorem for abelian groups, Permutation group, Alternating Group, Cayleyôs Theorem.

Unit III:
Rings, Integral Domains, Division Rings, Fields, Properties, Field of quotients. Ideals, Quotient rings Maximal, Prime and Principal ideals, Principal ideal ring, Divisibility in an Integral domain, Units and Associates.

Unit IV:
Homomorphism of a ring, Kernel, Isomorphism, Fundamental theorem of Homomorphism, Polynomial rings, Divisibility, Irreducible polynomials, Division Algorithm, Greatest Common Divisor, Euclidean Algorithm, Unique Factorisation Theorem, Eisenstein's Criterion of irreducibility.

References :

1. Topics in Algebra by Herstein, Vikas.
2. A First Course in Abstract Algebra by Fraleigh, Addison-Wesley.
3. Modern Algebra by Vasishtha, Krishna Prakashan Media Pvt. Ltd.
4. Higher Engineering Mathematics by Kreyszig, Wiley
5. Contemporary Abstract Algebra by Joseph A. Gallian, Narosa Publishing House.
6. Basic Abstract Algebra, 2nd Edition by P.B.Bhattacharya, S K Jain and S R Nagpaul, Cambridge University Press.
7. Modern Algebra ï An Introduction by Durban, 5th Edition, Wiley.
8. Algebra by Michael Artin, Prentice Hall of India Pvt. Ltd.
9. A Brief Survey of Modern Algebra by Birkhoff and Maclane, IBH.

Core Course 3 F : Zoology

BSE VI.3B :ANIMAL PHYSIOLOGY, ENDOCRINOLOGY AND IMMUNOLOGY

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
- To enable students to comprehend the modern concepts of physiological aspects of animals including human being
- To comprehend chemical nature and role of biological molecules
- To understand the defense mechanism of body

COURSE CONTENT:
Unit I: Digestion, Circulation and Respiration
a) **Digestion**ï Mechanical digestion, Physiology of digestion, role of enzymes and GI hormones. Absorption of carbohydrates, proteins, lipids, vitamins and minerals
b) **Circulation**: Composition of blood and physiology of blood clotting; Lymphatic system; origin, conduction and regulation of heart beat, heart beat and pulse, cardiac cycle, blood pressure, myocardial infarction .
c) **Respiration**ï Mechanism of breathing (external respiration) in man; structure and function of haemoglobin; Transport of gases - oxygen transport, oxygen equilibrium

curve, Bohr effect; Transport of carbon dioxide, chloride shift; Control and regulation of respiration

Unit II: Excretion, Nerve and Muscle Physiology

a) **Excretion**: Nitrogenous waste products ï Ammonotelism, ureotelism, uricotelism; Ornithine cycle; outline structure of human kidney and nephron, physiology of urine formation, counter-current mechanism; micturation; dialysis
b) **Homeostasis**ï Osmoï conformers and regulators in marine and freshwater animals; thermoregulation in animals ï Poikilotherms, heterotherms and homeotherms, adaptive changes in animals
c) **Nervous Co-ordination**ï Structure and types of neuron and synapses; Physiology of transmission of impulse across axons and synapses, neuroinhibiters and neurotransmitters (4)
d) **Muscle contraction**ï Ultrastructure of striated muscle, Contractile and regulatory proteins, neuro-muscular junction, mechanism of skeletal muscle contraction

Unit III: Endocrinology

a) General organization of mammalian endocrine system
b) Pituitary, thyroid, parathyroid, adrenal and gonads ï Structure and functions of their secretions, abnormalities, A brief account on hormonal control of human pregnancy
c) Hormones: properties, feed-back mechanism, classification, mode of action of hormones (steroid and peptides)
d) **Reproductive cycles**ï Estrous cycle in cow and menstrual cycle

Unit IV: Immunology

Introduction to Immunology, Types of Immunity, Lymphoid organs, Cells of immune system; Overview of antigen, structure and types of antibody, antigen-antibody reaction; Immune responses ï Humoral and cellï mediated immunities (2); Autoimmunity and hypersensitivity ; **AIDS** - Structure of HIV, mechanism of immune deficiency and preventive measures.

***References*:**

1. Animal Physiology by A. Maria Kuttikan& N. Arumugam ï (Saras Publication, Nagercoil, Tamil Nadu).
2. Regulatory mechanism in Vertebrates by Kamleshwar Pandey and J.P. Shukla - (Rastogi Publications, 2008).
3. Animal Physiology by K.A. Goyal and K.V. Sastry ï (Rastogi Publications, 2008).
4. Endocrinology and Reproductive Biology by K.V. Sastry ï (Rastogi Publications, 2008).
5. Animal Physiology by Arora M.P. (1989) ï Himalaya Publishing House.
6. Textbook of Medical Physiology by Guyton A.C. & Hall J.E. (1996) ï (W.B. Saunders & Co.).
7. General and Comparative Physiology by Hoar W.S. (1983) ï (Prentice Hall Publication).
8. A textbook of Animal Physiology by Hurtkat P.C. & Mathur P.N. (1976) ï (S. Chand & Co.).
9. Textbook of Animal Physiology by Nagabhushanam R. & Kodarkar M.S. (1978) ï (IBH).
10. General Endocrinology by Turner C.D. & Gangara J.T. (1971) ï (W.B. Saunders & Co.)
11. Immunology by Dulsi Fatima.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To develop the skills on haematology
- To enable students to analyse urine samples biochemically;
- To demonstrate physiological experiments ï respiration, heart beat and muscle contraction
- To understand the anatomical and histological aspects of endocrine organs

COURSE CONTENT*:*

1. Preparation of blood smears of Frog and man
2. Total count of RBC
3. Total count of WBC
4. Differential count of Leucocytes
5. Estimation of haemoglobin by Sahlis method
6. Human urine analysis for a) Nitrogenous substances, b) Normal inorganic constituents, c) Abnormal constituents ï (i) glucose, (ii) protein, (iii) ketone bodies.
7. To set up simple experiments to find out the rate of respiration in terrestrial/aquatic animals like cockroach, fish or rat.
8. Study of stained slides of mammals ï
   T.S. of a) Stomach b) Intestine c) Kidney d) Liver e) Pituitary, f) Adrenal gland, g) Thyroid, h) Testis, i) Ovary, j) Placenta, k) Pancreas
9. Demonstration of antigen-antibody reaction in gels
10. Effect of different Conc. NaCl on RBCs

PROFESSIONAL EDUCATION COURSES

BSE VI.4 : CRITICAL UNDERSTANDING OF ICT

Credits: 4 (3L+ 0T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

On completion of the course the students will be able to:

- Appreciate the historical, current and future trends in ICT and its implications to education
- Explain the meaning of ICT and its application in Education
- Demonstrate an understanding of the computer hardware and software fundamentals
- Use various digital hardware and software for creating resources and providing learning experiences
- Use a word processor, spread sheet, drawing and presentation software skillfully and intelligently to produce various teaching learning resources for educational use
- Use internet technologies efficiently to access remote information, communicate and

collaborate with others

- Model collaborative knowledge construction using various web 2.0 tools and technologies
- Design and develop technology integrated learning experiences using ICT tools
- Develop skills in using various e-learning and e-content tools and technologies
- Plan, develop, and use multimedia based learning content using open source authoring software
- Use ICT for designing learning experiences using innovative pedagogical approaches
- Explain the role of ICT in authentic and alternative assessment
- Understand the social, economic, security and ethical issues associated with the use of ICT
- Appreciate the scope of ICT for improving the personal productivity and professional competencies
- Appreciate the use ICT in improving educational administration
- Explain the emerging trends in information and communication technology

COURSE CONTENT:

Unit I: ICT and Education

Information and Communication Technology: meaning and nature. Learning theories and its implications for ICT integration in education. National ICT policy, curriculum and schemes
Historical account of the development of various educational media (audio, print, video, storage, display, projection)
Role of technology in emerging pedagogical practices. Visual literacy, media literacy, and new media literacy
Computer hardware fundamentals, computer network-LAN, WAN and Internet. Software ï meaning and types: proprietary software and open source software, System software and application software
Emerging Trends in ICT and its educational applications: Augmented reality, e-books and rhizomatic learning, learning analytics, ubiquitous computing and mobile learning, Game based learning, cloud computing and software as service, 3D printing, and marker space

Unit II: E-content and e-resources

Educational applications of word processing, spreadsheet, presentation, and drawing tools ï diagrams, concept maps, timelines, flow charts.
Reusable Learning Objects (RLO), e-content standards, authoring tools- open source and proprietary alternatives
Multimedia: meaning and types, multimedia tools-audio editing, video editing, screen casting, graphic editing, basics of animation, and creating interactive media. Evaluation of multimedia resources.
Open Educational Resources ï Meaning and importance, various OER initiatives, creative common licensing

Locating internet resources ï browsing, navigating, searching, selecting, evaluating, saving and bookmarking

Use of digital still and video camera, digital sound recorder, scanner, printer, interactive white board, visualizer, and multimedia projector for creating and using multimedia resources

Unit III: ICT and Pedagogy

Techno pedagogical content knowledge (TPCK). Approaches to integrating ICT in teaching and learning

Web 2.0 tools for creating, sharing, collaborating, and networking: Social networking, social book marking, blog, wiki, instant messaging, online forums/discussion groups and chats, and media streaming.

E-learning: concept, types, characteristics, e-learning tools and technologies, Learning Management Systems (LMS)

Subject specific ICT tools for creating and facilitating learning. Designing technology integrated authentic learning designs and experiences

ICI integrated Unit plan ï Web 2.0 for creating constructivist learning environment

Technology for pedagogical innovations: web quest, PBL, virtual tours, MOOC, flipped classroom

Assistive technology for special needs and inclusion: tools and processes, ICT and Universal design for Learning (UDL)

Unit IV: ICT for Assessment, Management, and professional development

ICT and Assessment**:** e-portfolio, electronic rubrics, online and offline assessment tools ï rubrics, survey tools, puzzle makers, test generators, reflective journal, and question bank. Use of web 2.0 tools for assessment,

ICT for professional development - tools and opportunities: electronic teaching portfolio, web 2.0 technologies, technology and design based research, ICT for self-directed professional development, web conferencing, role of OER and MOOCs

ICT for personal management: email, task, events, diary, networking. ICT for educational administration: scheduling, record keeping, student information, electronic grade book, connecting with parents and community, school management systems.

Managing the ICT infrastructure: software installation, troubleshooting of hardware, seeking and providing help, storage and backup, updating and upgrading software

Computer security: privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe practices, fare use and piracy

Sessional Work

1. Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices
2. Using word processor, spread sheet, drawing and presentation software to produce various teaching learning resources and sharing it online
3. Locating internet resources ï navigating, searching, selecting, saving, evaluating(use standard internet evaluation criteria), and bookmarking using social bookmarking
4. Creating digital concept maps, flow charts, timelines, and other graphics for a particular content
5. Creating screen cast video and podcast of a lesson
6. Shooting, editing, and sharing of videos segment on any educational topic
7. Creating account in YouTube/slide share and sharing the video/presentation. View and comment on others contributions
8. Creating account in wikispace/wikipedia/mediawiki and adding/editing content
9. Developing an educational blog in www.blogger.com, www.wordpress.com, or www.edublog.com
10. LMS experience- hands on various features of LMS ï the ICT course may be provided through LMS

11. Enrolling and completing some MOOC courses of interest
12. Creating resources for flipped classroom and Practicing flipped learning in school during internship
13. Evaluating OER resources. Creating and sharing OER materials- may be in NROER
14. Developing technology integrated unit/lesson plan and trying out this in the school during internship
15. Hands on experience on subject specific software tools like Geogebra, PhET
16. Developing a multimedia e-content for a topic using eXe Learning
17. Field visit to the Edusat center and take part in teleconferencing
18. Planning and creating digital rubrics for any topic and create an e-portfolio
19. Organize web conferencing using Skype or any other tools
20. Review of ICT labs (plans and equipments/resources) in school from internet
21. Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation
22. Readings on emerging ICT trends in education
23. Review of national ICT policy and curriculum
24. Using FOSS tools for timetabling, grade sheet

References:

1. Andrew A Kling(2010).Web 2.0 (Technology 360). Lucent Books : New Delhi.
2. Andrew M. St. Laurent. (2004). Understanding Open Source and Free Software Licensing. Oreilly:Cambridge
3. Athanassios Jimoyiannis (Editor) (2011). Research on e-Learning and ICT in Education. Springer: USA
4. Barbara B. Levin, Lynne Schrum.(2012). Leading Technology-Rich Schools (Technology & Education, Connections (Tec). Teachers College Press: New York
5. Bharihok Deepak. (2000). Fundamentals of Information Technology. Pentagon Press: New Delhi
6. Bruce M. Whitehead, Devon Jensen, Floyd A. Boschee.(2013). Planning for Technology: A Guide for School Administrators, Technology Coordinators, and Curriculum Leaders.Corwin:New Delhi
7. Cabmbridge, D.(2010).E-Portfolios for Lifelong Learning and Assessment. John Wiley and Sons
8. Christopher Moersch(2009). Beyond Hardware-Using Existing Technology to promote Higher-Level thinking. Viva Books: New Delhi.
9. Conrad, Keri (2001). Instructional Design for Web based Training. HRD Press
10. Costantino,P.M., DeLorenzo,M.N., Kobrinski,E.J.(2006).Developing a professional teaching portfolio: a guide for success. Pearson
11. Crumlish Christian (1999). The Internet No Experience Required. BPB Publications: New Delhi
12. Curtis J. Bonk (2011).The World Is Open: How Web Technology Is Revolutionizing Education. Jossey- Bass: San Fransisco
13. Imison,T., Taylor,P.H.(2001). Managing ICT in the Secondary Schools. Heinemann:Oxford
14. James,K.L. (2003). The Internet: A Userôs Guide. Prentice Hall of India Pvt.Ltd: New

