

Semester – I

Course No: AR 17106 (DCE)

Title of the course: Translation Skills

Marks: 100

مهارات الترجمة

Credits: 4

Unit - I

الترجمة من الانجليزية إلى العربية

الوحدة الأولى

ترجمة المصطلحات المفردة والمركبة حول العناوين الآتية:

- | | | | |
|-----|---------------------|-----|-------------------------|
| (١) | شؤون تربوية وثقافية | (٢) | شؤون اجتماعية واقتصادية |
| (٣) | شؤون سياسية وإدارية | (٤) | شؤون صحية وبيئية |

Unit - II

الترجمة من العربية إلى الانجليزية

الوحدة الثانية

الجملة الاسمية:

- | | | | |
|-----|-------------|-----|---------------------|
| (١) | المثبتة | (٢) | المنفية |
| (٣) | الاستفهامية | (٤) | الاستفهامية المنفية |

Unit-III

الوحدة الثالثة

الجملة الفعلية:

- | | | | |
|-----|--------------|-----|---------------|
| (١) | الفعل الماضي | (٢) | الفعل المضارع |
| (٣) | فعل الأمر | (٤) | فعل النهي |

Unit -IV

الترجمة من الانجليزية إلى العربية

الوحدة الرابعة

ترجمة عناوين الأخبار البسيطة من الجرائد الانجليزية اليومية.

Books Recommended:

الكتب للمطالعة العامة:

- | | | |
|----|-------------------------------------|------------------------|
| ١. | التعبير و المحادثة في اللغة العربية | د. محمد اجتباء الندوي |
| ٢. | الترجمة مناهجها و أصولها | د. معين الدين الأعظمي |
| ٣. | نحو الإنشاء و الترجمة | د. منظور أحمد خان |
| ٤. | اللغة العربية الوظيفية | د. شفيق أحمد خان وغيره |
| ٥. | فن الترجمة الصحيحة: | د. ممدوح محمد جبل |
| ٦. | عربي میں ترجمہ کیجیے | ندیم الواجهدی |
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|-----|-----------------------|-------------------|
| 7. | Arabic for Scholars | M. A. Saleem Khan |
| 8. | Arabic Made Easy | Abu Hashim |
| 9. | Spoken Arabic | Shafi Sheikh |
| 10. | Arabic for Beginners | M. A. Saleem Khan |
| 11. | Essential Arabic | I. A. Faynan |
| 12. | Teach Yourself Arabic | S. A. Rahman |

Semester -III

Course No: AR 17311 (OE)

Title of the course: Basic Arabic Translation - I

الترجمة الأساسية - ١

Marks: 50

Credits: 2

Unit - I

الوحدة الأولى

Translating possessive and adjective phrases
(From English to Arabic and vice-versa)

- i) Education
- ii) Government Functionaries
- iii) Daily life

Unit - II

الوحدة الثانية

Translation of sentences

- (i) Translation of simple nominal sentences
- (ii) Translation of simple verbal sentences
- (iii) Short paragraphs

Books Recommended:

الكتب للمطالعة العامة:

- | | |
|--|------------------------|
| ١. التعبير و المحادثة في اللغة العربية | د. محمد اجتباء الندوي |
| ٢. الترجمة مناهجها و أصولها | د. معين الدين الأعظمي |
| ٣. نحو الإنشاء و الترجمة | د. منظور أحمد خان |
| ٤. اللغة العربية الوظيفية | د. شفيق أحمد خان وغيره |
| ٥. فن الترجمة الصحيحة: | د. ممدوح محمد جبل |
| ٦. عربي میں ترجمہ کیجیے | ندیم الواجدی |
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- | | |
|---------------------------|-------------------|
| 7. Arabic for Scholars | M. A. Saleem Khan |
| 8. Arabic Made Easy | Abu Hashim |
| 9. Spoken Arabic | Shafi Sheikh |
| 10. Arabic for Beginners | M. A. Saleem Khan |
| 11. Essential Arabic | I. A. Faynan |
| 12. Teach Yourself Arabic | S. A. Rahman |

Semester -IV

Course No: AR 17412 (OE)

Title of the course: Basic Arabic Translation - II

الترجمة الأساسية - ٢

Marks: 50

Credits: 2

Unit - I

الوحدة الأولى

Translation from English to Arabic and vice-versa

- i) SMS
- ii) Emails
- iii) Certificates

Unit - II

الوحدة الثانية

Translation of simple paragraphs

- (i) News headlines
- (ii) News items

Books Recommended:

الكتب للمطالعة العامة:

- | | |
|--|------------------------|
| ١. التعبير و المحادثة في اللغة العربية | د. محمد اجتباء الندوي |
| ٢. الترجمة مناهجها و أصولها | د. معين الدين الأعظمي |
| ٣. نحو الإنشاء و الترجمة | د. منظور أحمد خان |
| ٤. اللغة العربية الوظيفية | د. شفيق أحمد خان وغيره |
| ٥. فن الترجمة الصحيحة: | د. ممدوح محمد جبل |
| ٦. عربي میں ترجمہ کیجیے | ندیم الواجهدی |
| 7. Arabic for Scholars | M. A. Saleem Khan |
| 8. Arabic Made Easy | Abu Hashim |
| 9. Spoken Arabic | Shafi Sheikh |
| 10. Arabic for Beginners | M. A. Saleem Khan |
| 11. Essential Arabic | I. A. Faynan |
| 12. Teach Yourself Arabic | S. A. Rahman |

SEMESTER I**BR15001DCE: Cellular and Molecular Biology****Unit: I**

Membrane structure: Structure and composition of biomembranes (Fluid Mosaic Model); Membrane fluidity, membrane rafts; Cell adhesion molecules (overview), tight junctions, gap junctions and plasmodesmata; Extracellular matrix; Cytoskeleton—microtubules, actin filaments, intermediate filaments.

Unit: II

Intracellular organelles: Structural organization of nucleus (nuclear membrane and nuclear pore complex), mitochondria, chloroplast, golgi bodies, endoplasmic reticulum, ribosome, lysosomes, peroxisomes, vacuoles; Genome organization in mitochondria and chloroplast.

Cell division and cell cycle: Mitosis and meiosis; Phases of cell cycle, cell cycle check points and control of cell cycle.

Unit: III

Nucleic acids: Structure of DNA double helix; Various forms of DNA (A, B, Z and H DNA); Packaging of genetic material (Nucleosome organization); DNA replication—enzymes, mechanism of DNA replication; RNA synthesis—promoters, transcription factors, mechanism of transcription; Structure of mRNA & tRNA.

Unit: IV

Protein synthesis: Genetic code; Aminoacylation of tRNA, initiation, elongation & termination of translation; Post translational modifications and protein trafficking.

Regulation of gene expression: Operon model in prokaryotes (lac operon, tryptophan operon and arabinose operon); Transcription attenuation; Regulation of transcription in eukaryotes—promoters and enhancers, activators and repressors, Role of chromatin in regulating gene expression; DNA methylation, miRNAs.

Tutorials: 3 hours/week

SEMESTER I**BR15001GE: Microbial Resources****Unit: I**

Microbial resources— historical perspective; Types of microbial resources (algal, fungal, bacterial, viral); Approaches for the assessment of microbial diversity (culture dependent and independent); Morphology and ultrastructure of bacteria and viruses (bacteriophages); Microbial growth and growth curve.

Unit: II

Role of microorganisms in food production and beverages (wine, beer, bread, cheese); Single Cell Proteins— production and utility; Microbes as sources of antibiotics and therapeutic agents; Major commercial microbial products (amino acids, enzymes, steroids and biopolymers).

Unit: III

Bioremediation; Role of microbes in bioremediation of soil and water; Role of microbes in waste water treatment (processes based on attached microbial growth, activated sludge process).

Unit: IV

Role of microbes in biogeochemical cycles (carbon, nitrogen, sulphur & phosphorus cycle); Microbes as bioindicators; Phycoviruses and algal blooms; Biodefence and bioterrorism.

Tutorials: 1 hour/week

SEMESTER I**BR15002GE: Algal Resources****Unit: I**

Algae: Introduction, habit and habitat, micro and macro-algae; Distribution in soil, freshwater and marine habitats; Contribution in primary productivity; Immobilized and inactivated algal biomass for metal and nutrient removal.

Unit: II

Algae as food and fodder: Algae as a source of vitamins, proteins, lipids, carbohydrates, minerals and iodine; Algae as fodder for cattle and poultry, seaweeds as animal feed; Agar agar, alginates and carrageenin.

Unit: III

Algae in pharmaceuticals: Algae as source of antimicrobials, antivirals and antifungals, neuroprotective proteins, therapeutic proteins and drugs; Use of algae in the light of modern research— as antioxidants and anticancer agents; Use of algae in forensic medicine research and HIV vaccine model.

Unit: IV

Algal biofuels and biofertilizers: Energy and chemicals; Biodiesel, hydrogen production-mechanism, progress and prospects; Mechanism of biological nitrogen fixation by cyanobacteria; Cyanobacteria as biofertilizers for paddy cultivation, reclamation of usar lands.

Tutorials: 1 hour/week

SEMESTER I**BR15001OE: Human Health and Plant Diet****Unit: I**

Introduction: Plants in the diet of hunter gatherers; Plants in modern western diet; Plants as sources of proteins, carbohydrates, fats, vitamins and minerals.

Unit: II

Good things from plants in the diet: Fibre, Antioxidants; Gut microbiotome; Role of phytonutrients in influencing gut microbiotome.

Unit: III

Plants as source of healthy diet: Natural health products; Algae and fungi as source of human food; Plant diet in pregnancy, lactation, infancy, childhood and adolescence.

Unit: IV

Plant diet and diseases: Impact of food matrix and phytonutrients against chronic diseases; Plant diet and disease management— diabetes, heart disease, cancer, obesity; Plants in nutrition fitness and sports; Food safety; Food poisoning.

Tutorials: 1 hour/week

SEMESTER II**BR15002DCE: Inheritance Biology****Unit: I**

Laws of inheritance: Dominance, segregation and independent assortment; Types of dominance; Lethal alleles; Multiple alleles; Test of allelism; Gene interaction— complementation, epistasis and pleiotropy.

Extra chromosomal inheritance: Inheritance of mitochondrial and chloroplast genes; Maternal inheritance.

Unit: II

Linkage and Recombination: Linkage, linkage maps, 3 point test cross; Homologous and non homologous recombination; Gene mapping in prokaryotes through transduction and conjugation; Sex-linked inheritance— sex limited and sex influenced traits; Mechanism of sex determination.

Quantitative inheritance: Genes and environment— heritability, penetrance and expressivity.

Unit: III

Mutations: Spontaneous and induced mutations, molecular mechanism of mutations (chemical mutagens and physical mutagens); Suppressor, missense, nonsense and silent mutations.

Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation; Auto- and allo-polyploidy and their genetic implications.

Unit: IV

Human genetics: Pedigree— gathering family history, construction of pedigree; Pedigrees of sex-linked, autosomal and mitochondrial traits; Genetic disorders (Klinefelter -, Turner-, Patau-, Down- & Edward's syndrome).

Population genetics: Gene pool; Hardy-Weinberg principle, factors affecting Hardy-Weinberg equilibrium (natural selection, migration and genetic drift); Molecular divergence and molecular clocks.

Tutorials: 3 hours/week

SEMESTER II**BR15003GE: Industrial Entomology****Unit: I**

Apiculture: Importance and scope; Bee species (biology, morphology, behaviour, and habitat); Bee keeping equipment, hives, bee pasturage and seasonal management; Honey extraction; Factors affecting honey yield; Properties and uses of honey; Granulation, fermentation and storage of honey; Uses of other bee products; Bee enemies including diseases and their control.

Unit: II

Sericulture: Silkworm species, systematic position and salient features; Rearing techniques of mulberry, muga, eri and tassar silkworms; Nutritional requirements of silkworms; Sericulture rearing house and appliances; Grainage technology and cocoon marketing; Enemies and diseases of silkworms and their management; By-products of sericulture.

Unit: III

Lac culture: Lac insect, biology and habitat; Host trees— pruning, inoculation, lac cropping techniques and harvesting; Enemies of lac insect and their control; Processing techniques of lac (traditional and modern); Physical and chemical characteristics of lac.

Unit: IV

Beneficial Insects: Insects as pollinators and biocontrol agents; Insects as soil fertility improving agents and scavengers; Use of insects and insect products in medicine; Use of insects in scientific investigations; Use of insects as food source.

Tutorials: 1 hour/week

SEMESTER II**BR15004GE: Bioresource Management****Unit: I**

Bioresource management: Exploitation of bioresources and sustainable development; Forest resource management (social forestry, agro forestry and NWFPs); Grassland management; Freshwater & marine bioresource management; Wildlife management.

Unit: II

Monitoring biodiversity: Methods for monitoring biodiversity trends; Mega biodiversity zones and global biodiversity hotspots; Threats to biodiversity, species extinction; IUCN threat categories, Red data book.

Unit: III

Conservation programmes: Principles and strategies of biodiversity conservation; *In situ* and *ex situ* conservation strategies; Role of remote sensing and geographical information system in biodiversity studies; Principles and methodologies for soil conservation and restoration; Biovillages.

Unit: IV

Acts and policies: Forest Conservation Act 1981; Environment (protection) Act 1986; Hazardous waste (Management and Handling) Rules 1989; Bio-Medical Waste (Management and Handling) Rules 1998; Environmental Impact Assessment (EIA); Environmental Management Plan (EMP) and Environmental Clearance for Establishing Industry (ECEI); National Biodiversity Action Plan National Biodiversity Act 2002.

Tutorials: 1 hour/week

SEMESTER IV

BR17405DCE: Project Work

Project work of 4 credits shall be taken by a student in 4th Semester. The Project work may be in the form of field surveys/practicals etc. A student is required to carry out Project work under the guidance of a supervisor and submitted his work in the Department that shall be evaluated as per guidelines.

SEMESTER IV**BR15004DCE: Bioinformatics****Unit: I**

Bioinformatics databases: Bioinformatics— concept and application; Types of databases- Genome (NCBI, EBI, TIGR, SANGER), Nucleic acid (EMBL, GeneBank, DDBJ), Protein (SwissProt, TrEMBL, PIR) databases; Structural classification of proteins (SCOP, CATH).

Unit: II

Sequencing: Conventional and next generation sequencing; Basic Concept of sequence similarity, identity and homology; Sequence based database searches (blast, fasta, gcg, msf, nbrf-pir etc.); Homologues, orthologues, paralogues; Sequence alignment (pair-wise and multiple); Gene finding and genome annotation; **Transcriptomics:** DNA Microarray, Serial analysis of gene expression, Qualitative RT PCR.

Unit: III

Emerging areas of bioinformatics: Computational systems biology, semantic web; Bioontologies (types, application, softwares), annotations; Proteomics— separation, identification of proteins, MS-MS, protein microarray, protein expression profiling, protein- protein interaction mapping; Metabolomics, cheminformatics, phenomics.

Unit: IV

Phylogenetics: Morphological & molecular phylogeny; Representation of molecular phylogeny; Methods of phylogeny— maximum parsimony, likelihood and Bayesian method; Distance methods (UPGMA, NJ); Softwares (PHYLIP, Tree base, Mesquite, NTSY SPC).

Tutorials: 3 hours/week

SEMESTER IV**BR15403CR: Microbial Technology****Unit: I**

Microbial genome: Bacterial genome structure, replication (DNA and plasmid); Genetic exchange (transformation, transduction and conjugation); Recombination (hosts, vectors and mechanism); Replication of Bacteriophages: Viral multiplication (lytic and lysogenic).

Unit: II

Culturing of microbes: Isolation and screening of microorganisms; Cultivation of microbes- nutritional requirements and factors affecting microbial growth (pH, temperature, water, oxygen, CO₂); Culture types— static cultures, suspension cultures; synchronous cultures, growth curve, generation time, growth kinetics; Storage and transportation of microbes.

Unit: III

Fermentation technology: Introduction; Types of fermentation (aerobic, anaerobic), fermentors and their types, substrates for fermentation; Role of enzymes in various fermentation processes; Microbial chemostat cultures; Scale-up of cultivation of microorganisms; Microbes in beverages and food production (wine, beer, bread, cheese); Advantages of fermented foods.

Unit: IV

Economic importance of microbes: Major commercial microbial products (amino acids, enzymes, steroids, therapeutic agents and biopolymers); Single Cell Proteins; Role of microbes in bioremediation; Microbes as bioindicators; Biodefence and bioterrorism; Role of microbes in waste water treatment.

Practical Work:

- Estimation of CO₂ in water samples obtained at different stages of Sewage Treatment Plant (STP).
- Estimation of dissolved oxygen in given water sample.
- Check the efficacy of antibiotics on a given microbial sample.
- To grow bacteria from cheek sample of mouth on nutrient medium.
- Study the preparation of yogurt.
- Study the procedure to ascertain the milk quality.

SEMESTER II**BR15004GE: Bioresource Management****Unit: I**

Bioresource management: Exploitation of bioresources and sustainable development; Forest resource management (social forestry, agro forestry and NWFPs); Grassland management; Freshwater & marine bioresource management; Wildlife management.