Delhi

15. Jane Hunter (2015).Technology Integration and High Possibility Classrooms: Building from TPACK
16. Jean-Eric Pelet (2014).E-Learning 2.0 Technologies and Web Applications in Higher Education (Advances in Higher Education and Professional Development (Ahepd)).Idea Group: U.S.
17. Liz Arney (2015.)Go Blended!: A Handbook for Blending Technology in Schools
18. Loveless Avril(2001). ICT-pedagogy and the curriculum-Subject to change. Routledge Falmer: London.
19. Lynne Schrum, Barbara B. Levin. (2010).Leading 21st-Century Schools: Harnessing Technology for Engagement and Achievement. Corwin: New Delhi
20. Manojkunar Dash(2010). ICT in teacher development. Neelkamal Publications: New Delhi.
21. Mary Webband Margaret Cox (2014). Information and Communication Technology-Assessment for Learning in the ICT Classroom (Inside the Black Box).Learning Sciences :US.
22. M. D. Roblyer, Aaron H. Doering (2012). Integrating Educational Technology into Teaching (6th Edition)
23. Michael Thomas (2009). Handbook of Research on Web 2.0 and Second Language Learning. Information Science Reference: US.
24. Rena M. Palloff, Keith Pratt (2011).The Excellent Online Instructor: Strategies for Professional Development. Wiley: San Francisco
25. Ronghuai Huang and Kinshuk(2014). ICT in Education in Global Context: Emerging Trends Report 2013-2014 (Lecture Notes in Educational Technology). Springer: New York.
26. Rosemary Papa.(2010).Technology Leadership for School Improvement. Sage:New Delhi.
27. Sarkar, S.K. & Gupta, A.K.(1998). Elements of Computer Science. S.Chand& Company: New Delhi
28. Semenov, Alexy (2005). Information and Communication Technologies in Schools. A handbook for Teachers. UNESCO
29. ShalinHai-Jew. (2012). Open-Source Technologies for Maximizing the Creation, Deployment, and Use of Digital Resources and Information. Information Science Reference:USA
30. Theodore Lee(2008). Professional Development of ICT Integration for Teachers.VDM Verlag : Germany.
31. W.J. Pelgrum and N.Law(2003). ICT in Education around the world-Trends ,Problems and Prospects . UNESCO : Paris.
32. Viva Lachs (2000). Making Multimedia in the Classroom-A Teacherôs Guide. Routlegde Farmer :London.

BSE VI.5: PEDAGOGY OF PHYSICAL SCIENCE 2

Credits: 4 (2L+ 2T +0P)	**Marks: 100**
Contact hrs per week: 6	**C1 + C2: 50**
Exam Duration: 2 hrs	**C3: 50**

Objectives

- Enable the students to write the unit plans and lesson plan as per the norms of NCF 2005.
- Applying the different teaching methods based on a constructivist point of view.
- Enable the students to observe the lesson systematically.
- Selecting the learning resource and effective use of the same.
- Using of ICT in physical science teaching and learning.
- Explore various assessment strategies for evaluating learning in Physical science.
- Explore various professional development opportunities.
- Plan and conduct action research in secondary schools.
- Identify various teaching- learning resources.
- Develop skills of facilitation as they teach in simulated situations.
- Reflecting the methods in the class.

COURSE CONTENT:

Unit I: Learning Resources in Physical Science

Print resources: Textbook as a learning resource, criteria for evaluation of a textbook, handbooks, teacher resource books, laboratory manuals, science journals and magazines, encyclopedia, newspaper.

Daleôs cone of experience and its use in teaching- learning.

Developing and using resources such as charts, models, science kits, posters, science parks.

Science laboratories: designing, management, and safe practices.

Making low-cost equipment from locally available resources, using the immediate environment and the community resources for teaching of physical science.

Exploring and using digital resources: websites, videos, games, simulations, mobile apps, presentations, OER, interactive multimedia resources, e-books, podcasts, digital concept maps, and digital graphics.

ICT integration in physical science teaching: different forms of ICT and its application in science education.

Unit II: Need and Importance of Assessment for Learning Physical Science

Learning standards in science, process and product assessment in Physical Sciences, importance of metacognition and reflection in assessment, importance feedback in facilitating learning.

Meaning of the terms test, examination, measurement, assessment and evaluation in proper context, Continuous and Comprehensive Evaluation (CCE) and its features.

Assessment and evaluation as intertwined process of classroom experiences performance based assessment, planning assessment framework, Learning Indicators (Lis) and its types, developing LIs for activity, presentation, group work, assignments etc.

Recording and reporting of learning evidences ï measurement of studentsôachievement ï

marks and grading.

Unit III: Tools and Techniques Assessment for Learning Physical Science

Tools and technique of assessment-- assessment of written and oral work, project work, laboratory work, field trips, journal writing, concept map; assessment of learners with special needs.

Use of observation, questioning, concept mapping, rating scales, worksheets, reflective journals/diary, peer and self-assessment in physical science.

Use of rubrics, and portfolio assessment in Physical Science, diagnosing learning difficulties and misconception in Physical Science.

Use of ICT in assessment.

Constructing different types test items in Physical Science at different levels of taxonomy, preparation of blue print/table of specification and constructing unit test.

Unit IV: Professional development of Physical Science teachers

Professional competencies of a physical science teacher.

Need for updating content and pedagogical competencies, pre-service and in-service courses and initiatives, agencies to nurture the best teachers, NCERT activities for teachers.

Participation in science fairs, exhibitions, and science club activities

Planning contextual activities- celebration of science day, birthdays of great physicists and chemists, seminars, conferences, online sharing, distance learning, membership to organisations- NSTA, IPA, IAPT, Indian Chemical Society, INSC. NCERT publications and journals

Meaning, nature, scope, designing and implementing innovative approaches to teaching science.

Teacher as a Researcher: meaning of research and its importance, action research versus research, selecting the problem for action research, format of research plan, action research in physical sciences, steps in action research, examples of action research from the primary, secondary, and higher secondary levels.

Sessional Activities:

(Any TEN from the following)

- Design and development of unit test.
- Developing rubrics for laboratory work, assignment, field trip, project etc.
- Facilitating the development of digital portfolio by a couple of school students.
- Designing and implementing science lab experiments.
- Text book analysis for content organization/ validness of curriculum mentioned in NCF 2005.
- Analysis of process skills and planning lessons for developing process skills.
- Identifying, selecting, and evaluating various media for chosen unit.
- Case studies of successful teacher leaders.
- Presentation and discussion on sample action research studies.
- Planning and conducting an action research.
- Debates on various ethical issues.
- Visit to a special school, observation of inclusion strategies in regular classroom.
- Development of teaching portfolio.
- Analysis of teacher competency framework of various organization.

- Study of a science professional organization.
- Review of an action research article/teaching of Physical science related research article.
- Organizing a science exhibition.
- Formation of a science club and conducting various activities.
- School visit to study the CCE practice.
- Conducting field trips to science museum, science park, botanical garden.
- Writing unit plan for at least 2 units of secondary science.
- Writing lesson plan for at least 2 topics of secondary science.
- Classroom Experience 2: Classroom Observation for studying teacherôs facilitation skills and how student work is distributed (with emphasis on pedagogical aspects-strategies/materials used).
- Preparing and demonstrating low cost/improvised teaching aids based on Class VII, VIII and IX class Physical Science.
- Simulated teaching of class VII-X topics.
- Developing and analysing a Physical Science achievement test.
- Develop an assessment rubric in Physical Science.
- Visit to a Science museum / Science park /Science teacher resource centres.
- Organize a seminar related to Science day. Developing an action research plan for teaching-learning Physical Science.

References:

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2. Pedagogy of Physical Science, Text book for B.Ed, Part II, NCERT
3. National Curriculum Framework 2005, NCERT, New Delhi.
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18. Donald A. Schon, (1987) Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions. San Francisco, Jossey-Bass, 1987 ISBN: 978-15-5542-220-2

BSE VI.6A :PEDAGOGY OF MATHEMATICS 2

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
On completion of the course the students will have
* understanding of nature of teaching proof and problem solving in mathematics
* ability to analyse the purposes of teaching algebra and geometry
* ability to select suitable tools for mathematical construction and measurements
* Appreciates the usefulness of mathematics in day today activity in various fields
* adopt different strategies to meet the diversified needs of learners and appreciates the availability of various learning resources in mathematics Decision making ability to use appropriate assessment tools for mathematical assessment

COURSE CONTENT:
Unit I : Teaching of Proof and Teaching of Problem-solving
Meaning and nature of Proof; kinds of proof- direct, proof by mathematical induction, proof by contradiction, proof by contrapositive, proof by cases, proof by counter examples ; planning and teaching of various theorems in mathematics (secondary level)
Problem-solving
Definition of problem, problem solving; Meaning and nature of Problem solving, strategies of problem solving- Means-ends analysis, backtracking, backward movement, heuristics; Polya's Problem solving steps; solving various mathematical problems

Unit II: Teaching of Algebra and Geometry
Introduction of basic ideas of algebra- variable, constant, coefficient, expression, equation; nature and purpose of teaching algebra; Contextualization of practical situation into algebraic expressions or equations(mathematization); solving various algebraic relations problems of secondary level.
Nature of geometry; purpose of teaching geometry; construction of different geometrical figures; Role of geometry in comprehending mathematics as whole; developing skills in selecting, drawing, using appropriate geometrical instruments and its utility in real life situation; scale drawing; topology and its application in mathematics.

Unit III: Meeting diverse needs of learners (Gifted and Slow learners) and Learning resources in mathematics
Gifted child in mathematics- their characteristics, identification and enrichment programmes

slow learners in mathematics- their characteristics, identification and remedial measures; overcoming dyscalculia and dysgraphia problems in mathematics and their remediation.
Creation of **visual aids**-charts, models, graphs; usage of **graphical tools**- calculator, logo, cabri, geogebra, sketch pad, ready reckoners; selection and integration of tools in relation to content and learning environment; **Audio-visual aids**- animations, film shows; mathematics lab; mathematics club; e-resources and open and free software; **community resources**- library, museum, theatre, knowledgeable person or experts

Unit IV: Assessment of learning in mathematics
Selection of appropriate tools for formative and summative assessment; diagnosing the learning difficulties of learners (Error analysis- procedural errors, conceptual errors, computational errors) and providing remedial measures (Peer tutoring, direct instruction, mentoring); creation of rubric, portfolios, Criterion reference test, Norm referenced test based on set criteria; construction, administration, scoring, interpretation of a unit test and providing feedback to learners.
For all the Pedagogical transactions the following content knowledge (8^{th}, 9^{th} , 10^{th}, 11^{th}, and 12^{th} standard syllabus) to be made use of, and these can be revised as per the change in curriculum of respective state or changes in CBSE syllabus or in NCERT text books.
Arithmetic: Number system, Ratio and Proportion, Fractions, Commercial mathematics and Data handling, sets, Matrices
Algebra: Polynomials, Graphical representations of various equations, trigonometry,
Geometry: Lines and angles; Triangles and its related theorems; polygons; analytical geometry,
Differential calculus; Integration, Trigonometry; graph theory; computing using ICT.

Sessional work:
Selecting any one of the theorem and teaching it by adopting the strategies of teaching proof
Selecting any one kind of problem in mathematics and demonstrate its procedure of solving
Selecting a topic in algebra or in geometry and teaching it using appropriate learning resources
Construction of unit test (administration, scoring, statistical analysis and reporting) on a selected unit
Analysing the errors committed by learners at secondary level, in regular test (FA1or FA2) and analysing its causes and suggesting various remedial measures for it

References:

1. Butler and Wren (1965), The Teaching of Secondary Mathematics- Fourth Edition, London, McGraw Hill Book company
2. Cooney T J and others (1975), Dynamics of Teaching Secondary School Mathematics, Boston: Houghton Miffilin
3. Focus Group Report (2005), Teaching of Mathematics, New Delhi, NCERT
4. Iglewiez, Boris and Stoyle, Judith (1973), An Introduction to Mathematical Reasoning, New York, the McMillan company
5. John Stillwell(1989), Mathematics and its History- undergraduate Texts in Mathematics, New York, Springer-Verlag New York Inc
6. NCERT, A textbook of Content-Cum-Methodology of Teaching Mathematics, New Delhi, NCERT
7. NCERT(2012), Pedagogy of Mathematics- textbook for Two year B.Ed course, New Delhi
8. Polya George (1957), How to solve it, Garden city, New York, Doubleday

9. Robert B Davis (1984),Learning Mathematics-The cognitive approach to Mathematics Education, Sydney, Croom Helm Australia Pty Ltd
10. Servas W and T Varga, Teaching school Mathematics, UNESCO source book
11. T V Somashekar, G Viswanathappa and Anice James (2014), Methods of Teaching Mathematics, Hyderabad, Neelkamal Publications Pvt Ltd

BSE VI.6B :PEDAGOGY OF BIOLOGICAL SCIENCE 2

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

- Explain various methods and strategies of biology teaching
- Use various approaches to facilitate learning
- Integrate ICT in biology teaching
- Develop and use various learning resources in biology teaching
- Construct unit test in biology
- Explore various assessment strategies for evaluating learning in biology
- Explore various professional development opportunities
- Plan and conduct action research in secondary schools

COURSE CONTENT:

Unit I: Methods and Strategies for Facilitating Learning:

Teaching concepts and generalisations, inductive approaches, using advance organisers, problem solving approach, investigatory approach, project method, cooperative learning method

Facilitating learning: questioning-techniques and strategies, higher order and metacognitive questioning, scaffolding-techniques and strategies, discussions/dialogue

Strategies for creating an inclusive biology classroom

Laboratory approaches- inductive, deductive, verification and problem solving

Using field trips, projects, quiz, exhibition, science fair, science clubs/nature clubs/eco clubs, study tours, observation of environment related days in learning biology

ICT integration in biology teaching: use of wiki, blog, social networking, social book marking, webquest, virtual field trips, e-learning, flipped learning and MOOC in biology learning

Unit II: Learning Resources in Biology Teaching

Textbook as a learning resource, Handbooks, Teacher Resource books, laboratory manuals, Encyclopaedia, newspaper

Developing and using Charts, models, science kits posters, worksheets, museum, botanical garden, national parks, aquaria, and herbarium

Science laboratories: designing, management, and safe practices

Making low-cost equipment from locally available resources, using the immediate environment and the community resources for teaching of biological science

Developing and using digital resources: websites, videos, games, simulations, mobile apps, presentations, OER, interactive multimedia resources, e-books, podcasts, digital concept maps, and digital graphics

Unit III: Assessment in Science

Learning standards in Science, process and product assessment in biology, importance of metacognition and reflection in assessment, importance feedback in facilitating learning
Use of observation, questioning, concept mapping, rating scales, worksheets, reflective journals/diary, peer and self-assessment in biology
Use of rubrics, and portfolio assessment in biology
Diagnosing learning difficulties and misconception in biology
Techniques of assessing laboratory and project work
Use of ICT in assessment
Strategies for continuous and comprehensive evaluation in biology
Constructing different types test items in biology at different levels of taxonomy, preparation of blue print/table of specification and constructing unit test.