Unit: II

Monitoring biodiversity: Methods for monitoring biodiversity trends; Mega biodiversity zones and global biodiversity hotspots; Threats to biodiversity, species extinction; IUCN threat categories, Red data book.

Unit: III

Conservation programmes: Principles and strategies of biodiversity conservation; *In situ* and *ex situ* conservation strategies; Role of remote sensing and geographical information system in biodiversity studies; Principles and methodologies for soil conservation and restoration; Biovillages.

Unit: IV

Acts and policies: Forest Conservation Act 1981; Environment (protection) Act 1986; Hazardous waste (Management and Handling) Rules 1989; Bio-Medical Waste (Management and Handling) Rules 1998; Environmental Impact Assessment (EIA); Environmental Management Plan (EMP) and Environmental Clearance for Establishing Industry (ECEI); National Biodiversity Action Plan National Biodiversity Act 2002.

Tutorials: 1 hour/week

SEMESTER I**BR15001OE: Human Health and Plant Diet****Unit: I**

Introduction: Plants in the diet of hunter gatherers; Plants in modern western diet; Plants as sources of proteins, carbohydrates, fats, vitamins and minerals.

Unit: II

Good things from plants in the diet: Fibre, Antioxidants; Gut microbiotome; Role of phytonutrients in influencing gut microbiotome.

Unit: III

Plants as source of healthy diet: Natural health products; Algae and fungi as source of human food; Plant diet in pregnancy, lactation, infancy, childhood and adolescence.

Unit: IV

Plant diet and diseases: Impact of food matrix and phytonutrients against chronic diseases; Plant diet and disease management— diabetes, heart disease, cancer, obesity; Plants in nutrition fitness and sports; Food safety; Food poisoning.

Tutorials: 1 hour/week

Course No:	BT-17206 -DCE	Maximum marks	75
Course title:	Laboratory Course II		
Credits:	Three		

1. Media Preparation
2. Isolation of Genomic DNA and RNA.
3. Agarose Gel electrophoresis and Quantification of DNA and RNA.
4. Immunoprecipitation (IP).
5. SDS-PAGE and Western Blotting.
6. Assay of Enzyme activity.
7. Effect of temperature and pH on enzyme activity.
8. Determination of Kinetic constants K_m and V_{max} .
9. Preparation of plant tissue culture media.
10. Plant Tissue Culture

Course No: BT-17306 -DCE

Maximum marks

75

Course title: Laboratory Course III

Credits: Three

1. Competent cell preparation
2. Bacterial Transformation
3. Plasmid Isolation
4. PCR gene amplification.
5. Restriction Digestion
6. Gene cloning
7. GST protein expression and purification
8. Animal Cell Culture.

- Study of source spice and condiments (source, part used, active components)
- Study of any five important fodder and forage crops
- Study of various types of fibres viz. cotton, coir, hemp etc.
- Morphology, microscopic study of oil yielding tissues and test for oil (mustard, groundnut, soybean, linseed, coconut, sunflower, castor, sesame and cashew nut)
- Study of comparative characteristics of the grains of cereals, millets and pulses.
- Study of food reserves in different food crops using microchemical tests.
- Study of methods of cultivation, processing and uses of various rosaceous fruits of Kashmir
- Study of ethnobotanical aspects of various local products.

Bot-Proj.: PROJECT WORK WORTH 8 CREDITS

Project work worth 8 credits is compulsory for the students and will be assigned in 3rd semester as component of 4th semester based on choice of the student and space availability in relation to his/her choice as well as choice of the teacher's concerned. However, the number of students per teacher should not exceed five. The project has to be submitted prior to the conduct of 4th semester examination so that it can be evaluated and viva voce be conducted prior to declaration of the results.

DISCIPLINE CENTRIC ELECTIVE (Bot-DCE) COURSES EACH WORTH 6 CREDITS

Bot-DCE 001: APPLIED CROP PHYSIOLOGY

Unit: I

Water relations and mineral nutrition: movement of water through soil-plant-atmosphere continuum; stomatal transpiration, role of transpiration; water use efficiency and crop productivity; availability of ions in soil, absorption and assimilation of mineral nutrients (N, P and K) by crops; plant nutrient responses.

Unit: II

Photosynthesis and crop productivity: photosynthesis in crop plants at organ, plant and canopy level; improving photosynthetic efficiency for greater yield; effect of environmental factors on photosynthesis (light, temperature, carbon dioxide); leaf factors and photosynthesis; photorespiration and its significance in crop plants.

Unit: III

Growth analysis and crop yield: principles and practices of plant growth analysis; concepts & computation of growth analytical parameters: net assimilation rate (NAR), leaf area ratio (LAR), leaf weight ratio (LWR), relative growth rate (RGR), leaf area index (LAI), crop growth rate (CGR) and specific leaf area (SLA); dry matter partitioning into various parts of plant and its impact on source-sink relationship; relation between growth and yield (harvest index).

Unit: IV

Chemical control of plant growth: role of plant growth regulators (PGRs) (auxins, gibberellins, cytokinins and ethylene) in agriculture and horticulture; plant growth retardants (nomenclature, mode of application and their uses in ornamental horticulture)

Laboratory Exercises:

- Preparation of calibration curves for the estimation of following tissue constituents in the plant material:
 - a.) reducing sugars b.) total starch content c.) soluble proteins d.) α -amino acids e.) total phenolics f.) inorganic phosphorus
- Separation and estimation of photosynthetic pigments (chlorophyll-a, chlorophyll-b, total chlorophyll, carotenoids) and anthocyanins.
- Analysis of growth and yield:
 - i.) Dry matter partitioning into roots, leaves and branches.
 - ii.) Computation, assessment and comparison of important growth parameters:
 - a.) net assimilation rate (NAR) b.) leaf area ratio (LAR) c.) leaf weight ratio (LWR) d.) relative growth rate (RGR) e.) harvest index (HI) f.) biomass duration (BMD) g.) leaf area duration (LAD)
- Study of the physiological effects of the following growth regulators:
 - i.) auxins ii.) gibberellins iii.) cytokinins

Bot-DCE 002: APPLIED ECOLOGY

Unit: I

Environmental monitoring microbes and organic pollution; microorganisms and metal pollution biosensors (types and role in pollution monitoring); microbes as bio-indicators, standards and criteria for indicators

Environmental pollution: kinds and sources of pollutants; impact of SO₂ on plants; eutrophication of aquatic ecosystems- sources and impacts; ozone depletion; ozone hole, UV radiation and their impact, response of plants to tropospheric ozone acid precipitation- components and impacts

Unit: II

Global climate change: climate change (causes and consequences); greenhouse gases sources, trends and role; global warming, CO₂ fertilization; climate change mitigations- methods and means, costs and benefits, international treaties and strategies

Ecosystem management: nature of environmental problems and societal response; environmental impact assessment (EIA) conceptual framework, contents, methodology and role in environmental conservation- and of EIA

Unit: III

Bioremediation: bioremediation (principles, factors and strategies); Phytoremediation process of phytoremediation (phytoextraction, phytostabilization, phytotransformation); applications of phytoremediation,

Microbes and waste management: microorganisms and wastewater treatment; commercial blends of microbes and enzymes in wastewater treatment; role of microbes in solid waste management

Unit: IV

Restoration ecology: concept, concerns, strategies and planning; biodiversity-ecosystem function relationship (BEF)

Sustainable development and environmental ethics: concept of sustainable development and indicators of sustainability; Environmental ethics - introduction to environmental ethics; ecological footprint analysis (an overview); traditional ecological knowledge (context, practices and challenges)

Laboratory Exercises:

- To determine the soil texture, aggregate stability, porosity and bulk density of various soil samples collected from different sites
- To determine the moisture content and water holding capacity of soil samples collected from different locations
- To find out the percentage organic carbon and organic matter content in soils of cropland, grassland and forests
- To determine the carbon stock in different plant systems.
- To estimate the dissolved oxygen content in different water samples
- To use the BOD test for assessment of the level of organic pollution in water samples

Bot-DCE 003: APPLIED PHYCOLOGY

Unit: I

Algal biomass: Monod and Droop models of nutrient-regulated phytoplankton growth; culture and cultivation of economically important freshwater algae; mass cultivation of cyanobacteria under outdoor and indoor conditions.

Unit: II

Algal biofuels and biofertilizers: energy and chemicals; biodiesel and hydrogen production-mechanism, progress and prospects; mechanism of biological nitrogen fixation by cyanobacteria; cyanobacteria as bio fertilizer for paddy cultivation; reclamation of usar lands.

Unit: III

Algae and pollution: eutrophication and pollution; algae as indicator of pollution; high rate algal ponds for the treatment of waste waters and sewage, immobilized and inactivated algal biomass for metal and nutrient removal.

Unit: 1V

Algae as a source of food, fodder and its role in industry: algae as source of carbohydrates, proteins, vitamins, lipids and minerals, as as cattle fodder and poultry fodder, polysaccharides (agar agar, carageenan and alginic acid); algae in pharmaceutical industries.

Laboratory Exercises:

- To determine the soil texture, aggregate stability, porosity and bulk density of various soil samples collected from different sites
- To determine the moisture content and water holding capacity of soil samples collected from different locations
- To find out the percentage organic carbon and organic matter content in soils of cropland, grassland and forests
- To determine the carbon stock in different plant systems.
- To estimate the dissolved oxygen content in different water samples
- To use the BOD test for assessment of the level of organic pollution in water samples

Bot-DCE 003: APPLIED PHYCOLOGY

Unit: I

Algal biomass: Monod and Droop models of nutrient-regulated phytoplankton growth; culture and cultivation of economically important freshwater algae; mass cultivation of cyanobacteria under outdoor and indoor conditions.

Unit: II

Algal biofuels and biofertilizers: energy and chemicals; biodiesel and hydrogen production-mechanism, progress and prospects; mechanism of biological nitrogen fixation by cyanobacteria; cyanobacteria as bio fertilizer for paddy cultivation; reclamation of usar lands.

Unit: III

Algae and pollution: eutrophication and pollution; algae as indicator of pollution; high rate algal ponds for the treatment of waste waters and sewage, immobilized and inactivated algal biomass for metal and nutrient removal.

Unit: 1V

Algae as a source of food, fodder and its role in industry: algae as source of carbohydrates, proteins, vitamins, lipids and minerals, as as cattle fodder and poultry fodder, polysaccharides (agar agar, carageenan and alginic acid); algae in pharmaceutical industries.

Laboratory Exercises:

- Preparation of temporary mounts and Identification of phytoplankton belonging to different classes of algae
- Culture of some important micro-algae
- Cultivation of cyanobacteria under indoor conditions
- Preparation of Biodiesel from vegetable oils

Bot- DCE 004: APPLIED PLANT PATHOLOGY

Unit: I

Pathogenecity and nature of disease: pathogens and pathogenesis. Kochs postulates, disease: definition and classification; mode of development: inoculum and inoculation, penetration and colonization of pathogen within infected plant

Plant disease epidemiology: elements of plant disease epidemics, host factors and pathogen factors affecting epiphytotic development; diseases forecasting in plant epidemics, examples of disease forecasting system and farmers warning system

Unit: II

Pathogens attack on host: role of enzymes and toxins in pathogenesis; aflatoxins, major types and importance

Plant defense against pathogens: structural or morphological defense and metabolic or biochemical defence induced by attaching pathogens; Phytoalexins

Unit: III

Plant diseases: symptomology of fungal and bacterial infections of plants; fungal diseases: symptoms, etiology and control of club root of crucifers, *Rhizopus* rot of fruits and vegetables, loose smut of wheat; bacterial disease: general characteristics; etiology and control of citrus canker, fire blight of apples and pears

Viral and viroid disease: general characteristics of viruses; cucumber mosaic virus, cauliflower mosaic virus, potato spindle tuber; nematodes disease: general characteristics of plant-parasitic nematodes; symptoms, biology and control of root knot disease of plants, ufra disease of rice: mycoplasma diseases: general characteristics of MLO'S; symptoms, causal organism and transmission of sandal spike disease

Laboratory Exercises:

- Preparation of temporary mounts and Identification of phytoplankton belonging to different classes of algae
- Culture of some important micro-algae
- Cultivation of cyanobacteria under indoor conditions
- Preparation of Biodiesel from vegetable oils

Bot- DCE 004: APPLIED PLANT PATHOLOGY

Unit: I

Pathogenecity and nature of disease: pathogens and pathogenesis. Kochs postulates, disease: definition and classification; mode of development: inoculum and inoculation, penetration and colonization of pathogen within infected plant

Plant disease epidemiology: elements of plant disease epidemics, host factors and pathogen factors affecting epiphytotic development; diseases forecasting in plant epidemics, examples of disease forecasting system and farmers warning system

Unit: II

Pathogens attack on host: role of enzymes and toxins in pathogenesis; aflatoxins, major types and importance

Plant defense against pathogens: structural or morphological defense and metabolic or biochemical defence induced by attaching pathogens; Phytoalexins

Unit: III

Plant diseases: symptomology of fungal and bacterial infections of plants; fungal diseases: symptoms, etiology and control of club root of crucifers, *Rhizopus* rot of fruits and vegetables, loose smut of wheat; bacterial disease: general characteristics; etiology and control of citrus canker, fire blight of apples and pears

Viral and viroid disease: general characteristics of viruses; cucumber mosaic virus, cauliflower mosaic virus, potato spindle tuber; nematodes disease: general characteristics of plant-parasitic nematodes; symptoms, biology and control of root knot disease of plants, ufra disease of rice: mycoplasma diseases: general characteristics of MLO'S; symptoms, causal organism and transmission of sandle spike disease

Unit: IV

Pest management: regulatory methods: quarantine and inspection; cultural methods; physical methods; chemical methods: types of chemicals, inorganic and organic chemicals, antibiotics

Biological methods: use of fungi, bacteria, entomopathogenic nematodes, organic amendments and antagonistic plants as biocontrol agents; biopesticides, types, advantages and limitations, general concept of integrated pest management (IPM) in disease control

Laboratory Exercises:

- Morphological studies and identification of the following fungi through temporary and permanent mounts- *Peronospora*, *Mucor*, *Rhizopus*, *Penicillium*, *Aspergillus* and *Alternaria*, *Albugo*, *Polyporus*, *Phoma*
- Symptomology and studies of some local diseased plant materials through temporary and permanent mounts: powdery mildew of cucurbits and composites, smuts, leaf spot diseases
- Sterilization of media and glass ware, preparation of culture of some local fungal flora
- Preparation of culture media, peptone dextrose agar (PDA), soil extract agar, Richard's solution, Czepek's solution, Coon's medium
- Inoculation of media by dilution plate method
- Isolation of plant pathogens from infected tissue by tissue segment method
- Preparation of some fungal stains
- Demonstration of cell wall degrading enzyme production by *Rhizopus* and *Mucor* on potato tuber discs
- Acquaintance with fungicides, bio-control agents and spray equipments
- Isolation of nematodes by Cobb's sieving and decanting techniques
- Isolation and purification of viruses by density gradient centrifugation

Bot-DCE 005: BIODIVERSITY AND CONSERVATION BIOLOGY

Unit: I

Biodiversity: concept of biodiversity (a historical perspective); magnitude of global biodiversity (an overview); components of biodiversity (species richness and evenness); levels of biodiversity – organizational (genetic, species and ecosystem), spatial (alpha, beta, gamma, delta); values of biodiversity (direct use, indirect use, option and existence values)

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Unit: II

Conservation biology: principles and characteristics; genetic variation (magnitude, loss and its consequences); species extinction (concept and causes - ultimate and proximate); the IUCN scheme of threatened species, summary of latest IUCN Redlist; IUCN scheme of threatened ecosystems; ecosystems at risk (tropical rain forests, coral reefs, mangroves, wetlands).

Unit: III

Biodiversity conservation: *in situ* conservation strategies (concept of protected areas network); IUCN's scheme of PA management categories; National Parks and Wildlife Sanctuaries in India (an overview); Biosphere Reserve (concept, design and distribution in India); *ex situ* conservation strategies (botanical gardens, field gene banks, seed banks, *in vitro* repositories, cryobanks, DNA banks); biodiversity hotspots (concept, criteria and conservation implications); global conservation efforts (organizations & conventions); Indian conservation efforts (legislations and policies)

Unit: IV

Measurement and resources of biodiversity: sampling unit – shape, size and number, issue of scale; phylogenetic and functional diversity (concept and applications); biodiversity surrogates (types and use); role of remote sensing and GIS in biodiversity assessment and monitoring; biodiversity informatics (concept and applications); global informatics initiatives - Global Biodiversity Information Facility (GBIF), Encyclopedia of Life (EoL); Biodiversity Heritage Library (BHL).

Laboratory Exercises:

- Preparation of an inventory of RET (Rare, Endangered and Threatened plants) in KUBG.
- Measurement of species diversity by using various biodiversity indices.
- Measurement of species evenness and similarity index.
- Measurement of alpha, beta and gamma diversity.
- Field demonstration of GPS (Global Positioning System) and its utility in biodiversity studies.
- Study of various economically and ethno-botanically important plants of Kashmir Himalaya
- Field study of various threatened endemic plants of Kashmir Himalaya.
- Field demonstration of *in situ* and *ex situ* conservation strategies through visit to the national parks, sanctuaries, botanical garden, herbaria, zoos, museums.