Unit IV: Professional development

Professional competencies of a biology teacher need for updating content and pedagogical competencies, teacher as a lifelong learner
Various in-service courses and agencies available for biology teachers to develop their professional competencies
Professional development activities: seminars, conferences, online and offline courses, teacher exchange, competitions, publications, development of teaching portfolio
Role of professional associations in professional development
Developing professional competencies in dealing with gender issues, equity and inclusion, ethical issues, environmental issues, human health and population
Action research, reflection and evidence based practice in science teaching
Importance of self-directed professional development
Teacher leadership: using transformative pedagogical practices

Sessional Activities

- enrolling and completing a mooc related to science
- converting one unit of secondary biology in to mooc format
- developing and trying out flipped learning in school
- design and development of unit test
- Developing rubrics for laboratory work, assignment, field trip, project etc.
- Facilitating the development of digital portfolio by a couple of school students
- Designing and implementing a science lab experiments
- Analysis of process skills and planning lessons for developing process skills
- Development of concept map for a given unit/facilitating concept mapping among school students
- Celebration of science days
- Developing graphics for a particular units
- Identifying, evaluating and selecting various media for chosen unit
- Case studies of successful teacher leaders
- Presentation and discussion on sample action research studies
- Planning and conducting an action research
- Debates on various ethical issues
- Visit to a special school, observation of inclusion strategies in regular classroom
- Development of teaching portfolio
- Analysis of teacher competency framework of various organization
- Study of a science professional organization

- Developing a self-directed professional development plan
- Review of an action research article/teaching of biological science related research article
- Organizing a science exhibition
- Formation of a science club and conducting various activities
- School visit to study the CCE practice
- Conducting field trips to science musem, science park, botanical garden
- Writing reflective journal

References

1. Amanda Berry, et.al. (2015). Re-examining Pedagogical Content Knowledge in Science Education (Teaching and Learning in Science Series). Routledge: New York
2. Carin A and B R Sund (1964), Teaching Science through Discovery, Charles E. Merrill Books Inc.,
3. David Sang & Robert Frost (2005). Teaching Secondary Science Using Ict
4. DK Publishing (2013). Timelines of Science
5. Don P. Kauchak,& Paul D. Eggen (2013). Introduction to Teaching: Becoming a Professional (5th Edition)
6. Ernst Mayr (1985).The Growth of Biological Thought: Diversity, Evolution, and Inheritance
7. J. A. Cover, Martin Curd, & Christopher Pincock (2012).Philosophy of Science: The Central Issues (Second Edition)
8. Jeffrey Bennett (2014). On Teaching Science: Principles and Strategies That Every Educator Should Know. Big Kid Science:Boulder,CO
9. John Gribbin.(2004).The Scientists: A History of Science Told Through the Lives of Its Greatest Inventors. Random House: New York
10. Judith Bennett (2003) Teaching and Learning Science : A guide to recent research and its applications, Continuum, London.
11. Lois N. Magner (2002).A History of the Life Sciences, Revised and Expanded
12. Michael F. Fleming (2002).Biology Teacher's Survival Guide: Tips, Techniques & Materials for Success in the Classroom
13. Michael Reiss (2012). Teaching Secondary Biology (Ase Science Practice). HodderEducation:London
14. Nathan S Washton (1967). Teaching Science Creatively, Saunders Company, London.
15. National Curriculum Framework 2005, NCERT, New Delhi.
16. Novak D J and D Bob Gowin (1984) Learning how to learn, Press Syndicate of the University of Cambridge, Ohio.111
17. BSCS (2009)The Biology Teacher's Handbook, 4th Edition
18. Ralph Martin, Colleen Sexton, Kay Wagner, Jack Gerlovich (2000) Science for All Children: Methods for Constructing Understanding, Allyn and Bacon, London.
19. Robert J. Marzano.(2007). The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction (Professional Development). ASCD:Alexandria, VA
20. Rodger W. Bybee, et.al. (2007). Teaching Secondary School Science: Strategies for Developing Scientific Literacy (9th Edition)
21. Sally McKeown (2012). Brilliant Ideas for Using ICT in the Inclusive Classroom. Routledge:New York
22. Samir Okasha (2002).Philosophy of Science: A Very Short Introduction. Oxford UnversityPress:Oxford

23. Sandra K Abell,& Mark J Volkmann. (2006). Seamless Assessment in Science: A Guide for Elementary and Middle School Teachers
24. Stephen P. Gordon. (2003). Professional Development for School Improvement: Empowering Learning Communities
25. Steve Alsop, Keith Hicks (2007). Teaching Science : A Handbook for Primary and Secondary School Teachers, Kogan Page, New Delhi.
26. Susan Loucks Horsley et.al. (2009). Designing Professional Development for Teachers of Science and Mathematics. Sage: New Delhi
27. Thomas S. Kuhn (2012). The Structure of Scientific Revolutions: 50th Anniversary Edition. University of Chicago Press:Chicago
28. West Ed, & WGBH Boston (2003).Teachers as Learners: A Multimedia Kit for Professional Development in Science and Mathematics

BSE VI.7 :School Attachment Programme 4

Credits : 3 **Marks: *100**
Duration : 3 **C1 +C2 :50**
2 weeks SAP + 1 week Community living **C3:50**

Objectives:

The student teachers will

- Understand the dynamics of class room processes.
- Understand the diversity in learning based on student responses to learning tasks
- Understand the role of planning, preparation and transaction in the teaching learning process.
- Understand the different strategies and approaches used in teaching based on the nature of content and the skills to be developed.
- Analyse the assessment tools and techniques employed with respect to their purpose, learner friendly, and quality.
- Develop lesson plans in the respective subject areas of specialization
- Understand the strategies adopted for developing art and creative sensibilities in learners

Course Content

The student teachers will perform the activities listed below and prepare reflective diary and the reports on the tasks performed separately. They will present their reports in the seminar organized after the completion of school attachment programme.

During this phase student teachers are expected to begin developing their own understanding about classroom dynamics, diversity in learning, role of planning, preparation, execution by adopting various strategies and approaches along relevant assessment strategies. Student teachers gain understanding being into actual classroom transaction by observation, gathering information and interaction with students, teachers and school Head.

The following tasks centered on classroom transactions are suggested to be carried out by student teachers in this phase.

- Understand the dynamics of classroom processes and multiple roles of teacher &

learners.

- Understand the Classroom management strategies employed by the teacher.
- Interact with teachers to understand how unit and lesson planning are done in their subjects
- Understand school policies and practices to address student learning difficulties- remediation, extra study hours etc. - at macro level- across subjects and at micro level within the class room.
- Develop 2 lessons (one lesson in each pedagogy) with the use of learning materials/teaching aids and one unit plan.
- Analyze test- question papers in subjects to understand what is assessed; types of questions/items used; and with reference to the objectives of the unit/lesson
- Reflect on the processes employed in CCE and the observed outcomes.

Records to be submitted for assessment

- Submission of lesson plan in each pedagogy.(one in each pedagogy).
- Observation records (3 lessons) in each pedagogy.(one in each pedagogy)
- Report on analysis of test paper/s.
- Report on class room transactions and learning processes

Community Based Activities:

Objectives

- To develop an awareness and understanding of educational status of the community.
- To create an awareness of the implementation of various progrmmes of the government related to school education through field experiences and community participation.

Activities

- The student teachers will visit the local community to study the drop out/ out of school children and the modes of alternative education received by them.
- Organize awareness programmes in the selected community on literacy, human rights, gender sensitization, environmental conservation etc through street play, role play and dramatization.
- To interact with community members like zilla parishat members, SDM and PTA members to study about their participation in school development programmes

Evaluation:* all the assessment are internal

- C1 ï Report 1
- C2 ï Report 2
- C3 ï PPT

SEVENTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

DSE 1 A : Physics

BSE VII.1A :NUCLEAR AND PARTICLE PHYSICS

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:
To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

COURSE CONTENT:

Unit I: Atomic Nucleus
Nuclear structure, Failure of proton-electron hypothesisï neutron, its discovery and properties, Proton-neutron hypothesis, Constituents of nucleus and their Intrinsic properties, Basic properties of nucleusï charge, spin, radii, mass, magnetic moment. Nuclear forces and their characteristics. Yukawaôs Theory (Qualitative), Packing fraction and binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, Nuclear stability, Segre chart.

Unit II: Nuclear Models

Nuclear Modelsï Liquid drop model approach, semi empirical mass formula and significance of various terms, condition of nuclear stability. Two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

Unit III: Radioactivity

Review: Radioactive decay ï Half life, mean life, Activity-decay constant. Radioactive displacement laws. Theory of α decay, Ũ-emission, Gamow factor. Geiger-Nuttal law. Beta decay, energy kinematics for Beta decay, positron emission Beta spectra. Neutrino hypothesis, K electron capture, internal conversion, Gamma decay, pair production, successive disintegration, units of radio activity, radioactive dating, uncontrolled and controlled chain reactions, nuclear fission and fusion. Energy liberated in nuclear fission, energy production in stars, Nuclear reactors.

Unit IV:

Particle Accelerators and Detectors: Cockroftï Walton voltage multiplier, LINAC, Cyclotron, Betatron.
Nuclear Detectors: GM counter, scintillation detector, bubble chamber, principle of semiconductor detector.
Particle Physics: Particles and anti-particles, Classification of particles, Symmetries and Conservation Laws, Qualitative introduction to quarks, Structure of hadrons.

References:

1. I. Kaplan, Nuclear Physics, Narosa, 2002.
2. Kenneth S. Krane, Introductory nuclear Physics, Wiley India Pvt. Ltd., 2008.
3. Bernard L. Cohen, Concepts of nuclear physics, Tata McGraw Hill, 1998.
4. Subramanyam and Brijlal, Atomic and Nuclear Physics, S. Chand & Company Ltd. 2013.
5. R.A. Dunlap, Introduction to the physics of nuclei & particles, Thomson Asia, 2004.
6. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition.
7. D. Griffith, Introduction to Elementary Particles, John Wiley & Sons, 2008.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. GM Counter characteristics.
2. GM Counterï Absorption coefficient.
3. Determination of Half life of Co-60.
4. Simulation experiment on radioactive decay.
5. Verification of inverse square law for beta rays.
6. Verification of inverse square law for gamma rays.
7. Rutherford modelï Simulation technique.
8. Ionization potential of Xenon.
9. Measurement of Mercury spectrum wavelength.
10. Spectrometer-Quartz prism-Refractive indices of quartz for the ordinary and extra-ordinary rays.
11. LCR Parallel resonance
12. LCR Series resonance.
13. FET characteristics.
14. Hartley oscillator.

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

DSE 1 A : Botany

BSE VII.1B :CELL BIOLOGY AND GENETICS

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To understand the structural complexity of eukoryotic cell;
- To understand the functioning of cell organelles;
- To acquaint students with the structure, significance of nucleus and chromosomes;
- To review Mendelian inheritance in the light of gene interactions.

COURSE CONTENT:

CELL BIOLOGY

Unit I :

a) Principles of microscopy ï Light, flourescent, phase contrast, UV and electron microscope.
b) Ultrastructure of prokaryotic and eukaryotic cells.
c) Cell- organelles : Ultrastructure and functions of cell wall, plasma membrane, Golgi complex, Endoplasmic reticulum, Mitochondrion.

Unit II :

a) Ultrastructure and functions of chloroplast, ribosome, lysosome and microbodies.
b) Nucleus ï Ultrastructure of eukaryotic nucleus.
c) Chromosomes ï Brief account of morphology and organization of prokaryotic and eukaryotic chromosome; Nucleosome model, concept of karyotype and idiogram (brief).

Unit III:
a) Chromosomal alterations : (i) Structural variations ï Deletion, Duplication, Translocation and Inversion. (ii) Numerical Variations ï Aneuploidy and euploidy.
b) Cell Division : Cell-cycle, events of cell division, karyokinesis, cytokinesis, cell-cycle; Mitosis, Meiosis and their significance.

Unit IV:
GENETICS
a) Mendelism ï Review of Mendelôs laws of inheritance, solving problems related to Mendelôs laws.
b) Inheritance of genes : Incomplete dominance, complementary gene action (flower colour in sweet pea), supplementary gene action (coat colour in mice), epistasis (fruit colour in summer squash), multiple factor inheritance (ear size in maize).
c) Sex determination in plants ï Melandrium.
d) Cytoplasmic inheritance ï plastid inheritance in Mirabilis, cytoplasmic male sterility in maize.
e) Genetic variations : Mutations ï spontaneous and induced, transposable genetic elements.

References:

1. Snustad D.P. and M.J.Simmons 2000, Principles of Genetics, John Wiley & Sons, Inc. USA.
2. Gupta, P.K.1999, A Textbook of Cell and Molecular Biology, Rastogi Publications, Meerut.
3. Wolfe,S.L.1993, Molecular and Cell Biology, Wadsworth Publishing Co., California, USA.
4. Harris, N. and K.J.Oparka, 1994, Plant Cell Biology : A Practical Approach, IRL Press, Oxford Univ.Press, Oxford, UK.
5. Singh, S.P. and B.S.Tomar, 2006, Cell Biology, Rastogi Publications, Meerut.
6. Gupta, P.K. 2005, Elements of Genetics, Rastogi Publications, Meerut.
7. Gardner, A.,1990, Principles of Genetics (6th Ed.), John Wiley & Sons Inc., USA.
8. Gupta P.K. 2000, Cytology, Genetics and Evolution, Rastogi Publications, Meerut.
9. Atherly, A.G. J.R.Girton and J.F.MacDonald, 1999, The Science of Genetics, Saunders College Publishing, Fortworth, USA.
10. Russel,P.J. 1998, Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.
11. Gunning, B.E.S. and M.W.Steer 1999, Plant Cell Biology, Structure and Function, Jones & Bartlett Publishers, Boston, Massachusettes.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives :
- To develop skills of staining cells and observing cell organelles.
- To prepare temporary and permanent cytological preparations of suitable plant materials to study mitosis and meiosis.
- To verify Mendelian laws of inheritance.

COURSE CONTENT :

1. Comparative study of cell structure in onion cells, Hydrilla and Chara/Spirogyra. Study of cyclosis in Tradescantia staminal cells.
2. Study of plastids to examine pigment distribution in plants (e.g. Cassia, Lycopersicon and Capsicum)
3. Examination of electron micrographs of virus, bacteria, Cyanobacteria. and eukaryotic cells with special reference to organelles;
4. Study of various stages of mitosis and meiosis by preparing slides of suitable plant materials (onion root tips and onion flower buds).
5. Working out the laws of inheritance using seeds/ beads.
6. Working out genetic problems related to Mendelian laws of inheritance and interaction of genes.

DSE 2AChemistry

BSE VII.2 :ELECTROCHEMISTRY AND PHOTOCHEMISTRY

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- Explain the nature of Electrolytic conduction involving theories of electrolytes.
- Understand the processes that occur at electrodes and in electrolytes and to apply emf methods to study different types of reactions.
- To have knowledge about the commercial cells and their applications
- To obtain information about the basic photophysical and photochemical processes

COURSE CONTENT:

Unit I: Electrochemistry – I

To study the behaviour and reactions of ions in a variety of environments through the laws that govern them. Electrical transport ï conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution.

Migration of ions Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwaldôs dilution law, its uses and limitations. Debye-Huckel-Onsagerôs equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

Applications of conductivity measurements : Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Unit II: Electrochemistry – II

Types of reversible electrodes ï gas-metal ion, metal-metal ion, metal-metal insoluble salt, Amalgam and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodesï standard electrode potential, sign conventions, electrochemical series and its significance.

To draw up a scheme for discussing the equilibrium position for an ionic reaction in terms of the electrode potential. Electrolytic and Galvanic cellsï reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cell EMF, Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), Chemical cells with and without transport.

Unit III : Electrochemistry – III

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pK_a determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods, polarization, over potential and hydrogen over voltage Power storage, Lead Battery, Ni-Cd cells, Fuel Cells, Hydrogenï Oxygen cell. Thermodynamic and Kinetic basis of corrosion, methods of inhibition of corrosion

Unit IV : Photochemistry

Discussing the Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus ï Drapper law, Stark ï Einstein law, Jablonski diagram showing various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions ï energy transfer processes (simple examples), Chemiluminescence.

References :

1. Photochemistry Gurudeep Raj Goel Publishing House
2. Principles of Physical Chemistry Puri, Sharma, Pathania 47th Edition Vishal Publishing Co.
3. Elements of Elecrochemistry by Samuel Glasstone and Lewis
4. Principles of Physical chemistry -Marron and Prutton

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To study the elecrical behaviour of weak and strong electrolytes
- Quantitative estimation of electrolytes by conductometric and potentiometric titration

COURSE CONTENT:

1. To determine the equivalent conductance of a strong electrolyte at several concentrations and verify Onsager's equation.
2. Conductometric titration of a strong acid Vs. strong base, strong base Vs. weak acid, strong base Vs mixture of acids (strong and weak) to determine the concentration of acids in a given solution and in mixture.
3. To determine the concentration of the given acid solution and concentration of acids in a mixture by potentiometric titration using sodium hydroxide solution.
4. Determination of Pka value of a weak acid by potentiometry.
5. Determination of the dissociation constant of a weak acid by conductometry
6. To determine the equivalent conductance of a weak electrolyto at different concentrations and verify Ostwald's dilution law. Also to find out the dissociation constant of a weak electrolyte.
7. To determine the solubility and solubility constant of a weak electrolyte conductometrically.
8. To find the composition of the complex formed between iron(III) and salicylic acid by Job's method.
9. To find out the amount of copper sulphate in the given solution by titrating with standard alkali by conductometry.
10. To determine the amount of FAS in the given solution by potentiometric titration with standard potassium dichromate and potassium permanganate solutions.
11. Estimation of Silver nitrate by potentiometric titration with standard potassium chloride solution.

References :

1.Systematic experimental in chemistry Arun Sethi New Age International (P) Ltd New Delhi.

DSE 3A Mathematics

BSE VII.3A :LINEAR ALGEBRA

Credits: 3 (1L + 2T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To enable the students to understand and apply the concepts of linear algebra in solving appropriate problems.

COURSE CONTENT:

Unit I:

Vector spaces, Subspaces, Linear Combinations, Linear span, Linear dependence and Linear independence of vectors, Basis and Dimension, Finite dimensional vector space ï some properties. Quotient spaces, Homomorphisms and Isomorphisms of vector spaces, Direct sums.

Unit II:
Inner product spaces, Euclidean vector spaces, Distance, Length, Properties, Cauchy-Schwarz inequality, Orthogonal and orthonormal vectors, Gram Schmidt Orthogonalisation Process, Orthogonal complement.

Unit III:
Matrices of Linear maps, Change of basis and the effect of associated matrices, Kernel and Image of a linear transformation, Rank and Nullity theorems.

Unit IV :
Singular and non-singular linear transformations, Elementary matrices and transformations, Similarity, Eigen values and Eigen vectors, Diagonalisation, Characteristic polynomial, Cayley - Hamilton Theorem, Minimal Polynomial.

References :

1. Theory and Problems of Linear Algebra, Saymour Lipschitz, Schaum Outline Series.
2. Introduction to Linear Algebra by Stewart, Van Nostrand Co. Ltd.
3. Modern Algebra, Vol.II, by Narayanan and Manicavachagam Pillay, S. Vishwanathan and Co.
4. Brief Survey of Modern Algebra, Brikhoff and Maclane, IBH
5. Linear Algebra by Serge Lang, Addison Wesley Publishing company Inc.
6. Vector Algebra, Shantinarayan and P K Mittal, S Chand and Co. Ltd.
7. Linear Algebra by Larry Smith, Spinger Verlag.
8. Elementary Linear Algebra with Applications, Keith Nicholson, PWS ï Kent Publishing Company
9. Linear Algebra, Surjith Sinth, Vikas Publishing House Pvt. Ltd.
10. Modern Algebra by Vasishta, Krishna Prakashan Media Ltd.
11. Linear algebra ï a geometric approach by Kumaresan. S

DSE 3A Zoology
BSE VII.3B :CELL BIOLOGY, GENETICS AND EVOLUTION

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

OBJECTIVES:

- To comprehend the modern concepts and applied aspects of cell biology
- To enable students to comprehend the modern concepts of genetics
- To create awareness regarding hereditary diseases
- To comprehend the origin of life and theories of evolution

COURSE CONTENT:

Unit I: CELL AND CELL ORGANELLES – I

Prokaryotic and Eukaryotic cells: Plant and animal cell differences, Diversity of cell size and shape; Cell theory; Protoplasm and its properties; Cytoskeleton ï Microtubules, microfilament and intermediate filaments

Cell membrane ï Ultrastructure, fluid mosaic model and functions; Structures and functions of Endoplasmic Reticulum, Mitochondria, Golgi complex, Ribosomes and Lyssosomes

Unit II: CELL ORGANELLES – II and GENETICS – I

a) **Nucleus** ï structure (nuclear membranes, nucleoplasm and nucleolus)
b) **Chromosomes** ï Structure of eukaryotic chromosome (nucleosome model), giant chromosome ï Polytene and lampbrush chromosomes; Mitosis and Meiosis, Cell-cycle and regulation
c) **Cancer:** Characteristics of cancer cells, types and carcinogens
d) **Inheritance**: Mendelôs Laws, Monohybrid cross, dihybrid cross, test cross
e) **Deviation of Mendelism**: Incomplete dominance and codominance
f) **Interaction of genes**: Epistasis ï (dominant and recessive) Complimentary genes; multiple geneï inheritance of skin colour in man; Multiple alleles ï inheritance of coat colour in rabbit, and ABO blood groups in man
g) **Linkage and crossing over**: Types, process and significances

Unit III: GENETICS - II

a) **Sex determination:** Genetically controlled mechanism (sex chromosome mechanism, genic balance mechanism, haplo-diploidy mechanism); sex determination in humans; Barr body, Structure of Y chromosome and sex determining genes in human; Sex determination in *Melandrium*.
b) **Sex linked inheritance:** Sex linked inheritance in *Drosophila* (eye colour) and humans; sex limited and sex influenced characters
c) **Cytoplasmic inheritance:** (i) Kappa particles in *Paramecium* (ii)
d) **Chromosomal aberrations:** Structural and numerical aberration in human (Syndromes)
e) **Inborn errors of metabolism in humans:** Phenylketonuria and Galactosemia

UNIT IV: EVOLUTION

a) **Origin of Life:** Theories on origin of life, Urey Millerôs experiment
b) **Theories of Evolution:** Lamarckism and Darwinism, Neo-Lamarckism, de Vries theory of mutation and its significance in evolution; Hardy-Weinberg's Law, Genetic drift, Modern synthetic theory of evolution; Concept of species and speciation; brief account of micro-, macro- and mega-evolution, Evolution of man
c) **Survival strategies:** coloration and mimicry

References:

1. Cell and Molocular Biology by P.K. Gupta ï (Rastogi Publications, 2008)
2. Cell Biology by C.B.Powar ï (Himalya Publishing House, Bombay)
3. Cell Biology by De Robertis*et.al*ï (W.B. Saunders, Philadelphia)
4. Genes (Vol. I ï VII) by Levin B. ï CBS Publishers
5. Cytology, Genetics & Evolution by Gupta PK (1992) ï Rastogi Publications.
6. Principles of Genetics by Sinnott, Dunn and Dobzhansky ï (McGraw Hill)
7. Cytogenetics by P.K. Gupta ï (Rastogi Publications, 2008)

8. Evolutionary Biology by B.S. Tomar& S.P. Singh ï (Rastogi Publications, 2008)
9. The origin of life by K.John ï (Reinhold Publishing Corpn)
10. The evolution of Man by G.W.Lasker ï (Holt, Rinehart & Winston)

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To acquire techniques for preparation of slides to study mitosis and meiosis and cell organelles;
- To develop skills of mounting giant chromosomes**;**
- To develop the skill of rearing *Drosophila*;
- To conduct breeding experiment for identifying inheritance and mutation in *Drosophila*;
- To understand the pattern of inheritance in human traits;
- To acquire the skill of making models of fossil forms.

COURSE CONTENT:

1. Staining of mitochondria in the buccal epithelial cells of man.
2. Preparation of mitosis in onion root tips.
3. Micrometry: Use of ocular and stage micrometers to measure cell and nuclear dimensions of human buccal epithelial cells/Study of Barr body.
4. Preparation of slides of grasshopper (*Poecilocerus pictus*) testis for the various stages of meiosis.
5. Preparation of salivary gland chromosomes of *Drosophila* larva/chironomous larva for banding patterns.
6. Study of Karyotype and idiogram of man.
7. Culture of *Drosophila* ï Collection, handling, rearing and maintenance of culture: a) Identification of sexes of *Drosophila*, b) Study of the life cycle of *Drosophila*.
8. Sorting out and study of mutant flies of *Drosophila* with reference to their various contrasting characters in comparison with normal flies-vestigial wings, ebony body, curled wing, sepia eye, white eye and bar eye.
9. Identification of blood groups (ABO) and Rh factor in man.
10. Study of fossil models of Trilobites and fishes/Archaeopteryx.
11. Study of cranial capacity and feature of skulls of prehistoric to modern man.

Project 1: Conducting breeding experiments to verify the law of segregation, law of independent assortment and law of sex linked inheritance

OR

Project 2: Analysis of inheritance of selected traits in human population; PTUï test, blood group distribution pattern, rolling of tongue, ear lobe attachment, baldness etc.

PROFESSIONAL EDUCATION COURSES

BSE VII.4 :CREATING AN INCLUSIVE SCHOOL

Credits: 4 (2L+ 2T +1P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student teacher will be able to:

- Understanding the meaning and significance of inclusive education.
- Appreciate the special needs of Individuals with diverse needs.
- Get Familiarized themselves with the concept of Inclusive Education.
- Understand the nature and needs of different categories of disabled children.
- Understand the concept of Special Education, Integration and Inclusion.
- Understand the different considerations and provisions for facilitating inclusion.
- Understand and Acquire the Skills of Adapting Curriculum to meet the need of the Students with Diverse needs

COURSE CONTENT

Unit I : Basic Concepts and Introduction to Inclusive Education

Meaning of Impairment, Disability and Handicap; Concept of Special Educational Needs and Diverse Needs, Difference between Special Education, Integration and Inclusive Education. Significance of Inclusive Education; Factors Affecting and Promoting Inclusion.

Unit II : Nature and Needs of Diverse Learners-Identification of Diverse Learners in the Classroom

Sensory Impairment: Hearing impairment and Visual impairment
Physical Disabilities: Orthopaedic impairment, Cerebral Palsy, Special Health Problems, Congenital defects; Slow Learners and Under Achievers; Intellectual Disability; Learning disabilities and ADHD; Autism Spectrum Disorders; Multiple disabilities ; Emotional and Behavioural Problems; Gifted and Creative; Socially Disadvantaged, Economically Deprived, Religious and Linguistic Minorities, Inhabitants of Geographically Difficult Areas

Unit III: Preparing Schools for Inclusion-General Considerations and Provisions
Concept of Inclusive School, Competencies and Characteristics of inclusive Teacher
Physical Consideration, Socio-Emotional Considerations, Curricular Considerations
Provision of Assistive devices, equipmentôs and technological support. Special provisions in Evaluation

Unit IV : Inclusive Practices in Classroom

Making learning more meaningful: Responding to special needs by developing strategies for differentiating content, curriculum adaptation and adjustment, lesion planning and TLM.
Pedagogical strategies to respond to needs of individual students: Cooperative learning

strategies in the classroom, peer tutoring, buddy system, reflective teaching, multisensory teaching. Use of ICT suitable for different disabilities.