Bot-DCE 006: CROP GENETICS AND MOLECULAR BREEDING

Unit: I

Aims and objectives of plant breeding: concept of germplasm and gene pool, mechanisms promoting self and cross pollination, genetic and cytoplasmic male sterility.

Methods of crop improvement in self pollinated crops: genetic composition of self-pollinated crops, progeny test, pureline theory, mass selection, pureline selection, backcross method, merits and demerits, achievements.

Unit: II

Methods of crop improvement in cross pollinated crops: heterosis and inbreeding depression - genetic basis, wide hybridization and its utility in crop improvement.

Population improvement method - progeny selection (ear to row method), recurrent selection for general and specific combining ability, production of hybrid varieties - concept and utility,

Quantitative traits: polygenic inheritance and role of environment.

Unit: III

Concept and development of transgenic plants – agrobacterium mediated gene transfer, direct gene transfer (particle bombardment)

Applications of transgenic plants in crop improvement - disease and insect resistance, drought tolerance, nutritional quality, male sterility, edible vaccines, golden rice

Biosafety: ecological risks and ethical concerns of genetically modified crops.

Unit: IV

Molecular markers: types and utility of molecular markers in genetic diversity analysis in crop plants (RAPD, AFLP, SSR and SNP)

Marker assisted selection in crop plants- marker assisted back cross breeding,

QTL mapping and its applications in crop plants

Laboratory Exercises:

- Field demonstration of self and cross pollinated plants with suitable examples.
- Study of hybridization techniques in the field.
- Study of floral modifications that favour inbreeding and out breeding.
- Mitotic chromosome analysis using suitable plant material (onion)
- Meiotic chromosome analysis using suitable plant material.
- Induction of polyploidy by colchicine treatment.

- Karyotype analysis and preparation of kario-idiogram.
- Analysis of pollen to ovule ratio as an index of the nature of breeding system in some crops.
- Study of different chromosomal aberrations and their effect on fertility.
- Demonstration of Restriction digest analysis, RAPD and SSR analysis.

Bot- DCE 007: INVASION BIOLOGY

Unit: I

Introduction to invasion biology: historical perspective of invasion biology, critique of invasion Biology (SPRED ecology – SPecies REDistribution)

Process of invasion: introduction (intentional and accidental), pathways and vectors, rapid evolution, hybridization, biotic resistance, propagule pressure, residence time, tens rule, establishment, naturalization, spread, invasion meltdown

Unit: II

Species invasiveness: allelopathy, phenotypic plasticity, escape from enemy, evolution of increased competitive ability, Darwin's naturalization hypothesis

Community invasibility: empty niche hypothesis, diversity–invasion dilemma and predator relationship, intermediate disturbance hypothesis

Unit: III

Invasions and global environmental change: effect of change in temperature, atmospheric CO₂ concentration, nitrogen deposition, disturbance regimes, and habitat fragmentation on species invasions

Ecological and economic impacts: biotic homogenization, impact of invasions on community structure, trophic levels, nutrient cycling, hydrology and fire regimes, invasion debt and alteration in total economic value (TEV) of biodiversity

Unit: IV

Invasion prediction and risk assessment: prediction of invasive species, weed Risk assessment, species distribution modeling (GARP, MaxEnt), quarantine measures

Management of invasive species: early detection and rapid response, physical, chemical and biological control (advantages and disadvantages), biological invasions (indicators and policy)

- Karyotype analysis and preparation of kario-idiogram.
- Analysis of pollen to ovule ratio as an index of the nature of breeding system in some crops.
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Laboratory Exercises:

- Determine the stage of invasion of a particular plant species in the given area.
- Determine allelopathic potential of the given plant species by point quadrat method
- Demonstrate the effect of leachate of an invasive species on seed germination of a native species
- Study the abundance of common pests of an invasive plant species

Bot- DCE 008: MEDICINAL PLANTS AND HERBAL RESOURCE MANAGEMENT

Unit: I

History of herbal medicine: documentary and archaeological evidences supporting the traditional theme of plants as a natural herbal resource

Herbal systems of medicine: world scenario with emphasis on- concept, status and potential at Regional, National and International level:

- | | |
|------------------------------|-------------|
| ❖ European | ❖ Unani |
| ❖ American | ❖ Ayurvedic |
| ❖ African and Middle eastern | ❖ Sidhi |
| ❖ Chinese and Tibetan | |

Traditional usage of ethno-medicine in Jammu and Kashmir: history, status and potential

Unit: II

Diversity and distribution of medicinal plants (MP's) in J & K

Different threats: causes and concerns of Kashmir Himalayan MP diversity

Assessment of population status: MP's of J & K in accordance with IUCN guidelines

Data collection: methods, documentation and exchange, importance of threat assessment of MP's

Unit: III

Commercial potential of MP's in Kashmir Himalaya

Role of MP's in world pharmaceutical industry

Role of Assessment of status of genetic diversity and its role in conservation of MP'S

Linkage between traditional knowledge holders, policy makers and industry: NGO's and their role in commercialization of MP's based on traditional knowledge

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Unit: IV

Spices and condiments: medicinal aspects in relation to modern theme of herbalism

Economic valuation: techniques used to estimate the monetary values and to educate the tribals and locals for facilitating herbal medicine commercialization

Bio-prospecting: the systematic search for new sources of chemical compounds, genes, proteins, microorganisms that have potential medicinal value as a biotic resource

Laboratory Exercises:

- Studies on MP's of Kashmir with respect to status, distribution pattern, adaptability and threats, if any
- Survey of various tribal areas of Kashmir valley to compile an inventory of important medicinal plant species of the region (name, local name, part used, uses, method of use, degree of popularity and precautions, if any)
- Assessment of resource allocation and resource partitioning of important MP's of Kashmir Himalaya
- Assessment of reproduction biology as a means of domestication and conservation of MP's
- Analysis of active components in relation to commercial usage of important MP's of Kashmir
- Developing vegetative and sexual parametres for commercialization of important MP's of Kashmir
- Preparing a herbarium of atleast 30 important medicinal plants with all details related to habit, habitat, density and diversity and status

Bot-DCE 009: MOLECULAR AND MICROBIAL ECOLOGY

Unit: I

Molecular ecology: introduction to molecular ecology - scope and limitations; molecular identification – importance and approaches, types of molecular markers in ecology; DNA barcoding - concept, criteria and applications.

Population genetics - genetic diversity in natural populations, population structure and effective population size, genetics of metapopulations, population bottlenecks.

Unit: II

Conservation genetics - loss of genetic diversity as a conservation concern, genetic load, conservation units, genetic restoration; molecular genetics in conservation biology, molecular markers in conservation genetics.

Unit: IV

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Conservation genetics - loss of genetic diversity as a conservation concern, genetic load, conservation units, genetic restoration; molecular genetics in conservation biology, molecular markers in conservation genetics.

Phylogeography - concept and scope; genetic variation in space and time - vicariance, dispersal; Molecular markers in phylogeography- microsatellite markers and mtDNA; applications of phylogeography - determining species natural range and tracing source populations of introduced species.

Unit: III

Microbial ecology: ubiquity of microorganisms, microbial habitats – soil, air and water as microbial habitats, microbial life in extreme environments; indicator microorganisms (concept, standards and examples)

Microbial diversity: amazing diversity of microbes, methods of assessment of microbial diversity - culture-dependent and culture-independent approaches. microbes and global environmental change:

Unit: IV

Microbial mediated remediation: microorganisms and organic pollution – organic pollutants (sources and types), process of biodegradation (contaminant structure, toxicity and biodegradability). microorganisms and metal pollution – definition and sources of heavy metals, metal solubility and bioavailability, metal toxicity, Microbial metal resistance, detoxification and remediation.

Microorganisms and waste management: wastewater microbiology – composition of wastewater, modern wastewater treatment (primary, secondary, tertiary treatment), commercial blends of microbes and enzymes in wastewater treatment; Solid waste management.

Laboratory Exercises:

- Sterilization of glassware, growth medium and other materials
- Preparation of various culture media
- Techniques of inoculation and characterization of colony morphologies
- Measurement of microbial growth rate
- Assessment of symbiotic associations with plant (Mycorrhiza and Rhizobia)
- Extraction of genomic DNA from mycorrhizas, plants and soil
- Amplification of DNA by PCR
- Quantification of DNA content
- Use of molecular markers such as RFLP, RAPD
- Analysis of the RFLP pattern for identification of OTUs
- Inference of phylogenetic relatedness, phylogenetic distance and evolutionary histories from molecular data

- Calculation of allele frequencies from phenotypic data
- Estimation of Hardy-Wienberg equilibrium
- Determining the effective population size

Bot-DCE 010: MOLECULAR GENETICS

Unit: I

Recombination in bacteria, genetic transformation, conjugation and transduction and their role in mapping of bacterial genes

Plasmids – general properties and regulation of replication (control of copy number)

Unit: II

Genetics of phages – molecular basis of lytic and lysogenic life cycle; genetic recombination in phage; deletion mapping

Concept of gene and allele, Cis-Trans/complementation test, genetic fine structure (r-II locus)

Unit: III

Mutations: types of mutations; molecular basis of gene mutation; site directed mutagenesis

Transposable elements in prokaryotes and eukaryotes, transposon induced mutations. Concept of proto-oncogenes and oncogenes

Unit: IV

DNA recombination mechanisms, molecular mechanism of recombination; Multigene families and their evolution

Chromosome mapping in eukaryotes: genetic and physical mapping of genes/chromosomes, restriction mapping- concept and applicability.

Laboratory Exercises:

- Aseptic culture techniques for establishment and maintenance of cultures
- Isolation of plant DNA and its quantification by spectrophotometric method.
- DNA check run by Agarose Electrophoresis
- Preparation of different growth media for bacteria.
- Estimation of growth rate in different bacteria and preparation of growth curve.
- Isolation of different bacterial colonies by streaking method.
- Preparation of bacterial colonies by plating method.

- Preparation of competent cells of *E. coli*.
- Small scale plasmid preparation from *E. coli*.
- Restriction digestion of insert plasmid.

Bot-DCE 011: MUSHROOM CULTIVATION TECHNOLOGY

Unit: I

Mushroom: introduction; general morphology of mushrooms; magnitude of mushroom species; mushroom biology: components of applied mushroom biology: mushroom science, mushroom biotechnology and mushroom mycorestoration

Nutritional and medicinal value of mushrooms: poisonous and non-poisonous mushrooms; edible mushrooms and cultivation in India and world; Medicines from mushrooms; mushroom production and consumption; world mushroom development industry movements

Unit: II

Mushroom cultivation technology: steps in mushroom cultivation: compost: materials used in composting and different formulation used in composting; compost preparation, methods of compost preparation

Spawn: definition, kinds of spawn, spawning and spawning technique, spawn running, post spawning management and handling during spawn running; equipment used for spawn production laboratory; Preservation and maintenance of mushroom culture

Unit: III

Casing: raw materials used for casing, preparation and sterilization of casing materials, qualities of an ideal casing material, care after casing, mushroom crop management: management at different stages of crop

Pests and pathogens of mushrooms and their management: management of pests and diseases of button mushroom and Oyster mushroom; important sanitation during various stages of mushroom cultivation

Unit: IV

Cultivation of important mushrooms: general process for the cultivation of the white button mushroom (*Agaricus bisporus*), the oyster mushroom (*Pleurotus sajor-caju*), paddy straw mushroom (*Volvariella* sp.), black ear mushroom (*Auricularia* sp.)

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Medicinal mushrooms: general process for the cultivation of shitake mushroom (*Lentinus* sp.) and reishi mushroom (*Ganoderma lucidium*); harvesting, postharvest handling, preservation and processing of mushrooms, and marketing of mushrooms

Laboratory Exercises:

- Morphological studies and identification of the local mushroom flora and of preserved specimen of mushrooms
- Sterilization of media and glass ware, preparation of culture of some local mushroom fungal species
- Preparation of culture media/substrate: Potato dextrose agar(PDA), Rice bran medium, Richard's solution, Grain spawn substrate, Sawdust spawn substrate, preparation of Agar slants
- Preparation of different types of compost and some compost formulations.
- Preparation of different types of spawns
- Cultivation procedures for Button mushroom and Oyster mushroom
- Picking and haunting of Mushrooms.
- Study of fungal pathogens and nematode pests of mushrooms

Bot-DCE 012: PLANT SYSTEMATICS AND PHYLOGENETICS

Unit: I

Plant systematics: systematics, biosystematics, phylogeny; contributions of systematics to biology; relevance of systematics to human society

Major species concepts (an overview); isolating mechanisms (pre-mating and post-mating); process of speciation (allopatric, parapatric and sympatric)

Unit: II

Systematics as a synthetic field: population biology (sources and kinds of variation); ecotypes (origin, types and taxonomic treatment); plant breeding systems (types and their taxonomic significance); pollination biology (modes of pollination, co-evolution between plants and pollinators).

Molecular systematics - sources of DNA-based characters (mitochondrial, chloroplast and nuclear genomes); use of various molecular markers in plant systematics citing relevant examples; DNA barcoding (concept, applications and limitations)

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Unit: III

Phylogenetics: concept and terminology used; history of phylogenetics; methodology of phylogenetics (Parsimony, Maximum likelihood, Bayesian analysis); applications of phylogenetics; diversity and phylogeny of land plants (bryophytes, pteridophytes, gymnosperms and angiosperms); angiosperm phylogeny; group classification (an overview); biocode and phylocode (an elementary idea); phylogeography (concept and scope)

Unit: IV

Plant diversity: plant diversity in India - present status and conservation concerns; biogeographical classification of India; forest types of India; plant diversity in Kashmir Himalaya - present status and utilization, current threats and conservation needs

Laboratory Exercises:

- Herbarium (each student has to prepare a herbarium comprising of at least 50 plant specimens from their area of residence).
- To study pollination mechanisms in some suitable plants.
- Demonstration on various internet resources on plant systematic, phylogenetics and diversity.
- To describe the plant species by using a comprehensive morphological character list.
- To draw the illustration of various plant parts, such as whole plant, leaves, whole flower, flower parts etc.
- To determine the synonymy of plant taxa by using taxonomic literature.
- To study inter-population, inter-specific, inter-generic character variation.
- To study the floral morphology of suitable plant species showing different sex types.
- To study cleistogamy and heterostyly in some suitable plants.
- To construct phylogenetic trees of sample taxa using the freeware softwares.

Bot- DCE 013: POSTHARVEST TECHNOLOGY OF CUT FLOWERS

Unit: I

Flower senescence: types of senescence; relation between aging and senescence; senescence in flowers; programmed cell death in relation to petal senescence in ornamental plants; ephemeral flowers as model systems for studying senescence;

Unit: III

Phylogenetics: concept and terminology used; history of phylogenetics; methodology of phylogenetics (Parsimony, Maximum likelihood, Bayesian analysis); applications of phylogenetics; diversity and phylogeny of land plants (bryophytes, pteridophytes, gymnosperms and angiosperms); angiosperm phylogeny; group classification (an overview); biocode and phylocode (an elementary idea); phylogeography (concept and scope)

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ethylene sensitive and insensitive flower senescence; ethylene and polyamines as modulators of flower senescence.

Unit: II

Pre and postharvest approaches in cut flower industry: cut flower trade (international and national scenario); factors affecting pre and postharvest quality of cut flowers; stage, time and mode of harvest of cut flowers; role of temperature, light, humidity and moisture on postharvest performance of cut flowers.

Unit: III

Postharvest storage of cut flowers: dry and wet storage of cut flowers; controlled atmospheric storage (CAS); modified atmospheric storage (MAS); low pressure storage (LPS); rehydration and pulsing during storage; role of cold chain in maintaining postharvest quality.

Unit: IV

Packaging, transportation and marketing of cut flowers: packaging for efficient transportation; simulation of transportation protocols; consumer preferences; marketing practices. Techniques for improving longevity/vase life of cut flowers -pretreatments (conditioning or hardening, pulsing and bud opening treatments); vase treatments

Laboratory Exercises:

- To study the visible effects and pattern of flower senescence at various stages under field and laboratory conditions
- To study the changes in membrane permeability of petal discs at various stages of flower development and senescence
- To study the changes in soluble protein content and protease activity at various stages of flower development and senescence
- To study the changes in carbohydrate fractions at various stages of flower development and senescence
- To study the effect of ethylene antagonists/growth regulators in the improvement of vase life in some important cut flowers
- To study the implication of postharvest storage in the improvement of vase life in some important cut flowers

Bot- DCE 014: STRESS BIOLOGY

Unit: I

Stress: abiotic and biotic stress – overview

Osmotic adjustments: role of Glycine betaine, mannitol, proline, polyamines

Changes in carbohydrate metabolism, Reactive Oxygen Species (ROS)

Unit: II

Role of transcription factors; DREB, dehydration-responsive element (DRE) binding protein; COR/CBF regulon; Role Late Embryogenesis proteins (LEA), heat shock proteins, Dehydrins, antifreeze proteins, etc.

Unit: III

Signal transduction in response to stress: role of calcium and G-proteins; Role of phytohormones in plant stress; ethylene response pathway; the abscisic and regulatory network; Biotic stress signalling (calcium mediated pathogen defence programme)

Unit: IV

Bioengineering plants for stress tolerance: genetic engineering approaches for insect resistance (Bt approach); gene silencing; RNAi – role in biotic stress management; concerns about GM crops; regulation of GM crops.

Laboratory Exercises:

- Changes in biochemical parameters in response to biotic/abiotic stress
- Estimation of changes in amino acids response to stress
- Changes in superoxide dismutase in response to stress
- Changes in catalase in response to biotic/abiotic stress
- Changes in ascorbate peroxidase in response to stress
- Changes in glutathione reductase in response to stress
- Changes in protein in response to biotic stress by SDS- PAGE
- Changes in protein levels in response to cold stress by SDS-PAGE

GENERIC ELECTIVE (Bot-GE) COURSES EACH WORTH 3 CREDITS

Bot-GE 01: AQUATIC ECOSYSTEM MANAGEMENT

Unit: I

Structure and function: lakes and wetlands (definition, types and distribution); zonation (principles and patterns); aquatic plants (growth forms and distribution pattern); hydrology, trophic status and nutrient dynamics of lakes and wetlands with special reference to Kashmir Himalaya.

Values and valuation: economic goods and ecosystem services (provisioning, regulating, cultural, supporting); valuation of aquatic ecosystems - framework and approaches of valuations, types of values (ecological, socio-cultural, economic).

Unit: II

Threats and challenges: threats to lake and wetland ecosystems with special reference to Kashmir Himalaya; biological invasion in lakes and wetlands; aquatic invasive plants (traits and impacts); eutrophication, catchment deterioration; climate change and aquatic ecosystems.

Restoration and management: ecosystem resilience and stability; restoration strategies; ecosystem approach to management; monitoring, prediction and management of invasive aquatic plants.

Tutorials

Bot- GE 02: BIOLOGICAL SYSTEMATICS AND BIODIVERSITY

Unit: I

Biological systematics: a historical account; relevance of biological systematics to human society; concept of species; taxonomic hierarchy; biological nomenclature (principals & practice); methods of systematics (classical and modern); molecular tools in scientific identification, classification and phylogeny; modern classification schemes of major taxonomic groups and their evolutionary relationships; importance of botanic gardens, herbaria, museums, zoos, aquaria

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Unit: II

Biodiversity: emergence of biodiversity concept (a historical overview), magnitude of biodiversity (global, India, J & K); current status of biodiversity (IUCN Red List), documentation & monitoring (field sampling methods, diversity measures & indices); uses of biodiversity (direct & indirect); terrestrial biomes & biodiversity hotspots; biogeographical zones of India; major drivers of biodiversity loss (habitat loss, alien invasion, overexploitation, climate change); principals of conservation, major approaches to conservation (*in situ* & *ex-situ*); National Parks, Wildlife Sanctuaries and Biosphere Reserves in India; non-formal conservation efforts; natural capital and green economy

Tutorials

Bot-GE 03: BIOSTATISTICS

Unit: I

Data types and collection: data types- data on ratio, interval, ordinal and nominal scales; continuous and discrete data; methods of primary and secondary data collection and their limitations, frequency and cumulative frequency distributions.

Processing and analysis of data: measures of central tendency- arithmetic mean, mode, median; measures of dispersion- mean deviation, variance, standard deviation, coefficient of variation.

Testing of hypothesis: basic concepts, procedure for hypothesis testing; test of difference between two means (independent and paired samples t test); test of proportions and test of goodness of fit (chisquare test).

Unit: II

Design and analysis of experiments: principles of experimentation; experimental designs- layout, analysis of variance and comparison of treatments in completely randomized design, randomized complete block design and factorial experiments.

Sampling techniques: principles and various steps in sample survey; procedures and practices involved in simple, systematic, stratified, cluster and multistage random sampling.

Simple correlation and regression: basic idea, scatter diagram, calculation of an estimated correlation coefficient, significance tests for correlation coefficients; simple linear regression- calculation of regression coefficient, standard errors and significance test.

Practicals

Unit: II

Biodiversity: emergence of biodiversity concept (a historical overview), magnitude of biodiversity (global, India, J & K); current status of biodiversity (IUCN Red List), documentation & monitoring (field sampling methods, diversity measures & indices); uses of biodiversity (direct & indirect); terrestrial biomes & biodiversity hotspots; biogeographical zones of India; major drivers of biodiversity loss (habitat loss, alien invasion, overexploitation, climate change); principals of conservation, major approaches to conservation (*in situ* & *ex-situ*); National Parks, Wildlife Sanctuaries and Biosphere Reserves in India; non-formal conservation efforts; natural capital and green economy

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Practicals

Bot-GE 04: BIOTECHNIQUES

Unit: I

Microscopic techniques: visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze- fracture methods for EM, image processing methods in microscopy.

Biophysical Methods: molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy, molecular structure determination using X-ray diffraction and NMR, molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

Unit: II

Radiolabeling techniques: detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.

Chromatographic techniques: principles and applications of paper, thin layer, column and chiral chromatography, HPLC, ion exchange, affinity, gas liquid chromatographic techniques, gel electrophoresis and ultracentrifugation.

Tutorials

Bot-GE 05: COMMERCIAL PLANT PROPAGATION

Unit: I

Vegetative propagation

Propagation by cuttings, layering, grafting and budding: stem cuttings, leaf cuttings, leaf bud cuttings, root cuttings, factors influencing the rooting of cuttings; layering types: tip layering, simple layering, mound layering, air layering grafting types, graft incompatibility, effect of rootstock on growth and development of the scion cultivar

Micropropagation (Tissue Culture)

Clonal propagation: Introduction, Orchid propagation, General techniques of micropropagation, Factors affecting in vitro stages of micropropagation, applications of micropropagation

Production of virus free plants: introduction, virus elimination by meristem-tip Culture. factors affecting virus eradication by meristem-tip culture

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Unit: II

Propagation through seeds and other propagules

Seed production and storage: breeder seed, foundation seed, registered seed, certified seed; seed storage and viability tests: Cut test, Float test, X-ray photographs

Seed germination and dormancy: germination tests (tetrazolium and excised embryo test), environmental factors influencing seed germination; types and methods of overcoming seed dormancy

Other plant propagules: propagation by- runners, suckers, crowns, bulbs, corms, stem tubers, tuberous roots, rhizomes.

Tutorials

Bot-GE 06: PRINCIPLES OF GENETICS

Unit: I

Beginning of genetics: cell cycle – mitosis and meiosis, difference between mitosis and meiosis.

Concepts of inheritance- chromosomal theory of inheritance

Mendel's laws of inheritance - principle of segregation and independent assortment, concept of monohybrid and dihybrid cross

Multiple alleles- gene interactions (complimentary, duplicate, epistatic interactions)

Concept of linkage- sex linked traits.

Structural and numerical changes in chromosomes – brief concept

Unit: II

Morphology and organization of eukaryotic chromosome

Genetic material: DNA as genetic material (experimental proof)

Structure of DNA (Watson & Crick model), mechanism of DNA replication (Semi-conservative).

Concept of gene and allele, euchromatin and heterochromatin, genetic code and its properties

Gene mutations – concept and types of point mutations, molecular basis of gene mutation

C-value paradox and its significance.

Tutorials

Unit: II

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Gene mutations – concept and types of point mutations, molecular basis of gene mutation

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Tutorials

Bot- GE 07: SEED TECHNOLOGY

Unit: I

Introduction : seed as basic input in agriculture; seed development in cultivated plants; seed quality concept and importance of genetic purity in seed production; types of cultivars, their maintenance and factors responsible for deterioration; seed production in self and cross pollinated crops.

Seed multiplication ratios: seed replacement rate, demand and supply; suitable areas of seed production and storage

Growth hormones and enzyme activities: effect of age, size and position of seed on germination.

Unit: II

Hybrid seed - methods of development of hybrids; use of male sterility and self-incompatibility and CHA in hybrid seed production; one, two and three line system; maintenance of parental lines of hybrids; planning and management of hybrid seed production technology of major field crops and vegetables.

Seed vigour and its concept: vigour test methods, factors affecting seed vigour, physiological basis of seed vigour in relation to crop performance and yield.

Seed invigoration: physiological and molecular control.

Tutorials

Bot-GE 08: URBAN ECOLOGY

Unit: I

Terrestrial urban ecosystems: Urban green spaces meaning and types, composition and diversity of vegetation in urban green spaces (Patterns and controlling processes) land use and surface cover as urban ecological indicators, urban soils characterization and biodiversity in small designed landscapes.

Aquatic and wetland urban ecosystems: Hydrology of urban environments, plant communities of urban wetlands and water bodies (Patterns and controlling processes)

Ecological processes and social drivers: Human impact, spatial and meta-community processes on biodiversity and community composition. Urban climate, urban impacts on global and regional sustainability.

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Types of ecosystem services: Types of ecosystem services provided by urban ecosystems, global effects of urbanization on ecosystem services, role of ecosystem services in contemporary urban planning.

Urbanization and citizen science: public perception, social-ecological perspective on urban biodiversity.

Approaches towards a sustainable city: Multifunctional green infrastructure planning to promote ecological services in the city, building urban biodiversity through financial incentives, regulation and targets, conservation in an urbanising world.

Tutorials

OPEN ELECTIVE (Bot-OE) COURSES EACH WORTH 3 CREDITS

Bot-OE 01: AGRICULTURAL BOTANY

Unit: I

Basic concept in agricultural botany; relevance of botany to agriculture, importance of use of climate dependent varieties, soil practices, manuring and irrigation

Plant protection, harvesting and processing of different crops under different agroclimatic conditions including cereals, legumes, pulses, vegetables

Importance and scope of vegetable production in India; classification of vegetables. types of vegetable gardens

Unit: II

Fertilizers - definition, classification, characteristics, reactions of fertilizer in soil, Important fertilizer elements- nitrogen, phosphorus, potassium, sulphur, zinc, Elementary idea of biofertilizers and vermin compost.

Integrated Nutrient Management (INM): concept, elementary idea of INM models, INM and soil health.

Practical knowledge- operations from sowing to harvesting of some kharif crops.

Judging of maturity and estimation of yields- study of crop production techniques at different farms

Tutorials

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Tutorials

Bot-OE 02: BIOENERGY

Unit: I

Sources of energy - renewable energy, non-renewable energy; short supply of fossil fuels; global energy outlook

Biofuels: introduction, history, classification of biofuels (solid, liquid and gaseous) environment impact of biofuels

Bio-renewable liquid fuels; bio-alcohol; bioethanol and biodiesel (history; production, advantages and disadvantages) current biodiesel technologies; microalgae as a vital source of biodiesel.

Unit: II

Gaseous biofuels: introduction, biogas production; aerobic and anaerobic conversion process; biogas processing technologies for anaerobic digestion; landfill gas; crude gases from pyrolysis and gasification of biomass.

Biofuel economy; estimation of biofuel prices; biodiesel economy; bioethanol economy;

Biofuel policy—introduction to biofuel policy; biodiesel policy; environment, protection agency; MOEF registration; biofuel and biodiesel in India; global biofuel projections; market penetration of biofuels; bioenergy markets

Tutorials

Bot-OE 03: BIOGEOGRAPHY

Unit: I

Fundamentals of biogeography: historical perspective of biogeography; principles and rules of biogeography; components of geographic template (climate, soil, aquatic environment)

Geological processes: theory of continental drift; plate tectonics; glaciation and biogeographic responses.

Ecological and evolutionary processes: habitat and ecological niche; plant-animal associations; speciation, diversification and extinction; dispersal (mechanisms, routes and barriers).

Biogeographic patterns: cosmopolitanism and endemism; disjunctions and relicts; range size and shape; terrestrial biomes; phytogeographic and zoogeographic realms; species-area relationship; theory of island biogeography; gradients in biodiversity (latitudinal, elevational and depth).

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UNIT: II

Applied biogeography: biodiversity- definition, components and levels; magnitude of global biodiversity; Linnaean and Wallacean shortfalls; values of biodiversity; threats to biodiversity; impacts of climate change on biodiversity; conservation strategies (National Parks, Wildlife Sanctuaries, Biosphere Reserves); biodiversity hotspots (criteria and global distribution); biogeographic classification of India; phylogeography (an elementary idea); biogeographic surveys and monitoring.

Tutorials

Bot-OE 04: BIOPESTICIDES AND INTEGRATED PEST MANAGEMENT

Unit: I

Pesticides: definition, and types of pesticides, limitations of using pesticides

Biopesticides: definition, types, advantages and limitations

Bio-fungicides; fungal or myco-fungicides, preventive and safety measures required in using bio-pesticides. bacterial fungicides, and fungal nematicides with emphasis on their role and application,

Bio-insecticides: bacterial insecticides, fungal and viral insecticides

Bioherbicides: a brief concept, current status and prospects, examples of bio-herbicides

Unit: II

Integrated pest management (IPM): definition, concept, applications, principles, process, new challenges and future prospects; IPM for sustainable agriculture

Components of IPM: physical methods, regulatory control, mechanical control, cultural control, breeding of plant resistance, pesticide resistance, chemical control; biological control: definition, use of fungi, bacteria, insects, parasitoids, nematodes and antagonistic plants as bio-control agents; integrated pest management of rice in India

Integrated management of fungal diseases of crop plants.

Integrated pest management in fruits(Apple) and vegetable crops

Integrated nematode management: definition and concept

Tutorials

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Tutorials

Bot-OE 05: COMMERCIAL FLORICULTURE

Unit: I

Floriculture industry: lifestyle horticulture, ornamental floriculture in improving the environment and quality of life, global floriculture (international scenario and trade), status and scope of commercial floriculture in India and J&K, loose flower market in India, dried flowers and flower parts, potted flowers for indoor gardening, bedding and landscape plants, oils and natural dyes from flowers.

Unit: II

Hi-tech floriculture: concept, fertilizers and manures for commercial floriculture, methods and efficiency of fertilizer application, use of organic manures and biofertilizers in floriculture, ornamental plant nursery and seed production, production of bulbous plants, cut flower production and trade (storage, packaging, transport and marketing of cut flowers).

Tutorials

Bot-OE 06: FRUITS OF KASHMIR

Unit: 1

Introduction: scope and importance of horticulture with special reference to fruits of Kashmir

Area production and productivity of major fruits of Kashmir

Methods of propagation – concept of rootstock and scion, techniques of grafting, layering and budding for propagation of fruit crops

Concept of germplasm and genetic variability; germplasm conservation and its utility with special reference to apple.

Concept of organic fruit – prospects and limitations

Concept of germplasm and genetic variability: germplasm conservation and its utility with special reference to apple

Role of climatic factors in horticultural crop production

Unit: II

Introduction, cultivation and economic importance of – apple, apricot, almond, cherry, and walnut

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Introduction, cultivation and economic importance of – apple, apricot, almond, cherry, and walnut

Major diseases and disease symptoms in – apple, cherry and apricot

Concept of organic fruit- prospects and limitations

Concept of high density planting- merits and demerits

Processing and value addition in- apple, almond and walnut.

Tutorials

Bot-OE 07: WEED MANAGEMENT

Unit: I

Weed: definition, concept and characteristics of invasive, naturalized, causal, indigenous weeds

Physical and cultural weed control: smoother crops, crop rotation, hand pulling, hoeing, water management, machine tillage for weed control.

Biological control: definition, history and development; ecological basis for biological control; biotic agents for weed control, biological control of some terrestrial and aquatic weeds.

Chemical control: brief History, classification, herbicide families-their characteristics and practical importance, entry of herbicide into plants and mode of action

Unit: II

Prediction and risk assessment: weed risk assessment, species distribution modeling (GARP, MaxEnt), quarantine measures; early detection and rapid response

Revegetation of weed-infested landscapes: determining revegetation needs based on site characteristics; approaches for revegetation and restoration; selecting species for revegetation; methods for establishing weed resistant communities

Integrated and coordinated weed management strategies: integrated weed management; interdisciplinary requirements; making plans - setting goals; monitoring progress; coordinated weed management planning and coordinated weed management areas; weed management in CRMP (coordinated resource management planning) context

Tutorials

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Tutorials



Financial Appraisal of Projects

Course Code: MBA-15429-GE

MBA 4th Semester

Credits: 3

Cont. Assessment: 15

Term End Exam: 60

Min. Pass Marks: 40 %

Course Objectives: - *The purpose of this course is to acquaint the students with the procedure and practice of financial appraisal of projects.*

Unit-I

Financial Appraisal – Concept. Estimation of project cost. Means of financing and capital structure. Working capital requirements and its estimation. Financing of working capital.

Unit-II

Estimation of working results. Cost of Production and Profitability Estimates. Cash flow Estimates. Projected Balance sheets. Term Loan Repayment Schedules. Analyzing Financial Projections- Ratio Analysis, Break Even analysis.