Practicum

- Collection of data regarding children with special needs.
- Visit to Inclusive Schools and to observe classroom transaction of any one of such school and make a report of the same.
- Identifying one/two pupils with special needs in the primary schools and preparing a profile of these pupils.
- Preparation of teaching aids, toys, charts, flash cards for children having any one type of disability. (Visit to Resource Room)
- Preparation of Lesson Plan, instruction material for teaching students with disability in inclusive school.
- Developing list of teaching activities of CWSN in the school.

Visits to different institutions dealing with different disabilities and Observation of their Classroom.

* In addition, school and community based activities may be organized.

References:

1. Fimian, M.J., Fafard, M., and Howell, K.W.: *A Teacher's guide to Human Resources in Special Education: Para Professionals, Volunteers, and peer tutors.* Boston: Allyn and Bacon, Inc.
2. Furth, H. (1964). *Thinking without Language.* New York: Free Press.
3. Hallahan, D.P. and Kauffman, J.K. (1988). *Exceptional Children: Introduction to special Education.* N.J.: Englewood Cliffs.
4. Jangira, N.K. (1986). *Special Education Scenario in Britain and India*. Gurgaon: The Academic Press.
5. Jangira, N.K. (2013). NCERT: The Mother of Inclusive Education, Regional Institute of Education NCERT, Ajmer. (Also available on Google search Jangira special education).
6. Julba, A. (2014) Teachers creating Inclusive classrooms: Issues and challenges ï A research study
7. Kapoor, S. (2015). Index of Inclusive School Quality, Brotherhood, Delhi.
8. Kothari, R.G. and Mistry, H.S. (2011). *Problems of students and Teachers of the special schools – A study of Gujarat state.* Germany: VDM Publication.
9. Maitra, K. & Saxena, V. (ed)(2008) *Inclusion: Issues and Perspectives,* Kanishka.
10. Meadow, K.P. (1980*). Deafruss and child development.* Berkley, C.A.: University of California Press.
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12. Mithu, A. and Michael, B. (2005). *Inclusive Education: From rhetoric to Reality*, New Delhi: Viva Books Pvt. Ltd.
13. NCERT (2006) Position Paper: National Focus Group on Education of Children with Special Needs, NCERT, New Delhi.

14. NCERT (2013) Training and Resource Material on Adolescence Education, New Delhi, available on www.aeparc.org
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16. Premavathy, V. and Geetha, T. (2006): Integrated and Inclusive Education DSE(VI) Manual: New Delhi, Krishna Publication.
17. Reed, M. (1984). *Educating Hearing Impaired Children.* Milton Keynes: Open University Press.
18. Sharma, P.L. (1988). *A Teacher's Handbook on Integrated Education of the Disabled*. New Delhi: NCERT.
19. Ramaa S : Website: s-ramaa.net (for various publications)
20. Voluntary Health Association of India. *Disabled 'Village Children' – A Guide for Community Health Workers, Rehabilitation Workers, and Families*.
21. World Bank (2003) Inclusive Education: Achieving Education for all including those with Disabilities and special Education Needs

Web Resources

- IBE-UNESCO (2016). Training Tools for Curriculum Development - Reaching Out To All Learners: a resource pack for supporting Inclusive Education, Ibe.training@unesco.org, http.//www.ibe.unesco
- Video on A World for Inclusion (2007) by UNESCO, directed by David Atrakchi, 20 minutes,http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=213
- Children with Disabilities (2012), by UNESCO, 23 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=2758
- Inclusive Education: Approaches, scope and Content (2008), by UNESCO, produced by International Bureau of education, 11 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=3314
- Inclusive Education: Learners and Teachers (2008), by UNESCO, produced by International Bureau of education, 14 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=3316
- Preparing Teachers in Asia-Pacific for Inclusive Education, (2012), by UNESCO, 3 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=2030
- Preparing teachers for inclusive education: Part 3 & 4, by UNESCO, produced by Lesotho, Ministry of Education, 21 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=418
- Toward Inclusive schools - Special needs in the classroom, by UNESCO, directed by Mike Fowler, 6 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=488
- Training Video: Special Needs in the Classroom, (1992), by UNESCO, directed by Mel Ainscow, 46 minutes, http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=405
- Including Children with Special Needs Primary Stage (2014), NCERT,http://www.ncert.nic.in/pdf_files/SpecialNeeds.pdf
- Including Children with Special Needs Upper Primary Stage, (2015), NCERT, http://www.ncert.nic.in/gpPDF/pdf/tiicsnups101.pdf
- Julka, A. (2007) Meeting Special Needs in Schools: A Manual, NCERT, http://www.ncert.nic.in/html/pdf/inclusive_education/COVER.pdf
- Position Paper National Focus Group on Education of Children with Special Needs, NCERT, http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/special_ed_final1.pdf
- Learning Curves, Inclusive education (2014), Azim Premji Foundation, http://www.teachersofindia.org/en/periodicals/learning-curve-issue-xxiii

BSE VII.5 :HEALTH AND PHYSICAL EDUCATION

Credits: 2 (1L+ 0T +1P)	**Marks: 100**
Contact hrs per week: 3	**C1 + C2: 50**
Exam Duration: 2 hrs	**C3: 50**

Objectives

The student teacher will be able to:

- to build a scenario of Health Education in India.
- to develop a Knowledge Base of the Most Common and Uncommon Diseases in India; their Diagnosis & Remediation.
- Prospective Teacher Educators to learn the Techniques Related to Health Risks & Learn How to Fix these.
- Prospective Teacher Educators to study the Health Education Vision & Mission of India.
- To acquire the skills for physical fitness, correct postures, habits and activities for development
- Acquire skills to practice yogasanas and meditation and learn the skills of concentration, relaxation, dealing with stress and strain
- Understand and develop psychological abilities as life skills to deal with growing up issues like HIV and AIDS and prevention of substance issues
- Understand the process of assessment

COURSE CONTENT

Unit I: Health Education Scenario in India

Introduction to the concept of health, significance and importance in the context of ancient and modern Indian perspective
Identity of Educational Institutional Plants: Structure, Infra-Structure and Environment, Time-Space-Personnel-Material Constellation Educational Management System, Emerging Health & Total Quality of the Educational Institutions, Status of Health Education in India from Pre-Natal Education through Higher Education, Yoga & Yog, Health & Hygiene, Clean Toilets, Work & Leisure, Quality of Health ï Role of Education, Administrators, Teachers, Students, Supporters,

Unit II: Tech-related Health Risks

Identification of the technological health hazards ï Smartphone Stress, Acne caused by the Cell Phones, Blackberry Stress Injuries to the Thumb, Radiation from the cell phones, Cell Phone Sickness, Cell Phone & Car Accidents, Allergies & Phones, Crazy Phones, Computers Causing Wrist Pain, Back & Neck Pain, Decreased Sperm Count from the WIFI, Laptop Burns, Laptop Headaches, Sleeping Problems from the Laptops, Decreased attention span from using Face-book, The Internet Causing Anxiety, Headphone Use leading to Accidents, Hearing Loss from Headphones, Visual Impairment, Death from Social Networking,

Environmental Degradation, Aggression, Social Crimes--- Evolving Controlling & Regulatory Mechanisms.

Unit III: Approaches to Sound Health

Games, Sports & Athletics.
Physical fitness, strength, endurance and flexibility, its components, sports skills, indigenous and self-defence activities.
Games and sports ï athletics (general physical fitness exercises), games (lead-up games, relays and major games) rhythmic activities, gymnastics and their impact on health.
Fundamental skills of games and sports; Sports for recreation and competition; Rules and regulation of sports; sports ethics; sports awards and scholarships, sportsmenship.
Yoga ï Raja Yoga, Karma Yoga, Bhakti Yoga, Jnana Yoga.
Safety and security ï disasters in and outside schools, ways of prevention, safety from snake and dog bites, animal attacks, prevention and treatment.
Occupational health hazards and its prevention; Commonly-abused substance and drugs and ways of prevention and inhabitation. Safety measures to be taken in Libraries, Laboratories, Classrooms, Halls, Play Fields, Water Tanks, Swimming Pools, Community Pools, Roads Human Development Index (HDI), Health: Vision, Goals and Objectives of Government of India, Experiments on Influence of Surroundings & Thought, Science of Laughter & Smiles, Health Observation Programs, Impact of TV Serials.
Role of Institutions (schools, family and sports), health services, policies and major health and physical education-related programme, blood banks, role of media.

Unit IV: First Aid – Principles and Uses

Structure and function of human body and the principles of first aid. First aid equipments. Fractures-causes and symptoms and the first aid related to them, Muscular sprains cause, symptoms and remedies, First aid related to hemorrhage, respiratory discomfort, First aid related to Natural and artificial carriage of sick and wounded person, Treatment of unconsciousness, Treatment of heat stroke, General disease affecting in the local area and measures to prevent them.

Practicum

Surfing to know the diseases in India.
Preventive & Ameliorative measures for health hazards.
Playing Games.
Athletics.
Yoga.
Reflective Dialogues on Serials, such as, Satyamev Jayate on Health of the People.
Preparation of inventories on myths on exercises and different type of food.
Make an inventory of energy rich food and nutritious food (locally available) indicating its health value.
Make an inventory of artificial food and provide critical observations from health point of view.
Home remedies as health care.
Role of biopolymers (DNA) in health of child.
Medicinal plants and child health.
Strategies for positive thinking and motivation.
Preparation of first aid kit.
*** In addition, school and community based activities may be organised.**

References:

1. Arora,P. (2005) Sex Education in schools, Prabhat Prakashan
2. K.Park ñPreventive and Social Medicineò Banarsidas Bhanoth, Publishers Nagpur Road, Jablapur, India.
3. NCERT(2013). Training and Resource materials on Adolescence Education, NCERT, New Delhi (This material is also available on www.aeparc.org.www.ncert.nic.in
4. NCERT(2014). Population Education, Source Material, NCERT, New Delhi.
5. Stephen, J. Williams, Paul R. Torrents, ñIntroduction to Health Serviceò, Delmore Publications.

Physical Education

1. Deboarh, A. Wuest, Charles, A. Bucher: ñFoundation of Physical Education Exercise Science and Sportsò, Tata McGraw Hill Pvt. Ltd., New Delhi.
2. John, E. Mixton, Ann, E. Jewett: ñAn Introduction to Physical Education, W.B. Saunders Company, London.
3. John, Cheffers; Tom, Evaul: ñIntroduction to Physical Education ï Concept of Human Movementò. Prentice Hall Engle Wood: New Jersey.
4. Bette J., Logdson & Others, ñPhysical Education for Childrenò, Lea and Febiger, Philadelphia..
5. Roberts, S. Weinberg & Daniel Gould, ñFoundation of Sports and Exercise Psychologyò, Human Kinetics Publication.
6. A.K. Uppal, Lawrance Gray Kumar, ñBiomechanics in Physical Education and Exercise Science: Friends Publication, New Delhi.
7. Jack, H. Wilmore, David, L.. Costil, W. Larry Kenney, ñPhysiology of Sports and Exercise: Human Kinetics Publication.

Yoga

1. Swami Satyanand Saraswati, ñAsana Pranayama Mudra Bandhò, Bihar School of Yoga, Munger.
2. M.M. Ghore, ñAnotomy and Physiology of Yogic Practicesò. Lonavala Yoga Institute, Lonavala.
3. Gharote, M.L. (2004). Applied Yoga, Kaivalyadhama S.M.Y.M. Samiti, Lonavala.
4. ñYogasanaò Morarji Desai National Institute of Yoga, New Delhi.
5. ñPranayamaò Morarji Desai National Institute of Yoga, New Delhi.
6. MDNIY (2010). ñYoga Teachers Manual for School Teachers, New Delhi.
7. NCERT (2015). Yoga: A Healthy Way of Living Upper Primary Stage, New Delhi.
8. NCERT (2015). Yoga: A Healthy Way of Living Secondary Stage, New Delhi.
9. Agarwal, Satya P. (1998). The social role of the GąŨ how and why, Motilal Banarsidass, ISBN 978-81-208-1524-7, retrieved 17 June 2010.
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11. Wholistic Social Development, CASE Publication under UGC SAP, The M.S. University of Baroda, Vadodara.
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14. Ministry of Health & Family Welfare, Government of India, *Annual Report to the People on Health*, December 2011.
15. Porter, Noah (2003). *Falun Gong in the United States*: An Ethnographic Study, Master

Thesis, Department of Anthropology, College of Arts and Sciences, University of South Florida.
16. Wu JY, Feng, L, Park , H-T, Havlioglu N, Wen L, Tang H, Bacon KB, Jiang Z, Zhang X, Rao Y. (2001). *Molecule that guides Nerve Calls Directs Immune Cells*, Science Daily, Apr. 20.

Web Resources

Position Paper National Focus Group on Health and Physical Education, NCERT
http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/health_prelims_final.pdf
Learning curves: sports in education, (2013) Azim Premji Foundation
http://azimpremjifoundation.org/pdf/learning-curve-17.pdf
www.FalunDafa.org
www.http://greatist.com/health/*19-worst-tech-related-health-risks*

BSE VII.6 :READING AND REFLECTING ON TEXT

Credits: 2 (1L+ 1T +0P) **Marks: 100**
Contact hrs per week: 3 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student teacher will be able to:

- Understand the meaning, process, importance and characteristics of reading.
- Understand and apply different levels, types, techniques and methods of reading.
- Acquaint with the skills of reading different types of texts.
- Develop different types of reading skills through various activities and met cognition
- Learn the skills of reading comprehension and to enhance vocabulary.
- Acquaint with the problems of reading across curriculum.