Unit-III

Project Appraisal Techniques - Payback period, Average rate of return, Net present value and Internal rate of return. Risk Analysis for Projects. Sensitivity analysis, Decision tree analysis.

Suggested Reading:-

1. *Arnold G. "Corporate Finance", Pearson Education, New Delhi.*
2. *Chandra Prasanna. Project; Planning, Analysis, Financing, Implementation and Control, New Delhi, Tata McGraw Hill.*
3. *Chitale V P. Project Viability in Inflationary Conditions – A Study of Capital Cost and Project Viability, New Delhi, Vikas Publishing House.*
4. *Pandey I.M., "Financial Management" New Delhi, Vikas Publishing House.*
5. *Patel B M. Project Management – Strategic Financial Planning, Evaluation and Control. New Delhi, Vikas Publishing House.*

Name of Course Instructor:- Prof. Mushtaq A Darzi



Applied Operations Research

Course Code: MBA-15320-DCE
MBA 3rd Semester
Credits: 3

Cont. Assessment: 15
Term End Exam: 60
Min. Pass Marks: 40%

Unit-I

Introduction to OR: Managerial Decision Making and OR. OR Models: Principles and Types. Linear Programming and its application in management decision making, Duality, and Sensitivity Analysis

Unit-II

Transportation Models, Trans-shipment Problem, application in supply chain management Travelling Salesman Problem, Assignment Models. Replacement Models: Group Replacement, Individual Replacement Application of Queuing Theory

Unit-III

Inventory control (deterministic Models only) Price Break Inventory Model Dynamic Programming. Principles of Optimality, Recurrence Relation Game Theory: strategic importance, prisoners dilemma, Pure and Mixed Strategy.

Suggested Readings:

1. J K Sharma *Quantitative Techniques for Managerial Decisions.*
2. N D Vohra *Quantitative Techniques in Management*
3. S.D.Sharma *Operations Research 12th Kedar Nath Ram Nath & Co*
4. V.K.Kapoor *Operations Research 7th Sultan Chand*



Marketing of Services

Course Code: MBA-15302-CR
MBA 3rd Semester
Credits: 4

Cont. Assessment: 20
Term End Exam: 80
Min. Pass Marks: 40%

Course Objective: *The basic aim of this course is to expose the student to the unique challenges of marketing and managing services and delivering quality service to customers in a complex and dynamic marketing environment.*

Unit-I

Concept of services, importance, Goods versus Services marketing, Service Marketing Mix; Emergence & Reasons for growth of service sector in India, Characteristics of services, Classifications of services, Environment of Services Marketing, Service Quality Gap Model, Gronross Model of service quality; Challenges to Service Marketing.

Unit-II

Services Design and Development; Service Blueprinting; Service Process; Physical Evidence and Servicescape; Pricing of services; Services Distribution Management; Managing the Integrated Services Communication Mix; Managing Service Personnel; Employee and Customer Role in Service Delivery.

Unit-III

Importance of positioning in Services Marketing – Steps in developing a positioning strategy – Positioning Maps – Relationship Marketing: Creating and maintaining valued relationship with Customers; Service recovery –role of Internal Marketing in service delivery.

Unit-IV

Building marketing strategy for hospitality, tourism, travel, medical, information technology, educational, financial and entertainment services.

Note: - Cases Studies and other assignments will be provided by the concerned faculty in the class.

Suggested Readings:

8. Christian Gronroos, *Service Management and Marketing*, John Wiley & Sons Ltd.
9. Valarie A. Zeithaml, et al, *Service Marketing*, Tata McGraw-Hill.
10. Christopher Love Lock, *Service Marketing*, Pearson Education Asia.
11. Kruise, *Service Marketing*, John Wiley & Sons Ltd.
12. Tom Powers, *Marketing Hospitality*, John Wiley & Sons Inc.
13. Philip Kotler, *Marketing of non-profit organization*, Prentice Hall.
14. Helen Woodruffe, *Services Marketing*, Macmillan.



Data Analysis Using Excel

Course Code: MBA-15435-GE

MBA 4th semester

Credits: 2

Cont. Assessment: 10

Term End Exam: 50

Min. Pass Marks: 40 %

Unit- I

- Basic Excel environment, workbook, worksheet, worksheet components and their functions, Menus especially Formulas & Data menus
- Creating a worksheets, using basic formulas and formatting, using functions, inserting charts, importing data, pivot tables and charts
- Printing in Excel

Unit- II

- Analysing data- preparing data for analysis
- Parametric tests: Linear Regression and Correlation, t-test, z-test, ANOVA
- Non-parametric tests: sign test, Wilcoxon and Mann-Whitney tests

Note: Lab will be based on Units I and II

Suggested Readings:

1. Gerald Keller, "Statistics for Management", Cengage LearningPHI.
2. Gordon S.Linoff, "Data Analysis using SQL & Excel", Wiley Publishing.
3. Albright, Winston & Zappe, "Decision Making using Excel", Cengage LearningPHI.

Name of Course Instructor: Mr. Tariq Ahmad Lone



Technical Writing

Course Code: MBA-15114-OE

MBA 1st Semester

Credits: 3

Cont. Assessment: 15

Term End Exam: 60

Min. Pass Marks: 40 %

Course Objective: *To familiarize students with the mechanics of writing and enable them to write precisely and effectively. To express themselves in different genres of writing from creative to critical to factual writing and take part in print and online media communication.*

Unit-I

Personal & Social Communication:

Journal writing, mails/emails, SMS, greeting cards, situation based – accepting/declining invitations, congratulating, and consoling, conveying information. Blogs, Reviews, posting comments, tweets, cross-cultural communication, gender sensitivity in communication.

Unit-II

Workplace Communication: strategies for writing, e-mails, minutes, reports of different kinds – annual report, status report, survey report, proposals, memorandums, presentations, interviews, profile of institutions, speeches, responding to enquiries, complaints, resumes, applications, summarizing.

Unit-III

Media & Creative Writing: Techniques of writing, Features for publication (Newspapers, magazines, newsletters, and notice-board), case studies, short stories, travelogues, writing for children. **Research Writing:** Qualities of research writing, writing abstract, developing questionnaire, dissertation, data (charts, tables) analysis, documentation, Articles for publication

Suggested readings:

E. H. McGrath, S.J. 2012. Basic Managerial Skills for All. 9th ed. Prentice-Hall of India, New Delhi

Name of Course Instructor: Ms. Sumaira



Financial Statement Analysis

Course Code: MBA-15112-GE

MBA 1st Semester

Credits:2

Cont. Assessment: 10

Term End Exam: 50

Min. Pass Marks: 40 %

Course Objectives: - *The purpose of this course is to acquaint the students with the broad framework of analyzing financial statements of companies.*

Unit-I

Financial Statements – concept. Financial Statements Analysis: Meaning, objectives and process, Techniques of Analysis, Uses and preparation of Comparative financial statements, Common size financial statement, Trend analysis.

Unit-II

Ratio Analysis: Advantages, significance and limitations - Liquidity Ratios; Solvency Ratios; Profitability Ratios. Funds Flow Analysis – Concept, uses and preparation of funds flow statement; Cash Flow Analysis - Concept, uses and preparation of cash flow statement.

Suggested Readings:

1. J.R. Monga, *Basic Corporate Accounting*, Mayur Paperbacks (c/o K.L. Malik and Sons Pvt. Ltd, 23 – Darya Ganj, New Delhi.
2. Nirmal Gupta, Chhavi Sharma, *Corporate Accounting, Theory and Practice*, Ane Books Pvt Ltd, New Delhi.
3. M.C., Shukla, T.S. Grewal and S.C. Gupta, *Corporate Accounting*, S. Chand and Co., New Delhi.
4. Ashok Sehgal and Deepak Sehgal, *Advanced Accounting, Volume II*, Taxmann, New Delhi.
5. S.N. Maheshwari, and S.K. Maheshwari, *Corporate Accounting*, Vikas Publication, New Delhi.
6. Shukla M.C. Grewal T.S. and Gupta, S.C.: *Advanced Accounts*; S.Chand & Co. New Delhi.
7. *Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India*, New Delhi.
8. Agarwala A.N. Agarwala K.N.: *Higher Sciences of Accountancy: Kitab Mahal*, Allahabad

Name of Course Instructor:- Prof. Mushtaq A Darzi

Course No: CH15106DC
Title: Mathematics for Chemists (02 Credits)

Max. Marks: 50
End Term Exam: 40 Marks

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Probability and Vectors (08 Contact hours)

Probability: Variables, Discrete and continuous, sample space, event probability. Fundamental counting principles: permutations and combinations, binomial probabilities, Probability distribution functions, probability involving discrete & continuous variables. Average values, distribution moments and variance.

Vectors: Vectors, dot, cross and triple products with applications. Gradient, divergence and curl of a vector, vector calculus, Gauss' theorem, divergence Theorem

Unit-II Determinants and Matrix Algebra (08 Contact hours)

Determinants, basic concepts, types and properties

Matrices: rectangular, square, diagonal & triangular matrices, trace of a matrix; addition and multiplication of matrices, zero & identity matrix, transpose, adjoint & inverse of matrices, special matrices (symmetric, skew-symmetric, hermitian, skew-hermitian, unitary matrices.)

Matrix equations: Homogeneous and non-homogeneous linear equations and conditions for their solutions. Eigen-value problem

Unit-III Calculus (Differentiation and Integration) (08 Contact hours)

Functions & their continuity and differentiability. Rules for differentiation, applications of differential calculus including maxima & minima finding (Examples: Maximally populated rotational levels, Bohr's radius, most probable velocity from Maxwell distribution), exact and inexact differentials; applications to thermodynamic properties.

Integration, basic rules for integration, integration by substitution, by parts, partial fractions. Applications of integral calculus.

Unit-IV Elementary Differential Equations (08 Contact hours)

Partial differentiation, Co-ordinate transformations (Cartesian to spherical polar co-ordinates) Variables-separable and exact first order differential equations, homogeneous, exact and linear equation. Solutions of differential equation by power series method, Fourier series, second order differential equations and their solutions. (Applications to chemical kinetics and quantum chemistry.)

Books Recommended

1. Physical Chemistry; Thomas Engel & Philip Reid; Pearson Education;
2. The Chemistry Mathematics Book; E. Steiner; Oxford;
3. Mathematics for Chemistry; G. Doggett & B.T. Sutcliffe; Longmann; 1995.
4. Mathematics for Physical Chemistry; R. G. Mortimer; Elsevier; 2005.
5. Mathematical Methods for Scientists and Engineers; D.A.McQuarie; University Science Books; 2003.
6. Chemical Mathematics; D. M. Hirst; Longman;
7. Basic Mathematics for Chemists; Tebbutt; Wiley;
8. Mathematics for Chemists; C. L. Perrin; Wiley; 1970.
9. Mathematical Techniques in Chemistry; J. B. Dence; Wiley; 1975.
10. Mathematical Method in Physical Science; 2nd edn; M.L. Boas, John Wiley and Sons;

Course No: CH15107GE
Title: Chemistry of the Environment (02 Credits)

Max. Marks: 50
End Term Exam: 40 Marks

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Environment (08 Contact hours)

Introduction, Segments of Environment; Factors affecting environment. Biogeochemical cycles of C, N, P, S and O.

Nature and Composition of Soil: Air, Water, Inorganic Components, Organic matter and Humus. Macro and Micronutrients in Soil. Acid-Base and Ion exchange reactions in Soil.

Pollution: Fertilizers, Pesticides, Plastics and Metals.

Unit-II Hydrosphere (08 Contact hours)

Chemical Composition of Water Bodies: Lakes & rivers, Factors determining composition (thermal stratification, acid-base, pE concept).

Aquatic pollution: Inorganic, Organic, Pesticide, Agricultural, Industrial and Sewage.

Water quality parameters: Dissolved oxygen, Metals, Content of Chloride, Phosphate, Nitrate, and Microorganisms. Water quality standards.

Analytical Methods for determining BOD, DO, COD, and metals (As, Cd, Hg, Pb & Se) Choice of methods for determination.

Purification and treatment of water: Chlorination, Ozonation, UV radiation.

Unit-III Atmosphere-I (08 Contact hours)

Chemical Composition of the Atmosphere: Particles, ions, radicals and their formation.

Vertical profile of the atmosphere, Heat budget of earth's atmospheric system. Chemical and photochemical reactions in atmosphere, photochemical smog formation.

Oxides of N, C, S and their effects.

Ozone layer: Formation of ozone and mechanism of ozone depletion.

Unit-IV Atmosphere-II (08 Contact Hours)

Pollution by chemicals: Chlorofluorocarbons, hydrocarbons and ozone.

Green house effect: Cause, source and impact on global climate.

Consequences of Green house effect and remedial measures.

Acid rain: Chemical aspects, adverse effects and control.

Books Recommended

1. Environmental Chemistry; 5th edn; Colin Baird; Freeman & Co; 2012.
2. Environmental Chemistry; 9th edn.S.E.Manahan; Lewis Publishers;2009
3. A Textbook of Environmental Chemistry; O.D.Tyagi & M.Mehra; Anmol Publishers; 1990.
4. Environmental Chemistry; A.K.De; Wiley Eastern; 1995.
5. Environmental pollution Analysis; S. M.Khopkar; Wiley Eastern.
6. Environmental pollution; B.K.Sharma & H.Kaur; Goel Publishers;1996.
7. Environmental Chemistry; Nigel. J.Bunce; Wurez Publishers; 1991.
8. Environmental Toxicology; Ed.Rose; Gordon & Breach Science Publishers.

Course No: CH15108GE
Title: Surfactants and their Applications (02 Credits)

Max. Marks: 50

End Term Exam: 40 Marks.

Duration: 32 Contact hours

Continuous Assessment: 10 Marks

Unit-I Self-Assembly of Surfactants (08 Contact hours)

Surfactants and Micelles: Classification of Surfactants, Solubility of Surfactants: Kraft temperature and cloud point, Micellization of surfactants: critical micelle concentration (cmc), aggregation number, counterion binding, factors affecting cmc in aqueous media. Thermodynamics of micellization: pseudophase model and mass action models. Structure and shape of micelles: geometrical consideration of chain packing, variation of micellar size and shape with surfactant concentration.

Unit-II Micellar Solubilization and Catalysis (08 Contact hours)

Introduction, factors affecting micellar solubilization: nature of surfactant/solubilize, effect of additive and temperature. Effect of solubilization on micellar structure, cloud point and cmc of surfactants. Solubilization of drugs into micelles and its importance in drug delivery systems and controlled release. Theoretical consideration of reactions in micellar media. Examples of micellar catalysis for hydrolysis, oxidation and reduction reactions

Unit-III Mixed Surfactant Systems (08 Contact hours)

Mixed micelle formation, mixed monolayer formation, synergism, various models of mixed micelle formation (Clint, Rubingh, Motamurra, Blankschtein, and Rubing-Holland models) and mixed monolayer formation (Rosen's model). Importance and practical applications of mixed surfactant systems.

Unit-IV Surfactant-Polymer Systems (08 Contact hours)

Effect of polymers on aggregation behavior of surfactants and the factors governing their interaction. Phase behavior of polymer-surfactant mixtures. Characterization of polymer-surfactant systems by various techniques like viscosity, light scattering, spectroscopic and conductance measurements. Applications of surfactant-polymers systems.

Course No: CH15109GE
Title: Chemistry of Bio-molecules (02 Credits)

Max. Marks: 50
End Term Exam: 40 Marks

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Carbohydrates (08 Contact hours)

Definition, classifications. Significance of right and left handedness.

Production through photosynthesis

Composition and functions of:

Monosaccharides: Glucose, Fructose and Galactose.

Disaccharides: Sucrose, lactose and Maltose. Invert Sugar.

Polysaccharides: Starch, glycogen and Cellulose.

Aerobic and Anaerobic metabolism

Unit-II Lipids (08 Contact hours)

Oils and Fats: Fatty acids and Triglycerides. Saturated and Unsaturated fatty acids (MUFA and PUFA). Rancidity of Oils & Fats. Absorption of toxic substances by fat.

Steroids: Cholesterol, transport of Cholesterol in blood stream. Cholesterol and heart diseases, Recommended values of HDL and LDL, Steroidal hormones and anabolic steroids

Unit-III Proteins and Enzymes (08 Contact hours)

Proteins: Introduction, Amino Acids: Structural features and classification.

Primary, Secondary, Tertiary and Quaternary structures of proteins and their significance.

Denaturation and Renaturation of proteins. Urea cycle.

Enzymes: Classification. Theories of mechanism of action of Enzymes; Fisher Lock and Key Theory, Koshland's Induced Fit Theory. Mechanism of action of Chymotrypsin and Carboxypeptidase.

Unit-IV Nucleic Acids, Vitamins and Minerals (08 Contact hours)

Nucleic acids: Structural features of nucleotides, Nucleotides : DNA and RNA.

Vitamins: Classes of Vitamins and their functions. Vitamin deficiency diseases.

Minerals: Macro and Micro minerals. Their functions and diseases caused by their deficiencies.

Books Recommended

1. Organic Chemistry; 5th edn;. Vol.2, I.L. Finar (Addison Wesley Longman-2000).
2. Biochemistry, Biotechnology and Clinical Chemistry of Enzymes; Trevor Palmer (EWP). Organic Chemistry by I.L.Finar; Vol. II (ELBS Longamnn).
3. Lehninger's Principles of Bio-chemistry; D.L. Nelson; M.Cox Worth publications; 2000.
4. Introduction to Nucleic Acids and Related Natural Products; Ulbight; Oldborn Press.
5. Chemsitry of Natural Products; S.V. Bhat, B.A. Nagasampagi, M. Siva Kumar. Naroosa Publishing House; New Delhi.

Course No: CH15110OE
Title: Chemistry in Everyday Life-I (02 Credits)

Max. Marks: 50
External Exam: 40 Marks.

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Household Chemicals (08 Contact hours)

Chemistry of Soaps, detergents, optical brighteners and bleaching agents, shampoos , conditioners , dyes, hair curling and permanents, deodorants and antiperspirants, perfumes, tooth pastes and sunscreen lotions.

Unit-II Water- An Amazing Chemical Stuff (08 Contact hours)

Molecular structure and its unique properties. Composition of natural water. Hard and Soft water. Standards for drinking water. Major causes of water pollution. Contamination of water: Chemical substances affecting potability, color, turbidity, odour, taste, pH and conductivity of water. Methods of treatment of water for domestic and industrial purposes: Sedimentation, Coagulation, Filtration, Sterilization, Break point Chlorination, Flocculation & Fluorination, demineralization and reverse osmosis. Determination of alkalinity of water. Water born diseases.

Unit-III Fossil Fuels (08 Contact hours)

Coal: Formation of Coal deposits. Types & composition of coal. Fuel value of various coals. Analysis of coal: Proximate and ultimate analysis. Significance of fuel gas analysis. Carbonization of coal.

Oil & Natural Gas: Composition & chemical structures of petroleum products. Refining of petroleum, cracking & catalytic reforming. Octane & Cetane rating of fuels. Diesel engine fuel, Kerosene and Gasoline. Lead in petrol: its role, disadvantages & alternatives. LPG & CNG as fuel, addition of mercaptanes to natural gases for safety reasons.

Unit-IV Polymers and Plastics (08 Contact hours)

Characteristics and Types of Polymers.

The big six of Polymer: Low Density Polyethylene (LDPE) , High Density Polyethylene (HDPE), Polypropylene PP), Polystyrene (PS), Polyvinyl Chloride (PVC) and Polyethylene - Tetra phthalate (PET or PETE)- their chemical characteristics and uses.

Books Recommended

1. Industrial Chemistry; by B.K.Sharma; Goel publishing House.
2. Applied Chemistry; by K.Bagavathi; Sundan MJP Publishers; 4th edn; Applying Chemistry to Society; McGraw Hill; 2013.
3. Principles of Modern Chemistry; 2nd edn; Oxtoby and Nachtrieb; Saunders College Publications; 1987.
4. Chemistry Fundamentals An Environmental Prospective; 2nd edn; Buell and Girad; Jones and Barlett; 2013.
5. www.chemistryincontext; (American Chemical Society)

Course No: CH15208GE

Title: Soil Chemistry and Environmental Analysis (02 Credits)

Max. Marks: 50

End Term Exam: 40 Marks

Duration: 32 Contact hours

Internal Assessment: 10 Marks

Unit I Nature and Composition of Soil (08 Contact hours)

Water and Air in soil. Inorganic and Organic components in soil. Soil Humus and soil solution. Acid-Base and Ion-Exchange reactions in soils. Production of mineral acids, Soil acidity and Ion-exchange equilibria in soil. Macro- and Micro-nutrients in soil.

Unit II Soil Pollution (08 Contact hours)

Fertilizers, pesticides, fumigants and livestock production.

Wastes and pollutants in soil: Chemical degradation, photochemical reactions and Biodegradation.

Soil loss and Degradation: Desertification, Deforestation and Soil erosion.

Unit III Environmental Analysis-I (08 Contact hours)

Environmental Analysis of water and waste water: General aspects, error and quality control.

Water Analysis Methods: Classical and Spectrophotometry (Absorption Spectrophotometry, Atomic absorption and Emission Analyses). Electrochemical methods and Ion chromatography. Analytical methods for determining dissolved oxygen, BOD and COD, Choice of methods for determining trace metals (As, Cd, Hg, Pb and Se).

Unit IV Environmental Analysis-II (08 Contact hours)

Air pollutants, sampling and methods of analysis (flame photometry, gas chromatography and spectrophotometry).

Determination of oxides of S, N, C, hydrocarbons and organics.

Continuous monitoring instruments as analytical tools for measuring air pollutants: NDIR, GC-MS, Chemiluminescence and Spectrophotometry.

Books Recommended

1. Textbook of Soil Chemistry; L. Bhattacharya; Discovery Publishing House; 2011.
2. Chemistry of the Soil; 2nd ed.; Firman E. Bear; Oxford; 1984.
3. Environmental Chemistry; Nigel. J. Bunce; Wurez Publishers; 1991.
4. Environmental Chemistry; 2nd edn; Colin Baird; Freeman & Co; 1991.
5. A Textbook of Environmental Chemistry; O. D. Tyagi & M.Mehra; Anmol Publishers; 1990.
6. Environmental Chemistry; A. K. De; Wiley Eastern; 1995.
7. Environmental pollution Analysis; S. M. Khopkar; Wiley Eastern.
8. Environmental Chemistry; S. E. Manahan; Lewis Publishers; 2000

Course No: CH15209GE
Title: Separation Techniques (02 Credits)

Max. Marks: 50

End Term Exam: 40 Marks.

Duration: 32 Contact hours

Internal Assessment: 10 Marks

Unit I Introduction to Separation Techniques

Introduction to sample pretreatment. Sample Preparation: Grinding, homogenization and drying of the sample. Dissolution and digestion of insoluble species. General theory of separation efficiency. Classification of separation techniques: Separation based on size, mass or density, complexation, Change of state and partitioning between phases.

Extraction: Solvent extraction technique, Solid Phase Extraction (SPE) Solid Phase Micro Extraction (SPME). Liquid – liquid extractions, Extraction of Inorganic analytes. Derivatisation, Supercritical fluid extraction.

Unit II Chromatographic procedures for preliminary separations

Fundamentals of Chromatography. Classical and Kinetic theories. Qualitative and quantitative analysis using Chromatographic methods. Basic principles of adsorption, liquid – liquid, liquid – solid, ion exchange and molecular exclusion Chromatography.

Unit III Chromatographic Techniques-I

Theory and applications of Paper Chromatography, Thin layer Chromatography, Column Chromatography, Gas Chromatography, Liquid Chromatography and High Performance liquid Chromatography.

Ion Exchange Chromatography. Classical and High performance techniques. Size Exclusion Chromatography, Super Critical Fluid Chromatography. Affinity and Chiral Chromatographic Techniques.

Unit IV Chromatographic Techniques-II

Multidimensional chromatographic techniques involving thin layer, liquid and gas chromatography. Coupling of Chromatographic and Spectroscopic techniques: GC-MS, GC-FTIR, LC-MS and LC-NMR.

Classical Electrophoresis, Gel and Capillary

Electrophoresis: Introduction classical electrophoresis : Factors affecting ion migration. Principle and application of gel and capillary electrophoresis. Introduction and application of high performance capillary electrophoresis and capillary electro chromatography.

Field Flow Fraction (FFF): Principles of separation, sub-techniques of FFF. Applications.

Books recommended

1. Analytical Chemistry, 2nd Ed. , R. Kellner , J.M. Mermet, M.Otto, M. Valcarcel and H.M. Widmur; Wiley (VCH) 2004.
2. Modern Chemical Techniques; CB. Faust; RSC- 1998.
3. Principles and Practice of Analytical Chemistry; F.W. Fifield and D. Kealey; Blackwell Publishing – 2004.
4. Modern Analytical Chemistry; David Harrey ; McGraw Hill – 2000
5. Fundamental of Analytical Chemistry, 8th edn; Skoog, West Hollar and Crouch , Cengage learning (Brooks/cole) – 2004.

Course No: CH15210OE

Title: Chemistry in Everyday Life-II (02 Credits)

Max. Marks: 50

End Term Exam: 40 Marks

Duration: 32 Contact hours

Internal Assessment: 10 Marks

Unit I Nutrition (08 Contact hours)

Digestive Processes: Breaking down of larger molecules into smaller molecules undergoing metabolism like carbohydrates, Proteins, fats and Vitamins. Aerobic and Anaerobic Metabolism of Carbohydrates. Role of Fat in Animal Metabolism.

Energy value of Nutrients: Fats and oils, sweets, vegetables and fruits. Counting of energy calories. Per day energy requirements.

Unit II Agro Chemicals: (08 Contact hours)

Composition and properties of soil, Inorganic and Organic components of soil.

Plant nutrients: Secondary and micro nutrients and their functions.

Fertilizers: Inorganic and Organic fertilizers.

Insecticides, Pesticides and herbicides, Environment and health problems with synthetic pesticides.

Alternate method of insect control: Pheromones, Hormones and Biological control.

Neem: The World's Pharmacy.

Unit III Ceramics (08 Contact hours)

Ceramics: Composition, structure and properties of ceramics. How to make ceramics.

Silicate Ceramics: Potteries and Clay products. Glass (composition of various glasses),

Cements: Composition of Portland cement.

Unit IV Forensic Chemistry (08 Contact hours)

Introduction. History of forensic science, Theory of forensic analysis. Fingerprint development, Ninhydrin, Silver Nitrate and Phenolphthalein reactions. Cyanoacrylate and Luminol Tests. Alcohol Detection. Hair, Urine and Blood Analysis. DNA fingerprinting. Super glue fuming.

Books Recommended

1. Text book of Engineering Chemistry by S. S. Dara, S.S. Umare (S. Chand and Co). 2013.
2. Engineering Chemistry by M. M. Uppal. & S. Bhatia. (Khanna Publishers).
3. Chemistry in Engineering and Technology by J. C. Kuricose & J. Rajaram (Tata McGraw Hill). 1984
4. General Organic and Bio-chemistry by Bettelheim and Brown. (Campbell books/cole) – 2009.
5. Forensic Chemistry by Suzana Bell (Pearson Prentice-Hall)- 2006
6. Forensic Chemistry Handbook by Lawrence Kobilmsky (John Wiley & Sons Inc.) – 2012.
7. [http:// www.aafs.org](http://www.aafs.org).
8. <http://www.fbi.gov>.

Course No: CH15310OE
Title: Philosophy of Science (02 Credits)

Max. Marks: 50
End Term Exam: 40 Marks

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Representation (08 contact hours)

Laws of nature: Knowledge, Sources of knowledge, The rationalists, The empiricists, The Mathematical knowledge, Synthetic Knowledge, Science as knowledge source, Religion and science The Method of science, Induction versus deduction, Representation and reason, Probabilistic laws, Basic and derived laws,
Realism: Realism and its critics, Instrumentalism, Constructive empiricism, Laws and antirealism, Anti-realism and structure of science.

Unit-II Reason (08 contact hours)

Inductive Scepticism: Theory and observation, Dissolving the problem of Induction, Probability and scientific inference, Kinds of Probability,
Inductive Knowledge: Reliabilist epistemology, reasoning with induction, Innate epistemic capacities and reasoning about induction, Internalism and justification.
Method and Progress: Methodology of scientific research programmes, Clinical trials and the scientific method, The content of discovery and the context of justification, Science without the scientific method, Method and the development of sciences, Paradigms and Progress.

Unit-III Classical Determinism and Probabilistic world (08 contact hours)

The Classical Mechanics: Mechanistic determinism, General principles; Action at a distance, Electric and magnetic forces, Failures of the classical mechanics; Atomic structure, problem of radiation.
The birth of modern science: The photo-electric effect, The atomicity of radiation, Particle wave duality, waves of probability, Uncertainty principle, subject versus object, the fundamental laws of radioactivity, The new Quantum theory, wave mechanics, Diracs Quantum mechanics, The new philosophical principles, the probabilistic reasoning.

Unit-IV The Dawn of Modern Thinking (08 contact hours)

The arrow of Time: From Descarts to quantum theory, the relation of quantum theory to other natural sciences. Language and reality in modern science. The role of modern science in the present development of human thinking.

Books Recommended:

5. Philosophy of science; Alexander Bird; McGill-Queen's University Press.
6. Physics and Philosophy; W. Heisenberg; Harper Perennial Modern Classics.
7. Physics and Philosophy; Sir James Jeans; Cambridge University Press.
8. Reconstruction of religious thought in Islam; Muhammad Iqbal; Adam Publishers & Dodo Press.
9. Philosophy of natural science; Carl G. Hempel; Pearson.
10. The philosophy of science; David Papineaus; Oxford University Press.
11. Reality and Representation; David Papineaus; Blackwell Publication.
12. Belief, truth and knowledge; D.M. Armstrong; Cambridge University Press.
13. Modern epistemology; Nicholas Everitt and Alec Fisher; McGraw-Hill Higher Education.
14. The structure of scientific revolution; Thomas S. Kuhn; The University of Chicago Press

Course No: CH15414DCE
Title: Chemistry of Materials (02 Credits)

Max. Marks: 50

External Exam: 40 Marks

Duration: 32 Contact hours

Internal Assessment: 10 Marks

Unit-I Langmuir Blodgett Films and Liquid crystals (8 Contact hours)

Langmuir- Blodgett Films: Introduction and general preparative techniques. LB Films of various compounds (hydrocarbon, liquid crystals compounds and polymers), Applications – nonlinear optical effects, conduction, photoconductivity and sensors.

Liquid Crystals: Mesomorphism, types of liquid crystals, molecular structural requirement of mesomorphism, properties of liquid crystals, Applications – Liquid crystal displays, thermography, optical imaging and ferroelectric liquid crystals.

Unit-II Organic Solids and Molecular Devices (8 Contact hours)

Organic solids and fullerenes: Organics conductors, magnetism in organic materials. Fullerenes- History, bonding, properties, doped fullerenes, fullerenes as superconductors and fullerene related compounds (carbon nanotubes)

Molecular devices: Molecular rectifiers and transistors, artificial photosynthetic devices, switches and sensors.

Unit-III Optical materials (8 Contact hours)

Luminescence and phosphors. Lasers – general principle of lasing action, Ruby laser, Neodymium-YAG lasers, semiconducting lasers, quantum cascade and quantum dot lasers.

Nonlinear optical effects, second and third order harmonic generation, nonlinear optical materials.

Unit- IV Solid electrolytes and High T_c Superconductors (8 Contact hours)

Ionic Conductors: Introduction to ionic conduction, types of ionic conductors, mechanism of ionic conduction- interstitial jumps (Frenkel) and vacancy mechanism. Super-ionic conductors: Diffusion and transition superionic conductors. Examples and applications of ionic conductors.

High T_c superconductors: Superconductors: Properties and types. high T_c superconductivity in cuprates: Structure and preparation of 1-2-3 materials, mechanism of high T_c superconductivity, Applications of High T_c materials.

Books Recommended

1. Introduction to Solids, Azaroff, Tata McGraw, 1993.
2. Solid State Chemistry and its Applications, West, Wiley, 2014.
3. The Physical Chemistry of Solids, Borg, Biens, Academic press, 1992.
4. Solid State Physics, N. W. Ashcroft and N. D. Mermin, Saunders college, 2001
5. Principles of Solid State, H. V. Keer, Wiley Eastern; 2008.
6. Thermotropic Liquid Crystals, Ed., G.W. Gray, John Wiley.
7. The Physics and Chemistry of materials, J.I. Gersten, F.W. Smith, John Wiley and sons, Inc. 2001.
8. New directions in solid state chemistry, C.N.R. Rao and J. Gopalakrishnan, Cambridge University Press, 2nd ed. 1997.
9. Introduction to superconductivity, Micheal Tinkham, Dover books, 2nded. 2004.

Course No: CH15419GE
Title: Novel Materials (02 Credits)

Max. Marks: 50
External Exam: 40 Marks

Duration: 32 Contact hours
Internal Assessment: 10 Marks

Unit-I Block Co-Polymers and Langmuir Blodgett Films (08 Contact hours)

Block Copolymers: Introduction: classification, micellization of diblock and triblock copolymers. Introduction to pH-, thermo- and Photo-responsive block copolymers. Linear-dendrimer block copolymers: introduction, structural peculiarities of their aggregates, potential applications.

Langmuir- Blodgett Films: Introduction and general preparative techniques. LB Films of various compounds (hydrocarbon, liquid crystals compounds and polymers), Applications – nonlinear optical effects, conduction, photoconductivity and sensors.

Unit- II Organic Solids and Molecular Devices (08 Contact hours)

Organic solids and fullerenes: Organics conductors, organic superconductors. Fullerenes- History, bonding, properties, doped fullerenes, fullerenes as superconductors. Carbon nanotubes: Types, Properties and Applications.

Molecular devices: Molecular rectifiers and transistors, switches and sensors.

Unit-III Optical materials: (08 Contact hours)

Luminescence and phosphors. Lasers - general principle of lasing action, Ruby laser, semiconducting lasers and quantum cascade lasers.