COURSE CONTENT

Unit I: Introduction to Reading

Reading ï Meaning and Process, Importance of Reading across Curriculum, Characteristics of Reading, Developing reading skills.Role of libraries in promoting reading habits

Unit II: Techniques and Methodology of Reading

Levels of reading ï literal, interpretative, critical and creative, Types of reading ï intensive and extensive reading, oral & silent reading, Reading techniques ï skimming and scanning. Methodology of reading

Unit III: Reading the Text

Types of Texts ï Narrative, expository, descriptive, suggestive, empirical, conceptual, ethnography, policy documents, field notes; Importance of Different Texts in Curriculum

Unit IV : Developing Reading Skills and Reading Comprehension

Developing Critical Reading Skills, Developing Reflective Skills, Activities for Developing Reading Skills, Developing Metacognition for Reading, Developing Reading Comprehension Developing Vocabulary for Reading, Problems of Reading

Practicum

- Divide the class in small group and provide different kinds of texts and instruct them to read and reflect according to the nature of text.
- Divide the group and provide one text and suggest students to make different interpretations.
- Design vocabulary games to enhance vocabulary.
- Read the text and provide a five words summary to each paragraph.
- Reading and comprehension exercises.
- Skim through the text and give suitable title to the text.
- Complete given text in stipulated time and summarize it in 6/7 lines with a suitable title.
- Making an oral presentation
- Organising a debate, discussion based on their reading
- Preparation of a poster
- Making a collage
- Displaying appropriate texts/graphic on bulletin board
- Addressing morning assembly during their internship in schools
- Making a power point presentation on selected topic
- Submission of written articles/assignments
- Writing maintaining reflective journals

*** In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc. Action research based on teaching learning and school and community could be conducted.**

References:

1. Bright, J.A., and McGregor, G.P. (1970). *Teaching English as a Second Language.* ELBS: Longman.
2. Doff, A. (1988). *Teach English: Training Course for Teachers.* Cambridge: Cambridge University Press.
3. Hill, L.A., and Dobbyn, M.A. (1979). *Training Course, Trainer's Book.* London: Cassell.
4. Hubbard, P., and Hywel, J. et al (1983). *A Training Course for TEFL.* Oxford University Press.
5. Joseph, K.S. (2004). *Self Instruction in English Grammar and Figures of Speech.* Vadodara: Gold Rock Publications.
6. Mukalel, J.C. (1998). *Approaches to English Language Teaching.* New Delhi: Discovery Publishing house.
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8. Mukalel, J.C. (1998). *Psychology of Language Teaching.* New Delhi: Discovery Publishing House.
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Techniques. Calcutta: Orient Longman.
11. Richard, J.; Theodore, S. and Rodgers, T.S. (1968). *Approaches and Methods in Language.* Cambridge University Press.
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13. Wilkins, D.A. (1982). *Linguistics in Language Teaching.* London: Edward Arnold.
14. Willis, J. (1981). *Teaching English through English ELBS.* England: Longman Ltd.
15. Yule, G. (1985). *The Study of Language.* Cambridge: Cambridge University Press.
16. My experiments with the truth ï *Autobiography of Mahatma Gandhi*
17. The Little Prince ï *Antain de Saint* ï Exupery
18. Cultural Heritage ï Dr. S. Radhakrishnan
19. Periodicals Like ï Outlook, India Today, Economic and Political Weekly, Business Today, Journals of Education, Organiser ï weekly
20. Recognizing Different Types of Text

Web Resources

- http://www.bbc.co.uk/skillswise/factsheet/en03text-l1-f-different-types-of-text

Models of Reading Process

- http://people.ucalgary.ca/~mpeglar/models.html
- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001687/
- http://www.tarleton.edu/Faculty/gentry/reading%20models.html

Reflective Skills

- http://www.skillsyouneed.com/ips/reflecting.html
- http://www.skillsyouneed.com/ps/reflective-practice.html

BSE VII.7A Internship in School Subject 1 – Physical Science (SAP-5)
&
BSE VII.7B :Internship in School Subject 2 – Mathematics (SAP-5)
OR
BSE VII.7C : Internship in School Subject 2 – Biological Science (SAP-5)

(Evaluation in each school subject shall be as per the break up shown below and all are internal)*

Credits : 12 (6+6) **Marks: *100**
Duration : 11 Weeks **C1 + C2 : 50**
C3 : 50

The activity is divided into three phases:

- Pre ï internship - 2 weeks
- Internship - 8 weeks
- Post internship- 1 week

- **Pre internship**

Objectives:

- To facilitate student teachers in designing and executing lessons in each pedagogy.
- To develop in student teachers the skills of observation and evaluating teaching of their peers

Activities
The student teachers will
- plan and teach minimum 3 lessons in each pedagogy
- observe minimum 5 lessons of their peers in each pedagogy
- participate in the mentoring sessions to plan lessons under the guidance of mentors.

- **Internship**

Objectives:

To provide the student teachers with the field experience of getting attached to a school for a long duration and develop professional skills of teaching, participate in various day to day functions of schools, and in organizing various activities.

Activities

- The student teachers will teach 20 lessons (excluding lesson givn during pre-internship) at secondary level in each pedagogy.
- The student teachers will organize various activities- co-curricular and extended subject based in the school.
- The student teachers will participate in various academic and administrative activities including monitoring and supervising students in school conducted tests and examinations.
- The student teachers will diagnose the learning difficulties of students and provide

remedial instruction.

- The student teachers will conduct CCE and unit tests and prepare evaluation records

- **Post Internship**

Activities

- Submission of internship records - evaluation records, activity record, observation records, reflective diary

- PPT Presentation of reflections

Evaluation in each pedagogy is as follows:

C1 ï Pre-internship activities

C2 ï Internship records and post-internship presentation

C3 – Internship in teaching

EIGHTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

PHYSICS

BSE VIII.1A :SOLID STATE PHYSICS

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To enable students to apply the basic knowledge of classical and quantum mechanics for an understanding of physics of nuclei and of solids.

COURSE CONTENT:

Unit I: Crystal Structure

Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis ï Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Coordination number, packing fraction for cubic crystals (sc, bcc and fcc). Diffraction of X-rays by Crystals. Braggôs Law.

Unit II:

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Dulong and Petitôs Law, Einstein and Debye theories of specific heat of solids. T^3 law.

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia ï and Paramagnetic Domains. Curie-Weiss Law, Discussion of B-H Curve. Hysteresis and Energy Loss.

Unit III:

Electrical Properties: Free electron model of a metal, solution of one dimensional Schroedinger equation in constant potential, Density of states. Fermi energy, Energy bands in solids, Distinction between metals, semiconductors and insulators. Kronig- Penney model. P and N type Semiconductors. Conductivity of Semiconductors, mobility. Hall effect- Expression for Hall coefficients. Applications of Hall effect.

Dielectrics: Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation.

Unit IV: Superconductivity

Superconductivity: Qualitative description,. Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, Londonôs Equation and Penetration Depth. Isotope effect. High temperature superconductors Applications

Reference Books:

1. Charles Kittel, Introduction to Solid State Physics, 8th Ed., Wiley India Pvt.Ltd., 2004.
2. A J Dekker, Solid State Physics, Macmillan, 1965.
3. J.P. Srivastava, Elements of Solid State Physics, 2nd Ed., Prentice-Hall of India, 2006.
4. Leonid V. Azaroff, Introduction to Solids, Tata Mc-Graw Hill, 2004.
5. M. A. Wahab, Solid State Physics: Structure and Properties of Materials, Alpha Science International, Ltd., 2005.
6. Neil W. Ashcroft and N. David Mermin, Solid State Physics, Cengage Learning, 1976.
7. S O Pillai, Solid State Physics, NEW AGE, 2009.
8. G. I. Epifanov, Solid State Physics, Central Books Ltd., 1979.
9. M. Ali Omar, Elementary Solid State Physics, Pearson India, 1999.
10. H. Ibach and H Luth, Solid-state Physics, Springer, 2009.

PRACTICALS

Exam Duration: 3 hrs **C3: 50 Marks**

Objectives:

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. Measurement of susceptibility of a paramagnetic solution (Quinck`s Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. Determination of Hall coefficient in semiconductors.
5. Determination of Curie temperatureï ferromagnet.
6. Determination of work function of a metal using R-D equation.
7. To measure the Dielectric Constant of a dielectric Materials with frequency.
8. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR).
9. To determine the refractive index of a dielectric layer using SPR.
10. To study the PE Hysteresis loop of a Ferroelectric Crystal.
11. To draw the B- H curve of iron using a Solenoid and determine the energy loss from Hysteresis.
12. To measure the resistivity of a semiconductor (Ge) crystal with temperature by four-probe method (from room temperature to 150^{o} C) and to determine its band gap. Franck-Hertz experiment.
13. Powder XRD pattern of KCl.

14. Powder XRD pattern of NaCl.
15. Powder XRD pattern of $CaCl_2$.
16. Solar cell experiment.
17. Frequency resonance of LR circuit.
18. Polarisation by reflection-Brewster's law.

References:

1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971.
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
6. Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments 7th Edition, Cengage Learning, 2009.
7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

DSE 2B BOTANY

BSE VIII.1B :MOLECULAR BIOLOGY, BIOCHEMISTRY & BIOTECHNOLOGY

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To understand the structure and functions of biological macromolecules;
- To understand and appreciate the importance of nucleic acid and gene research in modern times;
- To acquaint students with the tools and techniques of biotechnology, the processes involving gene manipulation and their applications.

COURSE CONTENT :

Unit I :

Discovery, brief history of DNA and RNA. (i) DNA: types, molecular structure, characteristics, structural properties and functions. Satellite and repetitive DNA, mitochondrial and plastid DNA, plasmid, DNA damage and repair, replication of DNA in

prokaryotes and eukaryotes. (ii) RNA : Types, structure, characteristics, structural properties and functions, Role of RNAs in protein synthesis.
Gene structure and regulation in prokaryotes, operon concept ï lac and tryptophan operon, genetic code.

Unit II :
Nitrogen Metabolism : Forms of nitrogen, cellular conversion of nitrates to ammonium ions, assimilation of NH+4 ions, biological nitrogen fixation, amino acids ï nature, classification, structures, synthesis of amino acids - reductamination and transamination.
Proteins ï classification, structure ï primary, secondary, tertiary and quaternary, Biosynthesis of proteins ï transcription, m-RNA processing, translation. Inhibitors of protein synthesis.

Unit III :
Carbohydrates : Introduction, classification, chemical structures of mono, oligo and polysaccharides, synthesis and breakdown of sucrose and starch.
Lipids : Introduction, classification, chemical structures, saturated and unsaturated fatty acids, synthesis and breakdown of fatty acids, b- oxidation.
Enzymology : Discovery, nature, nomenclature and classification, mechanism of enzyme action, lock and key hypothesis, induce-fit hypothesis, regulation of enzyme action, inhibitors, prosthetic groups and coenzymes, factors affecting enzyme action.

Unit IV : Biotechnology and Bioinformatics
a) Tools and techniques, cloning vectors, brief account of genomics and c-DNA library, interferons, transposable elements, PCR, bio-informatics.
b) Applications of Biotechnology ï functional definition and applications, brief account of DNA finger printing, Agrobacterium ï mediated gene transfer, achievements in crop improvement, transgenic plants.
c) Brief account of recent advances in Plant bio-technology; products of bio technology
d) Brief account of Bioinformatics ï genomics, proteomics.

References:

1. Lea, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons, England.
2. Lehninger, A.B., Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
3. Srivastava, H.S.2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Meerut.
4. Jain.J.L. 1994, Fundamentals of Biochemistry, Sultanchand & Co., New Delhi.
5. Old, R.W. and S.B.Primrose, 1989, Principles of Gene Manipulation, Blackwell Scientific Publication, Oxford, UK.
6. Lodish, H., A.Berk, S.L.Zipursky, P.Matsudaiva, D. Baltimore, and J.Darnell, 2000. Molecular Cell biology, W.H. Freeman & Co., New York.
7. Alberts, B., D.Bray, J.Lewis, M.Raff, K.Roberts and I.O.Watson, 1999, Molecular Biology of Cell, Garland Publishing Co., Inc., New York.
8. Malacinski, G.M., 2005, Essentials of Microbiology (4th Ed.)., Narosa Publishing House, New Delhi.

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives :
ÅTo understand the molecular mechanisms operating in cells.
ÅTo familiarize with techniques in biochemistry and biotechnology.

COURSE CONTENT :
1. Isolation of DNA from coconut endosperm.
2. Effect of pH and temperature on activity of amylase in germinating seeds.
3. Study of catalase and peroxidase enzyme activity as influenced by pH and temperature.
4. Separation of amino acids by paper chromatography.
5. Study of root nodules in leguminous plants.
6. To test for the presence of carbohydrates , proteins and lipids.

DSE 2BChemistry

BSE VIII.2 :SPECTROSCOPY, NATURAL PRODUCTS AND HETEROCYCLICS

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

To develop an understanding of the
- basic principles of Spectroscopy and apply the principles in the structural elucidation of simple organic compounds.
- chemistry of natural products, dyes and drugs, macromolecules and heterocyclic compounds

COURSE CONTENT:

Unit I : Spectroscopy

UV and Visible spectroscopy: Introduction, absorption laws, instrumentation, formation of absorption bands, types of electronic transitions, chromophores, auxochromes, absorption and intensity shifts, solvent effects, Woodward ï Fieser rules for calculating absorption maximum in dienes and Ŭ,ß-unsaturated carbonyl compounds.

IR spectroscopy: Introduction, theory of molecular vibrations, vibrational frequency, factors influencing vibrational frequencies, finger print region and applications of IR spectroscopy.

NMR spectroscopy: Introduction, instrumentation, number of signals, position of signals (Chemical shift), shielding and deshielding effects, factors influencing chemical shifts- inductive effect, anisotropic effect and hydrogen bonding. Splitting of signals, spin-spin coupling, chemical exchange and coupling constant.
Structural determination of simple organic compounds using UV, IR and NMR spectral data.

Unit II: Natural Products
Carbohydrates: Introduction, classification and nomenclature. Configuration of monosaccharides. Erythro and threo diastereomers. Interconversions in carbohydrates ï glucose to fructose, fructose to glucose, aldopentose to aldohexose and aldohexose to aldopentose. Epimerisation, mechanism of osazone formation, Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Structural elucidation of D(+) glucose. Mechanism of Mutarotation. Constitution of disaccharides - maltose, sucrose and lactose. Introduction to polysaccharides (starch and cellulose) without involving structure determination.
Alkaloids : Introduction, general methods of structural determination, structural elucidation of Conine, Nicotine and piperine
Terepinoids : Introduction, isoprene rule, structural elucidation of Citral and Menthol
Amino acids, Peptides, Proteins and Nucleic acids
Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α-amino acids.Classification of proteins. Peptide structure determination - end group analysis, selective hydrolysis of peptides. Solid-phase peptide synthesis. Primary and secondary structures of proteins. Protein denaturation.
Nucleic acids : Introduction, constituents of nucleic acids. Ribonucleosides and Ribonucleotides. The double helical structure of DNA. Types of different RNA and their functions in the synthesis of protiens. Genetic code.

Unit III: Dyes, Drugs and Macromolecules
Dyes: Introduction, Classification of dyes, Colour and constitution (electronic concept), synthesis and uses of Methyl orange, Phenolphthalein, Fluorescein and Indigo.
Drugs: Introduction, classification, structure and synthesis of sulpha drugs- sulphapyridine, sulphathiazole, sulphadiazine and sulphaguanidine, mechanism of action. Antimalarials ï plasmaquin, mepacrine and chloroquin.

Macromolecules: Introduction, Classification, Types of polymerization ï chain polymerization, step polymerization, free radical polymerization, co-polymerisation, Ionic polymerization, Coordination polymerization. Natural and synthetic rubbers ï buna S , butyl rubber and neoprene. Synthetic fibres ï nylon 6, nylon 6,6, terylene. Conducting polymers ï polypropylenes and polyanilines. Bio-degradable polymers.

Unit IV: Heterocyclic Compounds
Introduction, methods of formation of five membered heterocycles ï furan, thiophene and pyrrole. Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and their chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Six membered heterocycles: methods of formation of pyridine, mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six-membered heterocycles, preparation and reactions of Indole, quinoline and isoquinoline with special reference to Fischer indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis.

Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

References :

1. Organic Spectroscopy by P S Kalsi
2. Organic Chemistry : I L Finar Vol II
3. Application of absorption Spectroscopy to Organic Compounds : John R Dyer
4. Organic Spectroscopy : William Kemp
5. Fundamentals of Molecular Spectroscopy : C N Banwell

PRACTICAL

Exam Duration : 3 hrs **C3 : 50**

Objective:
To develop skills of synthesis and Estimation of organic compounds

COURSE CONTENTS:

1. Two step organic synthesis

1. Synthesis of p-bromoaniline from acetanilide
2. Preparation of o-iodobenzoic acid from anthranilic acid
3. Preparation of m-nitrobenzoic acid from methyl benzoate
4. Preparation of Paracetamol
5. Synthesis of Quinoline

2. Quantitative organic analysis

1. Estimation of aniline/ phenol by bromate-bromide method
2. Estimation of glucose by Fehlings method/ Spectrophotometry using 3,5 dinitro salicylic acid
3. Determination of iodine value of an oil by Wijôs method/ Chloramine-T method
4. Determination of saponification value of an ester / oil
5. Estimation of amino acid by formal titration method
6. Estimation of ascorbic acid in Vitamin C tablets by Volumetry
7. Estimation of Paracetamol by titrimetric and spectro photo metric methods.
8. Colorimetric Estimation of proteins by Biuret method

References :

1. Organic synthesis-special techniques V.K. Ahluwalia, 2nd Edition Narosa Publishing House
2. Organic Synthesis A.I. Vogel

DSE 3B Mathematics

BSE VIII.3A:COMPLEX ANALYSIS& NUMERICAL ANALYSIS

Credits : 3 (1L + 2T + 0P) **Marks: 100**
Contact hrs per week: 5 **$C_1 + C_2$: 50**
Exam Duration : 2 hrs **C_3 : 50**

Objectives:
To develop the understanding & application of the concepts of complex analysis in problem solving situations. To enable and apply Numerical methods in solving problems related to real life situations with help of computers, which have become indispensable in modern world.

COURSE CONTENT:

Unit I:
Functions of a Complex Variable, Limits, Continuous Functions, Differentiability, The Cauchy-Riemann Equations, Analytic Functions, Harmonic Functions, Conformal Mappings. Elementary Transformations, Bilinear Transformations, Cross ratio, Fixed Points of Bilinear Transformations.

Unit II:
Complex Integration: Introduction, Definite Integral, Cauchyøs Theorem, Cauchyøs integral Formula, Higher Derivatives. Power Series**:** Introduction, Sequences and Series, Sequences and Series of Functions, Power Series, Elementary Functions.

Unit III:
Numerical Methods: Numerical Solutions of Algebraic and Transcendental equations, Bisection Method, Method of false position, Iteration method, Newton-Raphson method.
Finite differences, Forward and Backward differences, Weierstrass theorem, Interpolation, Newton-Gregory forward and backward interpolation formulae, Divided differences, Lagrangeøs interpolation formula.

Unit IV:
Numerical Differentiation: Finding first and second derivatives using interpolation formulae, Difference equations.
Integration: General quadrature formula, Trapezoidal Rule, Simpsonøs 1/3 rule, Simpsonøs 3/8 rule, Weddleøs rule, Newton-Cotes quadrature formula, Gauss quadrature.

References:

1. Complex Analysis by Ahlfors McGraw Hill International Edition.
2. Introduction to the Theory of Functions of a Complex Variable by Palka, Springer Verlag.
3. Complex Analysis by Serge Lang, Springer Verlag
4. Theory of Functions of a Complex Variable by Shanthinarayan, S. Chand and Co. Ltd.
5. Foundations of Complex Analysis by Ponnuswamy, Narosa Publishing House.
6. An Introduction to the Theory of Functions of a Complex Variable by Copson, Oxford

University Press.
7. Complex Variables and Applications by Churchill, Brown and Verhey, McGraw Hill International Book Company.
8. Functions of One Complex Variable by Conway, Narosa Publishing House.
9. Theory and Problems of Complex Variables, Murray R. Spiegel, Schaum Outline Series, McGraw Hill Book Company.
10. Complex Analysis by Armugam, Tangapandi, Somasundaram, Scitech Publications Pvt. Ltd.
11. Numerical Analysis by Guptha, S. Chand and Co. Ltd.
12. Finite Difference and Numerical Analysis by Saxena, S.Chand and Co. Ltd.
13. Introductory Methods of Numerical Analysis by Shstry, PHI.
14. Numerical Methods for Scientists and Engineers, Grewal, Wiley Eastern Ltd.
15. Higher Engineering Mathematics by Grewal, Wiley Eastern Ltd.
16. Advanced Engineering Mathematics by Kreyszig, Wiley Eastern Ltd.
17. Numerical Calculus by William Edmund Milne, Princeton University Press.
18. Introduction to Numerical Analysis by Hildebrand, Tata McGraw Hill Publishing Ltd.
19. Numerical Analysis by Schield, Schaumôs Outline Series.
20. Introduction to Numerical Methods by Peter A. Stark, MacMillan Co. Ltd.

DSE 3B Zoology

BSE VIII.3B :BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Credits: 3 (1L + 1T +1P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

- To enable students to comprehend the modern concepts and applied aspects of biomolecules
- To understand the importance of nucleic acids
- To appreciate the application of biological tools and techniques

COURSE CONTENT:

Unit I: Biochemistry - I

a) **Carbohydrates** ï Classification, chemical structures of mono, oligo and polysaccharides and properties; carbohydrate metabolism ï Glycolysis, TCA cycle, electron transport system, gluconeogenesis

b) **Proteins** ï Classification and structural properties; Amino acids ï Amino acid metabolism, transamination, decarboxylation

c) **Lipids** ï Classification and properties; Lipid metabolism ï oxidative pathway of saturated and unsaturated fatty acids

Unit II: Biochemistry – II

a) **Enzymology** ï Nature of enzymes, nomenclature and classification, mechanism of enzyme action ï lock and key hypothesis, induce fit hypothesis; regulation of enzyme action and factors affecting enzyme action, Coenzymes and inhibitors

b) **Vitamins and minerals** ï Role of vitamin and minerals in normal health

c) **Nucleic acids:** Discovery, DNA- structure, forms, denaturation and anneling, bacterial, plasmid, plastid and mitochondrial DNA

Unit III: Molecular Biology – I

a) RNA- structure, types (rRNA, mRNA, tRNA), and functions .

b) Replication of DNA in prokaryotes.

c) **Gene expression:** Central dogma; Transcription in prokaryotes; Genetic code; Translation in prokaryotes.

Unit IV: Molecular Biology – II and Biotechnology

a) Regulation of gene expression in prokaryotes ï lac operons

b) Genetic engineering: History, restriction endonucleases, ligases, vectors (pBR322, T-DNA), cDNA library, cloning, PCR, bioinformatics

c) Biotechnology: Transgenic animals (giant mouse, transgenic sheep), monoclonal antibodies, gene therapy. Human genome project.

References:

1. Principles of Biochemistry by Lehninger AB (CBS Publishers and Distributors, New Delhi
2. Animal Physiology and Biochemistry by K.V. Sastry ï (Rastogi Publications, 2008)
3. Cell and Molecular Biology: Concepts and Experiments by Gerald Karp
4. Molecular Biology of the Cell by Bruce Alberts
5. Molecular Cell Biology by Harvey Lodish, David Baltimore and Arnold Berk
6. Biotechnology: Applying the Genetic Revolution by David P. Clark BA, 2008
7. Biotechnology by V. Kumaresan (Saras Publication)

PRACTICALS

Exam Duration : 3 hrs **C3 : 50**

Objectives:

- To develop the skills of analyzing the enzyme actions
- To identify and estimate the qualitative and quantitative analysis of carbohydrate, protein and fats
- To analyze and separate amino acids
- To develop the skill of isolating DNA

COURSE CONTENT:

1. Effect of temperature on the salivary amylase enzyme activity
2. Effect of pH on the salivary amylase enzyme activity
3. Effect of substrate concentration on the salivary amylase enzyme activity
4. Detection of various enzymes in the digestive tract of cockroach
5. Separation and analysis of amino acids in body fluids and food using paper chromatography
6. Qualitative and quantitative estimation of carbohydrates, proteins and lipids in food/animal tissues
7. Demonstration of separation of proteins/enzymes with electrophoresis
8. Isolation of DNA from kidney/spleen of rat (demonstration)

GENERIC ELECTIVE 2

BSE VIII.4 : INDIAN CONSTITUTION AND HUMAN RIGHTS

Credits 2 (2L+0T+0P) **Max. Marks: 100**
Contact Hours per week: 2 **C1+ C2: 50**
Exam duration: 2 Hrs **C3: 50**

Objectives:
On completion of this course, the student teacher will be able to
- know the importance, preamble and salient features of Indian Constitution
- appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.
- develop an understanding of the strength of the Union Government.
- understand the functioning of the State Government for the unity and the strength of the Democracy.
- know the importance of local self-Government and Panchayati Raj Institutions in India.
- know the meaning, significance, the growing advocacy of Human Rights.

Transaction Mode:
Through Lectures, Group discussions, Interactive sessions, field activities and use of Education Technology.

COURSE CONTENT:

Unit I: Meaning and Importance of the Constitution
Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

Unit II: Fundamental Rights, Duties and Directive Principles
Fundamental Rights, Fundamental Duties, and the Directive Principles of the state policy of the Indian Constitution.

Unit III: Union, State and Local Self Governments
Union Government: Parliament, the President and Prime Minister: State Government: Governor and the Council of Minister: Judiciary: Functions and Powers: Panchayat Raj System.

Unit IV: Human Rights
Origin and Development of Human Rights, Growing Advocacy and Declining Trends of Human Rights, Rights of Scheduled Casts, Scheduled Tribes, Minorities, Children and Women, Human Rights Defenders, Human Rights Violation and Human Rights Organizations.

References:
1.M.V.Pylee, **Indian Constitution**, OUP, New Delhi
2.Granveille Austin, **Indian Constitution**, OUP, New Delhi
3.Rajani Kotari, **Politics in India**, OUP, New Delhi
4.Johari, J C, **Indian Government and Politics**.

5.S R Maheswari, **Local Governments in India (Latest Edition)**
6.R K Arora and Rajani Goyal, **Indian Public Aministration 1995.**
7.C P Bhambri, **Introduction to Indian Constitution**.
8.Subash C Kashyap, **The Working of Indian Constitution,** NBT, New Delhi
9.Subash C Kashyap,**Our Parliament**, NBT, New Delhi
10.Granveille Austin, **Functioning of the Indian Constitution**, NBT, New Delhi.
11.Bipan Chandra**, India after Independence**. Roopa, New Delhi 2000.
12.Arjun Dev, **Source Book on Human Rights**, NCERT, New Delhi.
13.**Human Rights in India: Theory and Practice**, National Book Trust, 2001.

PROFESSIONAL EDUCATION COURSES

BSE VIII.5 : KNOWLEDGE AND CURRICULUM

Credits: 4 (2L+ 2T +0P) **Marks: 100**
Contact hrs per week: 6 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives:

This course is designed to help student teachers to

- Understand the concept and the need for curriculum in schools.
- Explore the influences of the knowledge categories, social, cultural, economic and the technological aspects in shaping the present school curriculum and the text books.
- Analyze the principles employed in sequencing the school curriculum and the syllabus at different levels.
- Identify various learning sites and resources operating as curriculum supports in the system.
- Analyze the multiple roles of schools in implementation of curriculum.
- Discuss the roles and responsibilities of curriculum stakeholders.
- Analyse the role of teachers in operational sing the curriculum.
- Examine the processes and criteria commonly used to evaluate curriculum in pursuit of improvement.
- Explore the evaluation approaches adopted to revise the curriculum at the national and state levels.
- Analyze the national curriculum frameworks for necessary reforms proposed and their implications at school level.
- Develop an image of oneself as a curriculum informant, designer, agent, and evaluator.