Nonlinear optical effects, second and third order harmonic generation, nonlinear optical materials.

Liquid Crystals: Mesomorphism, types of liquid crystals, molecular structural requirement of mesomorphism, properties of liquid crystals, Applications – Liquid crystal displays, thermography, optical imaging and ferroelectric liquid crystals.

Unit- IV Nanomaterials and composites (8 Contact hours)

Nanomaterials: Introduction with examples and applications of nanoparticles, nanofibers (nanowires, nanotubes and nanorods) and nanoplates.

Composites: Polymer-nano-object blends, Metal-Matrix composites, self-repairing composites and Nanofluids for Thermal transport.

Books Recommended

1. Solid State Chemistry and its Applications, West, Wiley, 2014.
2. The Physical Chemistry of Solids, Borg, Biens, Academic press, 1992.
3. Solid State Physics, N. W. Ashcroft and N. D. Mermin, Saunders college, 2001
4. Principles of Solid State, H. V. Keer, Wiley Eastern; 2008.
5. Thermotropic Liquid Crystals, Ed., G.W. Gray, John Wiley.
6. The Physics and Chemistry of materials, J.I. Gersten, F.W. Smith, John Wiley and sons, Inc. 2001.
7. New directions in solid state chemistry, C.N.R. Rao and J. Gopalakrishnan, Cambridge University Press, 2nd ed.
8. Nanotechnology, An Introduction, J. J. Ramsden, Elsevier, 1st Edition, 2011.
9. Essentials of Nanotechnology, J. J. Ramsden, Jeremy Ramsden and Ventus Publishing ApS, 2009.

Course No: CH15420OE
Title: Food Chemistry (02 Credits)

Max. Marks: 50

End Term Exam: 40 Marks

Duration: 32 Contact hours

Continuous Assessment: 10 Marks

Unit-I Food Components (08 Contact hours)

Chemistry of different components of food: Composition and functions of Sugars, Polysaccharides, Lipids, Proteins, Vitamins and Minerals.

Unit-II The Chemistry of Food Colours and flavours (08 Contact hours)

Introduction. Pigments in animal and plant tissues: Chlorophyll, Carotenoids, Anthocyanins and other Phenols. Natural and artificial food colorants.

Definition of flavor. Classification of food flavors. Chemical components responsible for the following: Sweetness, Saltiness, Sourness, Bitterness, Astringency, Pungency, Meatiness and Fruitiness. Synthetic flavouring.

Unit-III The Chemistry of Food Preservatives: (08 Contact hours)

Introduction. Basis of Food Preservation. Food additives: Sodium Chloride, Nitrites, Smoke, SO₂, Benzoates and other Organic acids.

Unit-IV The Undesirables in Food Stuff (08 Contact hours)

Autooxidation and antioxidants. Modified atmosphere and vacuum packaging. Toxins of plant foods. Toxins of animal foods. Toxic agriculture residue Toxic metal residue. Toxins generated during heating and packaging of food. Environmental pollutants of food stuff.

Books Recommended

1. Food Chemistry; Owen R. Fennema; 3rd Ed.; Marcel Dekker, Inc. NY; 2005.
2. Food: The Chemistry of its components; T.P. Coultate; 3rd Ed.; RSC Paperbacks; 1996.
3. Food Flavours; Biology and Chemistry; Carolyn Fisher and Thomas R Scott; RSC Paperbacks; 1997.
4. Food Preservatives; H.J. Russell and G. W. Gould; 2nd ed.; Springer International Edition; 2005.

CLB15103CR: Lab course-I

- Biochemical calculations
- Concept of pH and buffers
- Qualitative analysis of carbohydrates
- Qualitative analysis of amino acids
- Qualitative analysis of lipids
- TLC and paper chromatography amino acids and sugars
- Quantitative Estimation of proteins using Lowry's/ Biurett method
- Quantitative Estimation of glucose by Nelson Somogy's method
- Quantitative Estimation of cholesterol by Zlatki's Method
- Titrimetric estimation of ascorbic acid
- Sterilization techniques
- Preparation of culture media, pure culture techniques
- Study of bacterial growth by turbidimetry/ spectrophotometry and serial dilution methods
- Extraction and Assay of Enzymes

CLB15203CR: Lab Course-II

- Isolation of bacterial genomic DNA
- Isolation of Plasmid DNA
- Preparation of genomic DNA from Plant tissue by CTAB method
- Isolation of DNA from blood samples by Phenol-Chloroform method
- Qualitative and quantitative determination of DNA
- Absorption spectra of Nucleic Acids and Determination of melting temperature of calf thymus DNA.
- Denaturation of DNA and UV absorption studies.
- Agarose gel electrophoresis
- Polyacrylamide gel electrophoresis (PAGE) and SDS- PAGE
- Amplification of DNA segment by PCR

CLB15303CR: Lab Course-III

- Estimation of serum albumin and determination of albumin/globulin ratio.
- Estimation of serum triglycerides, total cholesterol, HDL cholesterol, LDL cholesterol.
- Estimation of serum bilirubin
- Estimation of serum acid phosphate, alkaline phosphate, ALT and AST and their clinical use
- Estimation of serum urea and creatinine
- Urine analysis – Routine and microscopic examination
- Sub Cellular fractionation and marker enzymes activity
- Estimation of serum of normal and sickle hemoglobin
- Estimation of T3, T4, and TSH by ELISA/RIA
- Estimation of antinuclear antibodies and C reactive protein
- Separation of mononuclear cells by Ficoll-Hypaque.
- TLC/ DLC
- Estimation of non-protein nitrogen, urea, urate, creatine and creatinine.
- Tests for urinary proteins
- Tests for lipids and lipoproteins
- Estimation of cholesterol
- Estimation of Na^+ , K^+ and Cl^-
- Estimation of Ca^{++} , Mg^{++} and P
- Estimation of Fe^{+2} , Cu^{+2} and Zn^{+2}
- Estimation of porphyrins and hemoglobin
- Tests for gastric function, occult blood
- Tests for liver and billiary tract diseases
- Tests for renal diseases

SEMESTER IV

CLB15401CR: Internship Dissertation

Internship represents a cross-over point between university and career. The experience one gets during an internship will indicate how he/she should structure future studies, particularly when it comes to deciding what aspects one should focus on. Students carry their internship program outside the parent department wherein project work will be carried out, based on research and actual bench work under the guidance of their respective supervisor at the place of internship. The department facilitates the students for placement for their internship. During the program the students are in close touch with their respective teachers in the department. The students are expected to put at least six working hours daily for a maximum period of six months. At the end of the internship, the internship dissertation will be submitted in the parent department and evaluated.

CLB15402CR: Host Institute Grading

During the internship, the students will be critically evaluated by the supervisors and will be graded by them based on their attendance in the lab, daily experimental work, writing and communication skills and other criteria related to routine lab work.

CLB15403CR: Internship Assessment

This will include an openers enation, defending their dissertation work to be evaluated by an external examiner (to be nominated by Head of the Department) and all the faculty members. The presentation will be followed by the viva of the students to be carried out by the external examiner.

SEMESTER- II

Human Development

Course code: ECO-15209-GE

Unit 1: Human Development: Conceptual Framework

Background and Concept of Human Development, Dimensions and attributes of Human Development, Concepts of Sustainability, Empowerment, Equity, Productivity and Accountability.

Unit 2: Measurement of Human Development

Measuring Human Development— different approaches, Gender Development Index (GDI), Difficulties in measurements.

Unit 3: Human Development in India

Human Development indicators in India, Human Development and Economic Growth, Human Development India— an inter-state comparison

Course No. ELE-15403C

Paper type: Core

Industrial Training and Seminar Work

Credits: 0L+1T+2P

I. Industrial Training:

The students are required to undergo training at some centre of excellence, outside the State, to get additional exposure in the new and emerging areas in the field of Electronics. Training Incharge/s from the Department shall accompany the students for making necessary academic and other arrangements at the host institute. At the end of the training programme, the performance of the students shall be evaluated by the host institute in collaboration with the Training Incharge.

II. Seminar Work

Each student shall be required to deliver a power point presentation on any topic pertaining to some latest area in the field of Electronics & Communication. Each student shall be evaluated for his/her Seminar Work by a team of faculty members headed by the Seminar Incharge.

Course No. ELE-15404C

Paper type: Core

Project Work

Credits: 0L+0T+8P

The students shall be divided into groups, with not more than 4 students in a group. Each group of students shall choose to work on a hardware/software project pertaining to the area of Electronics. The major theme of the project shall be to develop a prototype solution for a commercially needful application.

Each Project Group shall work under the supervision of Project Guide allocated within/outside the Department. The project Reports prepared by the students, as well as the working prototype shall be evaluated by an external Examiner.

ENG-04-DCE:Kashmiri Literature in English Translation

Unit I: Poetry

Lala Ded :Vakhs

- With a rope of loose-spun am I towing
- Import not esoteric truth to fools
- My guru gave but one precept
- Shiva abides in all that is everywhere
plus numbers 4,23,24,54 from
(trans. Prof J L Koul)

Shaikh-ul-Alam: Shruhks:

- The crow keeps on cawing to me somber forebodings
- With a single breath mountains will resound
- Whomsoever thou givest, none can take away from him
- Awhile I saw the stream aflow
- Awhile I feasted on the balmy dew
- The burning passionate fire of youth
(trans. Prof G R Malik)

Unit II: Poetry

Habba Khatoon:

- I will seek you down the wandering brooks
- Come friend, let's seek my love
- I can't live with my in-laws
- What blazing fire I nurse within
(trans. Trilokinath Raina)

Mahmud Gami:

- Shereen Khusraw-We have it on Nizami's authority (trans. Mohd Amin Malik)
- The Parable of Man- I sought man's parable in a bubble (trans. Shafi Shauq)

Unit III: Poetry

Mehjoor

- Stay O' Love and hear my plaint
- I will make garlands of flowers(Trans. Trilokinath Raina)
- Spring-
- Thrilling the hearts with your sights and scenes(Trans. Shafi Shauq)
- Freedom (Trans. Hamida Bano)

Rehman Rahi:

- Inklings from the Dark (Trans. Prof G R Malik)
- The Splendor and the Psalm (Trans. Ab Rashid Majrooh)

Unit IV: Short Story:

- Akhtar Mohiddin: *Butcher in the Bosom* (Trans. Hamida Bano)
- Hari Krishan Koul: *This Capital City* (Trans. Nusrat Bazaz)
- Amin Kamil: *The Autumnal Storm* (Trans. Mohd Amin Malik)

Course Descriptions 1st Semester

CORE COURSES

ENS17101CR: Fundamentals of Environmental Science (04 credits)

Unit I: Components of environment

- 1.1. Definition, principle and scope of environmental science
- 1.2. Atmosphere: Structure and composition
- 1.3. Hydrosphere and cryosphere: Hydrological cycle
- 1.4. Lithosphere: Structure and composition
- 1.5. Biosphere: Components

Unit II: Ecosystem dynamics

- 1.1. Structure and function of ecosystems
- 1.2. Ecosystem resilience
- 1.3. Primary productivity
- 1.4. Secondary productivity
- 1.5. Energy flow, energy models and energy relations in ecosystems

Unit III: Population and community ecology

- 1.1. Characteristics of population
- 1.2. Population growth and population interactions
- 1.3. Population regulation: Density dependent and density independent
- 1.4. Concept and characteristics of communities
- 1.5. Ecological succession, primary and secondary processes in successions, climax community and types of climax

Unit IV: Meteorology

- 1.1. Meteorological parameters: Atmospheric pressure, temperature, precipitation, humidity and wind
- 1.2. Radiation and heat budget
- 1.3. Atmospheric stability
- 1.4. Temperature inversions
- 1.5. Wind roses

ENS17102CR: Environmental Chemistry (04 credits)

Unit I: Analytical chemistry

- 1.1. Stoichiometry
- 1.2. Titrimetry and gravimetry
- 1.3. Potentiometry (pH and conductivity)
- 1.4. UV-visible and flame photometry
- 1.5. Atomic absorption spectrophotometry

Unit II: Atmosphere chemistry

- 1.1. Formation and evolution of earth's atmosphere
- 1.2. Ions, radicals and particulates in the atmosphere

- 1.3. Formation of inorganic and organic particulate matter
- 1.4. Thermo-chemical and photochemical reactions in the atmosphere
- 1.5. Chemistry of green house gasses

Unit III: Water chemistry

- 1.1. Physico-chemical characteristics of water
- 1.2. Solubility of gases in water; dissolved gases in water - CO₂, O₂, H₂S, CH₄ and NH₃
- 1.3. Biochemical oxygen demand and chemical oxygen demand
- 1.4. Carbonate-bicarbonate system
- 1.5. Redox potential

Unit IV: Soil chemistry

- 1.1. Soil profile and pedogenesis
- 1.2. Inorganic and organic components of soil
- 1.3. Physico- chemical properties of soils
- 1.4. Biochemical properties of soil
- 1.5. Soil classification and types

ENS17103CR: Laboratory Course

(04 credits)

Course Contents

1. Estimation of volume of a water body: Pond, pool, lake
2. Determination of the soil texture in different terrestrial habitats
3. Estimation of meteorological parameters (temperature, precipitation, humidity, wind)
4. Determination of latitude, longitude and altitude of a place
5. Demonstration of major rock types
6. Determination of light intensity in different habitats
7. Standardization of reagents – titrants (acids, bases)
8. Determination of pH, conductivity, alkalinity and acidity of water samples
9. Estimation of pH, conductivity and alkalinity of soil samples
10. Estimation of free carbon dioxide content in water samples
11. Estimation of chloride content in different water and soil samples
12. Estimation of cations (calcium, magnesium, sodium, potassium) in water samples
13. Estimation of cations (calcium, magnesium, sodium, potassium) in soil samples
14. Experimental verification of Beer-Lambert's law
15. Determination of primary productivity aquatic habitats
16. Determination of primary productivity in terrestrial habitats
17. Study of dose – effect relationships in important toxicants/pollutants
18. Study of leaf pigment by paper chromatography and TLC methods
19. Estimation of protein and carbohydrate content in biological samples
20. Collection and identification of the fish fauna of different aquatic habitats

- 1.3. Formation of inorganic and organic particulate matter
- 1.4. Thermo-chemical and photochemical reactions in the atmosphere
- 1.5. Chemistry of green house gasses

Unit III: Water chemistry

- 1.1. Physico-chemical characteristics of water
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ENS17103CR: Laboratory Course

(04 credits)

Course Contents

1. Estimation of volume of a water body: Pond, pool, lake
2. Determination of the soil texture in different terrestrial habitats
3. Estimation of meteorological parameters (temperature, precipitation, humidity, wind)
4. Determination of latitude, longitude and altitude of a place
5. Demonstration of major rock types
6. Determination of light intensity in different habitats
7. Standardization of reagents – titrants (acids, bases)
8. Determination of pH, conductivity, alkalinity and acidity of water samples
9. Estimation of pH, conductivity and alkalinity of soil samples
10. Estimation of free carbon dioxide content in water samples
11. Estimation of chloride content in different water and soil samples
12. Estimation of cations (calcium, magnesium, sodium, potassium) in water samples
13. Estimation of cations (calcium, magnesium, sodium, potassium) in soil samples
14. Experimental verification of Beer-Lambert's law
15. Determination of primary productivity aquatic habitats
16. Determination of primary productivity in terrestrial habitats
17. Study of dose – effect relationships in important toxicants/pollutants
18. Study of leaf pigment by paper chromatography and TLC methods
19. Estimation of protein and carbohydrate content in biological samples
20. Collection and identification of the fish fauna of different aquatic habitats

DISCIPLINE CENTRIC ELECTIVE

ENS17104DCE: Environmental Geoscience

(04 credits)

Unit I: Earth science

- 1.1. Origin and evolution of earth
- 1.2. Geological time scale
- 1.3. Earth surface processes
- 1.4. Geomagnetism: Magnetic and gravitational fields of the earth
- 1.5. Continental drift: Plate tectonics and Neo-tectonics

Unit II: Natural hazards and disaster management

- 1.1. Concept and classification of natural hazards
- 1.2. Causes and environmental consequences of
 - a. Earth quakes and Tsunami
 - b. Floods and droughts.
 - c. Landslides
- 1.3. Risk assessment and vulnerability analysis
- 1.4. Disaster management: preparedness, response, rehabilitation and failures (case studies)
- 1.5. National disaster management policy

Unit III: Marine systems

- 1.1. Marine zones
- 1.2. Composition of seawater
- 1.3. Marine resources and their recycling
- 1.4. Ice sheets and fluctuations of seawater
- 1.5. Ocean conveyor belt

Unit IV: Geochemistry

- 1.1. Geochemical classification and distribution of elements in earth
- 1.2. Mobility of trace elements
- 1.3. Concept of rare earth elements
- 1.4. Geochemical cycles - C, N, P, S
- 1.5. Concept of residence time and rate of natural cycles

ENS17105DCE: Environmental Toxicology

(04 credits)

Unit I: Principles of toxicology

- 1.1. Definition, scope, goals and divisions of toxicology
- 1.2. Factors influencing toxicity, toxicity of chemical mixtures
- 1.3. Factors affecting environmental concentration of toxicants,
- 1.4. Dose - response relationship
- 1.5. Toxicity testing methods (single & multi species, acute, sub-acute and chronic toxicity)

Unit II: Biotransformation of xenobiotics

- 1.1. Membranous barriers, binding, storage and absorption of xenobiotics
- 1.2. Excretion of xenobiotics
- 1.3. Biotransformation: General principles and types of biotransformation
- 1.4. Cytochrome P 450, its variants and their role
- 1.5. Glutathione – S- transferase, its variants and their role

Unit III: Bio-magnification of xenobiotics

- 1.1. Bioaccumulation, bioconcentration and biomagnification - study methods (microcosm)
- 1.2. Compartment models
- 1.3. Bioassay and its applications in toxicology
- 1.4. Antidotal procedures in toxicology
- 1.5. Chemical safety evaluation

Unit IV: Toxicants as public health hazard

- 1.1. Pesticides and heavy metals.
- 1.2. Radioactive substances and food additives
- 1.3. Automobile emissions.
- 1.4. Occupational diseases: Principles and methods of occupational health.
- 1.5. Evaluation and control of occupational health hazards.