COURSE CONTENT:

Unit I: Concept and the nature of curriculum

a) Meanings of curriculum; different perspectives of curriculum; need for curriculum in schools.
b) Educational policy reforms leading to curriculum reforms; Relationship between curriculum framework, curriculum , syllabus and text books- their significance in school

education.

c) Meaning and concerns of core curriculum-its need and significance in Indian context; Meaning and concerns of Hidden curriculum and spiral curriculum and their relevance to learning.
d) Types of curriculum: subject-centered, activity-centered, environmental centered, and community-centered and their relevance.

Unit II: Foundations of Curriculum Development

a) **Forms of knowledge & Curriculum:** Forms of knowledge and structure of a Discipline, and their characterization in different school subjects; Logical grammar of different school subjects
b) **Nature of learner& learning:** Nature of learner - needs and interests, and different perspectives on learning (behaviourists, cognitivists and social constructivists) and their implications to curriculum development
c) **Socio –cultural**: Importance of society-school relationships ; Societal factors that affect the curriculum ; Multiculturalism, multilingual aspects, and societal aspirations; Social reconstruction, social efficiency, inequality in educational standards, need for common goals and standards;
d) **Technological determinants** : Science and technological advancements, Using the resources of the information society in curriculum development
e) **Some of the critical issues**: environmental concerns, gender concerns .inclusiveness, value concerns, social sensitivity, and globalization.

Unit III: Process of curriculum Development

a) Understanding shifts in emphasis in approach to curriculum; from subject centered and behaviouristic learning to integrated approach involving development of perspectives, activity centered and constructivist orientation;
b) **Behaviouristic orientation**: Formulating aims and objectives ï (general, specific - subject wise and level wise); Selecting content and learning experiences ï Principles involved; Organizing the content and learning experiences- Principles (continuity, sequence and integration: organizing elements- concepts, skills, and values); breadth of coverage and depth of understanding; applicability and relevance to school curriculum planning
c) **Constructivists orientation**: curriculum embedded in real life contexts; authentic learning in real life contexts leading to knowledge construction; applicability and relevance to school curriculum planning

Unit IV Curriculum Implementation and Curriculum evaluation

a) Operationalising curriculum into learning situations; Planning and converting curriculum into syllabus and curriculum engagement activities.
b) Role of teachers in operationalising curriculum in generating dynamic curricular experiences through i) flexible interpretation of curricular aims ii) concept mapping iii) contextualization of learning v) selecting varied experiences and long range and daily planning, choice of resources, planning assessment etc.
c) Planning and use of curricular materials: Text book; teachers hand book, source book, work book, manuals, and other learning materials such as kits, AV and software materials..
d) School culture and climate in implementing the curriculum.
e) Supports to curriculum engagement: available infrastructure and curriculum sites and

resources (library, laboratory, playground, neighbourhood etc); Use of community resources in curriculum engagement .

f) Role of external agencies ï National, Regional and State in developing the learning supports (including training of teachers) for curriculum implementation.
g) Meaning of curriculum evaluation; Need for curriculum evaluation
h) Process of curriculum evaluation and renewal: collecting opinions and views on school curriculum and text books from different stakeholders; studentsô attainability of curricular standards as one of the criterion; evaluation of the discrepancies observed between anticipated and observed inputs, transactions and outputs; critical analysis of text books ;evaluation of other curricular materials;
i) Role of National, Regional and State bodies in empowering the teachers in evaluating curriculum

Sessional Work:

- Review of national curriculum frame works and write a report for presentation and discussion
- Analysis of teachersô handbooks, text books, workbooks, source books followed by Presentations.
- Readings of certain curriculum reviews and articles bearing significance to the course outlined and reflections on them

References:

1. Olivia, P (2004): Developing the curriculum (6th Ed). Allyn & Bacon, Inc. ISBN: 0205412599.
2. Curriculum planning for better teaching and learning by J.G. Saylor and W Alexander (Holt, Rinehart and Winston).
3. Yashpal Committee (1993): Learning without Burden, MHRD, and India.
4. Position paper: National Focus Group on óCurriculum, Syllabus, Textbooksô, NCERT.
5. Lewy, Arieh (1977): Handbook of Curriculum Evaluation, International Institute for educational Planning, France and Longman Inc.
6. Giroux, Henry et.al (1981): Curriculum and Instruction: Alternatives in Education by MC Cutchan Public Corp, Printed in USA.
7. Dewey, John (1959): The Child and the Curriculum, Chicago, the University of Chicago Press.
8. Hilda T (1962): Curriculum and Development- Theory and Practice; Harcourt, Brace and World, Inc.
9. Howson, Geoffrey (1978): Developing a New Curriculum, London: Heinmann
10. NCERT (1988) National Curriculum for Elementary and Secondary Education: A framework.
11. NCERT (2000) National Curriculum Framework For school Education.
12. NCERT (2005) National Curriculum Framework. NCERT publications
13. Schubert W (1986): Curriculum Perspectives, Paradigms and Possibilities, New York: Macmillan.
14. Zias, R (1976): Curriculum Principles and Foundations; New York; Thomas Crowwell.
15. Hirst, Paul (1975) : Knowledge and curriculum, (International Library of the Education volume 12): A collection of Philosophical papers, International library of Philosophy of Education, Routledge publishers
16. Kumar, Krishna and Malla Reddy : Curriculum Development and Educational Technology.

BSE VIII.6 :GUIDANCE AND COUNSELLING

Credits: 4 (3L+ 1T +0P) **Marks: 100**
Contact hrs per week: 5 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student teacher will be able to:

- appreciate the nature, purpose and need for guidance and counselling;
- sensitise the student-teachers with the need and relevance of Guidance and counselling.
- demonstrate an understanding of educational, vocational and personal guidance
- develop an understanding of the process of Guidance and Counselling
- understand the process of organization of guidance services in schools
- develop capacity of applying the techniques and procedures of guidance and counselling
- describe various testing and non- testing techniques
- develop the skill of administration and interpretation of psychological tests
- understand the concept and importance of career development.
- analyse the role of the teacher in the provision of Guidance and Counselling
- know the qualities required for good Counsellor

COURSE CONTENT

Unit I: Meaning and Nature of Guidance

Guidance: Concept, aims, objectives, functions and principles.
Need & Procedure for (Educational, Psychological and Social) guidance.
Purposes and Principles of organization of different Guidance Services
Organization of guidance services at Secondary Level: Need and Importance
Group Guidance: Concept, Need, Significance and Principles, Organization of Guidance programs in schools.
Role of Guidance Personnel in organization of guidance services in School : Counsellor, Career Master, Psychologist, Doctor, Teacher Counsellor, Head of the Institution, Teacher, Social Worker

Unit II: Meaning and Nature of Counselling

Counselling: Meaning and nature; Difference between Guidance &Counselling; Principles and approaches of counselling, Individual and Group Counselling; Skills in Counselling-Skills for Listening, Questioning, Responding, & Communicating, Listening Attentively to the concerns of the counselee, Negotiating Self Discovery, Decision Making, Problem Solving etc and values such as Patience, Empathy etc.; Methods and Process of Counselling
Academic, Personal, Career and Behaviour problems of students with special needs, viz. socio-emotional problems of children with disabilities and deprived groups such as SC, ST and girls, need for Counselling; Professional Ethics and Code of Conduct ; Qualities and Qualifications of an effective Counsellor

Unit III: Tools and Techniques of Guidance

Testing and Non-Testing Techniques for Studying and Appraisal of students : a) Testing Techniques: Intelligence/Mental Ability tests, Aptitude Tests, Attitude Scales, Interest inventories, and Personality Tests, b) Non-testing Techniques: Interview, Observation and Case Study, c) Tools-Questionnaire, Anecdotal Record, Cumulative Record Cards, etc.

Role of the teacher in Assessment and Testing.

Unit IV: Career Guidance and Counselling

Educational and Career Information in Guidance and Counselling: Meaning, Importance, collection, types, classification of occupational information; Dissemination of Occupational Information: Class talk, career talk, Group discussion, Preparation of Charts and Poster, Career Exhibition, Career conference; Guidance for gifted, slow learner, socio-economically disadvantaged children; Career development: Meaning and Importance; Teacherôs role in Career planning, Vocational training and placement opportunities for CWSN. Broad outline with respect to the emerging courses and career options available in India; Guidelines for Establishment of Guidance Cell or Career Corners in Schools

Suggestive List of Activities:

- Group Guidance-Preparation of Class Talk and One Career Talk
- Visit to different Guidance Centre
- Design a checklist/Questionnaire to collect information on students and classify them under educational, psychological or social problem.
- Preparation of Cumulative Record
- To prepare a Case study and Analysis of Case study
- Administration, Scoring & interpretation of at least two tests: One Mental Ability Test and One Aptitude Test
- Job Analysis of a Counsellor
- Preparation of list of problem behaviours based on observation. Detailed study of the Guidance and Counselling Services available in a given School
- Prepare a Chart and Poster for dissemination of Career Information
- Familiarise and write a report of any one of the Personality Tests used in Guidance and Counselling

References:

1. Aggarwal, J. C. (2004). Educational Vocational Guidance and Counselling, Delhi: Doaba House.
2. Asch, M. (2000). Principles of Guidance and Counselling, New Delhi: Sarup and Sons.
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18. NCERT (2008). Guidance for Human Development and Adjustment (Module3) New Delhi: NCERT.
19. NCERT (2008). Introduction to Guidance (Module 1). New Delhi: NCERT.
20. NCERT (2005). National Curriculum Framework-2005,NCERT,New Delhi

Web resources

- Introduction to Guidance and Counseling African Virtual university http://oer.avu.org/bitstream/handle/123456789/153/GUIDANCE%20AND%20COUNSELING.pdf?sequence=1
- Ethical Principles of Psychologists and Code of Conduct by APA, http://www.apa.org/ethics/code/principles.pdf
- Guidance and Counselling, http://www.ncert.nic.in/departments/nie/dse/activities/advisory_board/pdf/guidelines_for_guidance_and_counseling.pdf
- http://www.egyankosh.ac.in/

BSE VIII.7 :VALUE AND PEACE EDUCATION

Credits: 2 (1L+ 1T +0P) **Marks: 100**
Contact hrs per week: 3 **C1 + C2: 50**
Exam Duration: 2 hrs **C3: 50**

Objectives

The student teacher will be able to:

- Understand the need and importance of education for peace and values.
- Understand the nature, characteristics and types of human values.
- Understand the five core values of Truth, Righteous conduct, Peace, Love and Non-Violence.
- Appreciate the developments in Peace Education in India and Abroad.
- Understand various methods, techniques and approaches of value development.
- Appreciate the preamble to the constitution and values inherent in it.
- Understand various models of value education.
- Appreciate the importance of living together and imbibe in their attitude and behaviour.

COURSE CONTENT

Unit I: Concept, Meaning and Nature of Value

Concept and meaning of value and Peace:
Indian and Western perspectives on value and Peace.
Reflections of great Indian thinkers on values and Peace (Gandhiji, Swami Vivekananda, Sri Aurobindo, Rabindranatha Tagore, J. Krishmamurthi)
Understanding Peace in the individual, Social, National and International context
Nature and characteristics of values
Sources and selection of values -culture and human needs

Unit II : Concept, Meaning and Nature of Peace

Historical development of Peace education in India and in the world
Preamble to the Indian Constitution and values inherent in it
Exposition of the five human values of Truth, Righteous Conduct, Peace, Love and Non-Violence with illustrations from life and literature.
Creation of United Nations, UNESCO, UNICEF and their role in promoting value and Peace Education.

Unit III : Concept and need for Value-based Education and Education for Peace

Concept of value based education and Education for Peace with special reference to peace to Indian view of life;
Paradigm shift from Peace education to Education for Peace.
Need for and importance of value based education and Education for Peace in the present scenario.
Recommendations of Sri Prakasha Committee (1959) on value education.
Recommendations of Parliamentary Committee of HRD on Values Education (1996-90) headed by Shri S.B. Chauhan.

National Focus Group Report on Education for Peace (2005).

Curriculum development and Models of Value Education.

Models of value education; Rationale building model, the consideration model, valuing process and clarification model.
Aims and objectives of Value based education and Education for Peace in the curriculum.
Integration of human values with all (school) academic subjects.

Unit IV :Pedagogy of Value Education and Education for Peace

- Approaches and Techniques of teaching human values:-
  Direct approach: value based Story-telling, Group activities (dramatization, literary activities, games and sports, service activities), Counselling, organizing value based co-curricular activities.

  Indirect Approach; Incidental Approach with illustrations

  Integrated approach: Integration into curricular, co-curricular activities and subjects (with illustrations of integration from Language, Mathematics, science and social science , art and aesthetics , Yoga and health education,
- Teacher as Role Model.
- Role of school ambience and environment in development of values.

Practicum

- Develop / compile stories with values from different sources and cultures, organize value based co-curricular activities in the classroom and outside the classroom, develop value based lesson plans, integrating values in school subjects.
- Study of any Model of integrated value education ï case study of models expressed by Sri Sathya Sai, J. Krishnamurti, etc.
- Visit to Ramakrishna Institute of Moral and spiritual Education

In addition, school and community based activities may be organised.

Evaluation Strategies

1. Reflective reading based presentations.
2. Unit tests.
3. Quiz based evaluation
4. Seminar presentation
5. Submission of case reports on violation of peace as reported through mass-media.

References:

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18. The Curriculum framework for Quality Teacher Education (1998) NCTE, New Delhi

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Web resources

Education for values in schools- a framework, NCERT
http://www.ncert.nic.in/pdf_files/Framework_educationCOMPLETEBOOK.pdf

Values Education A Handbook for Teachers (2012), CBSE
http://cbseacademic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf

Position Paper National Focus Group on Education for Peace, NCERT
http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/education_for_peace.pdf

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