ENS17106DCE: Mountain Ecology

(02 credits)

Unit I: Mountains ecology

- 1.1. Mountain ecosystem: Goods and services
- 1.2. Major mountains systems of the world: Himalayas, Alps, Andes
- 1.3. Ecological specializations in high altitude ecosystems
- 1.4. Impacts of climate change on mountain ecosystems
- 1.5. Mountain policy support: Land use dynamics, poverty and food security

Unit II: Himalayan resources

- 1.1. Glacier resources
- 1.2. Forests and forestry
- 1.3. Medicinal plants
- 1.4. Flora and fauna of Jammu & Kashmir
- 1.5. Energy resources of Jammu & Kashmir (Hydel and Solar)

ENS17107DCE: Human and Environment

(02 credits)

Unit I: Environmentalism

- 1.1. Environmentalism: Concept and history
- 1.2. Environmental organizations (WWF, UNEP, IUCN, WHO)
- 1.3. Environmental movements in India: Narmada dam, Tehri dam, Almatti dam and Chipko
- 1.4. The monetization frontier
- 1.5. Environmental politics

Unit II: Environmental education and psychology

- 1.1. Environmental education
- 1.2. Environmental protection and religious teachings
- 1.3. Public awareness and role of NGOs
- 1.4. Environmental psychology and current problems
- 1.5. Environmental ethics

Credit IV: Environmental economics**(16 hrs)**

- 1.1. Environmental economics: Definition and scope
- 1.2. Population, poverty and environment
- 1.3. Concept of intangibles and externalities
- 1.4. Environmental evaluation methods: Hedonic pricing, contingent evaluation and household production function
- 1.5. Carbon credits and trading

ENS14108EO: Plant morphogenesis, Cyto-genotoxicity & Herbal Medicine (04 credits)**Credit I: Plant morphogenesis and regeneration****(16 hrs)**

- 1.1. Initiation, nutrition and maintenance of plant cell and tissue culture
- 1.2. Cellular totipotency, initiation of callus cultures and its characteristics
- 1.3. Cell differentiation and organogenesis
- 1.4. Suspension culture
- 1.5. Tissue culture studies of some threatened medicinal plants of Kashmir Himalaya

Credit II: Herbal medicine and health care**(16 hrs)**

- 1.1. Traditional Herbal Medicines for Healthcare and Management of Human diseases
- 1.2. Medicinal and aromatic materials from plants
- 1.3. Benefits of Medicinal and aromatic plant materials
- 1.4. Industrial utilization of medicinal plants
- 1.5. Phytochemical and anti microbial studies of some medicinal plants

Credit III: Cyto-genotoxicity**(16 hrs)**

- 1.1. Necrosis, apoptosis and inflammation
- 1.2. Somatic and genetic risk of environmental pollutants.
- 1.3. Cancer latency, threshold and non-threshold model of cancer
- 1.4. Mechanism of chemical carcinogens (free radicals and alkylating agents)
- 1.5. Classification of carcinogens (physical, chemical and biological agent)

Credit IV: Toxicogenomics (Testing protocols)**(16 hrs)**

- 1.1. Ames test and micronucleus test
- 1.2. Chromatid and chromosome aberration
- 1.3. Screening, tier testing and test batteries for mutagenicity testing
- 1.4. FISH technique
- 1.5. Use of Comet assay in environmental toxicology

Bibliography

- Environmental Science. Botkin, Keller
- Environmental Science. Cunningham, Saigo
- Environmental Science. Jackson & Jackson

- Environmental Science. Tyler Miller
- Essentials of Geology. Chernicoff, Fox, Venkatakrishnan
- Physical Geology. Monroe & Wicander
- Concepts of Ecology. E.J. Kormondy
- Atmosphere, Weather & Climate. R.G. Barry & R.J. Chorley
- Environment: Principles & Applications. Chris Park.
- Earth Systems. W.G. Ernst
- Environmental Science - Physical Principles & Applications. Boeker & Grondelle
- Fundamentals of Physical Environment. Briggs, Smithson, Addison & Atkinson
- Atmosphere, Weather & Climate. R.G. Barry & R.J. Chorley
- Geosystems: An Introduction to Physical Geography. Robert W. Christopherson
- Introducing Physical Geography. Alan Starhler & Arthur Starhler
- Earths Dynamic Systems. W.K. Hamblin & E.H. Christiansen
- Soils in our Environment. Miller and Gardiner
- Fundamentals of Soils. J. Gerrard
- Environmental Science. Enger and Smith
- Basics of Environmental Science. Michael Allaby
- Principles of Environmental Science. Cunningham and Cunningham
- Environmental Sciences (System and Solutions). Mckinney and Schoch
- Principles of atmospheric physics and chemistry. Goody
- Smoke, Dust and Haze. S K Friedlander
- General Climatology. H. J. Critchfield
- Environmental Chemistry. IAN Williams
- Environmental Chemistry. A. K. De
- Environmental Chemistry. Stanley E. Manahan
- An Introduction to Analytical Chemistry. S.A. Iqbal & M. Satake
- Chromatography of Environmental Hazards. Lawrence Fishbein
- Principles of Biochemistry. Wilson Walker
- Electron Spin Resonance. J.E. Wertz And J.R. Bolton
- Analytical Chemistry. D. Kealey And P.J. Haines
- Text Book of Quantitative Chemical Analysis. G.H. Jeffery, J. Basset, J. Mendham and R.C. Denney
- The Surface Chemistry of Soils. Garrison Sposito
- The Nature & Properties of Soils. Brady & Weil
- Soils in our Environment. Miller and Gardiner
- Soil Genesis and Classification. Boul, Hole & Mccacken
- Essentials of Geology. Chernicoff, Fox, Venkatakrishnan
- Text Book Of Limnology. Gerald A. Cole
- Limnology. R. G. Wetzel
- Limnology. Jacobson
- A Treatise on Limnology (Vol I – III). G. E. Hutchinson
- Limnology. Goldman and Horne
- Limnology. P. S. Welch
- Soil in the environment. Daniel Hillel
- Weathering (An introduction to scientific principles). Bland and Rolls
- Soil fertility and fertilizers. Havlin et al.
- Soil erosion and its control. R P C Morgan.
- Soil properties. Liu and Evett
- Soil science and management. Edward J Plaster
- Soils (An introduction). Singer and Munns
- Basic concept of environmental chemistry. Des W Connel
- Basic physical chemistry of the atmospheric science. Peter V Hobbs

- Environmental chemistry. Fritz Helmet
- Introductory chemistry for environmental science. Harrison and De Mora
- An introduction to environmental chemistry. Andrews et al.
- Stream ecology. Barness and Mishall
- Analytical mass spectrometry. Budde
- Primary Productivity of the Biosphere. Helmut Lieth & Robert H. Whittaker
- Tropical Ecosystems & Ecological Concepts. Patnick L. Osborne
- Concepts of Ecology. E.J. Kormondy
- Ecology & Environmental Management. C.C. Park
- Ecology of a Changing Planet. Mark B. Bush
- Ecology for Environmental Sciences: Biosphere, Ecosystems & Man. J. M. Anderson
- Fundamentals of Ecology. E.P. Odum
- Instant Notes in Ecology. Mackenzie, Ball & Virder
- Primer of Ecological Theory. Jonathan Roughgarden
- Ecology with special reference to Animals and Man. S. Charles, Kendeigh
- Evolutionary Ecology. Eric R. Pianka
- A Primer of Ecology. Nicholas J. Gotelli
- Ecology Theories and Applications. Peter Stiling
- Applied Ecology and Natural Resource Management. Guy R. Mcpherson and Stephen Destefano
- Population Ecology. Begon & Mortimer
- Geosystems: An Introduction to Physical Geography. Robert W. Christopherson
- Physical Geology. Plummer, Mc. Geary, Carlson
- Physical Geology. Monroe & Wicander
- Essentials of Geology. Chernicoff, Fox, Venkatakrishnan
- Earths Dynamic Systems. W.K. Hamblin & E.H. Christiansen
- Introducing ecology. Cotgreave and Forseth
- Community ecology. Diamond and Case
- Community ecology. R J Putman
- Biodiversity and conservation. Michael J Jeffries
- Environmental Geology: Principles & Practice. Fred G. Bell
- Physical Geology. Monroe & Wicander
- Economic Geography - A Study of Resources. Prithwish Roy
- Environmental Science. Cunningham, Saigo
- Fish & Fisheries of India. V.G. Jhingram
- Concepts of Ecology. E.J. Kormondy
- River Jhelum, Kashmir Valley. L. Nyman
- Natural Resources and Environmental Technology. Jasper S Lee
- Himalayan Glaciers. Naseerudin Ahmed, Sarwar Rais
- Wildlife Wilderness. G.A.Bhat
- Range ecology. Humphrey
- Flowers of the Himalaya. Adam Stainton
- Wildlife resources. Anderson.
- Microclimate - The Biological Environment, 2nd ed. Normal J. Rosenverg, Blaine L. Blad, Shashi B. Verma
- Atmospheric Change. Graedel and Crutzen
- Atmospheric, Weather and Climate. R.G. Barrey and R.J. Chorley
- Geosystems- An Introduction to Physical Geography. Robert W. Christopherson
- Physical Geology. Plummer, Mc. Greary, Carlson
- Essentials of Geology. Wicander & Monroe
- Earths Dynamic Systems. W.K. Hamblin & E.H. Christiansen

- The Global Casino. Nick Middleton
- Natural Hazard Mitigation. Godschalk, Beatley, Berke, Brower & Kaiser
- Active Tectonics. E. Keller & N. Pinter
- Environmental Chemistry. M. Satake & Y. Mido
- Earth's Dynamic Systems. W.K. Hamblin & E.H. Christiansen
- Physical Geology. Wicander & Monroe
- Environmental Chemistry. Stanley E. Manahan
- Environmental Chemistry. M. Satake, Y. Mido, M.S. Sethi & S. A. Iqbal
- Environmental Chemistry. Ian Williams
- Our Geologic Environment. H. Blatt
- Environment. Raven, Berg and Johnson
- Environmental Science. Botkin, D.B. and Keller, E.A.
- Environmental Science. Nebel, B.J. and Wright, R.T.
- Environmental Geography. Marsh, W.M. and Grossa, Jr. J.M.
- Environmental Oceanography. Abel, D.C. and Mc Connell, R.L.
- Resources of the Earth. Craig, J.R., Vaughan, D.J. and Skinner, B.J.
- Natural Hazards and Disasters. Hyndman, D. and Daudley, N. (Editors)
- Environmental Geochemistry. Eby, G.N.
- Environmental Hydrogeology. Soliman, M.M., LaMoreaux, P.E., Memon, B.A.,
- Mineralogy. Perkins, D. Assad, F.A. and LaMoreaux, J.W.
- Environmental Law, the Economy and Sustainable Development. Revesz, Sands and Stewart
- Higher Education in India. Mehraj-ud-Din
- Environmental Economics and Policy. Tietenberg
- Issues in Environmental Economics. Hanley and Roberts
- Importance of Wildlife Conservation from Islamic Perspective. H.S.A. Yahya
- Psychology. Jhon J. Seamon, Douglas and T. Kenrick
- Society in Focus – Introduction to Sociology. William E. Thompson and Joseph V. Hickey
- Clinical Approach to Rural Development. E.D. Setty
- Environmental psychology. Annete Bolger
- Environment and Society. Francis Moore
- Environmental Economics-A Critical Overview. Alan Gilpin
- The economics of the environment and natural resources. R. Quentin Graflon et al.

General Instructions for the Candidates

1. The first semester is of 24 credit weightage.
2. A candidate has compulsorily to opt for 12 credits from the core component.
3. A candidate has a choice to opt for any 12 credits (3 papers) out of minimum of 16 credits (4 papers) offered as Electives (Allied).
4. A candidate can earn more than the minimum required credits (i.e., more than 96 credits for four Semester programme) which shall be counted towards the final result of the candidate.

COURSE DESCRIPTIONS OPEN ELECTIVE

ENS17OE01: Environmental Ethics and Sociology (2 Credits)

Unit I

- 1.1. An introduction to environmental ethics and philosophy
- 1.2. Ethics in society
- 1.3. Responsibility for environmental degradation
- 1.4. Theories of environmental ethics and philosophy
- 1.5. Resource consumption patterns and the need for equitable utilization

Unit II

- 1.1. Role of agriculture in socio-economic development
- 1.2. Land reforms and Bhoodan movement in India
- 1.3. Community development projects
- 1.4. Rural social structure
- 1.5. Ecological theories of urbanization and urban social problem

ENS17OE02: Global Environmental Problems (02 Credits)

Unit I

- 1.1 Acid rain
- 1.2 Ozone depletion
- 1.3 Deforestation
- 1.4 Biodiversity loss
- 1.5 Global warming and climate change

Unit II

- 1.1. Role of an individual in conservation of natural resources
- 1.2. General idea about environmental laws
- 1.3. International conventions (Stockholm declaration)
- 1.4. Kyoto protocol and Montreal protocol
- 1.5. Earth summit

ENS17OE03: Environmental Protection (02 Credits)

Unit I

- 1.6. Role of an individual in conservation of natural resources
- 1.7. General idea about environmental laws
- 1.8. International conventions (Stockholm declaration)
- 1.9. Kyoto protocol and Montreal protocol
- 1.10. Earth summit

Unit II

- 1.1. Environment management
- 1.2. Control of soil, water and air pollution
- 1.3. Solid and hazardous waste management
- 1.4. Biodiversity conservation
- 1.5. Natural resource management

ENS17OE04: Sustainable Development (2 credits)

Unit I

- 1.1. Concept and strategies of sustainable development
- 1.2. Principles of ecological economics – scope and usefulness
- 1.3. Prey-predator and supply-demand cycles

ENS14201CR: Environmental Pollution and its Control - I
(Air, Noise and Radioactive Pollution)

(04 credits)

Credit I: Air pollution

(16 hrs)

- 1.1. Sources, classification and properties of primary and secondary air pollutants
- 1.2. Pollutant behaviour in atmosphere
- 1.3. Smog and acid rain
- 1.4. Ozone layer depletion
- 1.5. Global warming and climate change

Credit II: Control of air pollution

(16 hrs)

- 1.1. Indoor air pollution and its control: smoke, HCs, particulate matter, Radon
- 1.2. Air quality standards and Monitoring of air pollution: SO_x, NO_x, CO, SPM and hydrocarbon
- 1.3. Control of particulate, gaseous air pollution - SO_x, NO_x, CO and green house gases
- 1.4. Plume Rise and Design of Stack height
- 1.5. Bio-filters and control of air pollution

Credit III: Noise pollution and its control

(16 hrs)

- 1.1. Noise pollution: Definition and sources
- 1.2. Measurement of Noise and sound pressure level,
- 1.3. Equivalent sound pressure level (Leq), Noise pollution level (NPL), Sound exposure level (SEL), Traffic noise index (TNI), Day-Night level (DNL), noise criteria curves
- 1.4. Impact of noise on human health and environment
- 1.5. Noise control and abatement measures

Credit IV: Thermal and radioactive pollution and its control

(16 hrs)

- 1.1. Thermal pollution: causes and consequences
- 1.2. Control of thermal pollution
- 1.3. Radioactive pollution: causes and consequences
- 1.4. Types of radioactive pollutants and their sources
- 1.5. Radioactive waste management and control

ENS14202CR: Environmental Pollution and its Control - II
(Soil and Water Pollution)

(04 Credits)

Credit I: Land degradation and soil pollution

(16 hrs)

- 1.1. Causes and kinds of land degradation and Soil Pollution
- 1.2. Desertification: causes, consequences
- 1.3. Soil erosion: causes, assessment and environmental impacts
- 1.4. Fate of pesticides in soil
- 1.5. Industrial waste effluents and heavy metals and their interaction with soil components

Credit II: Control of land degradation and soil pollution

(16 hrs)

- 1.1. Control of soil pollution
- 1.3. Soil conservation and control of soil erosion

ENS14201CR: Environmental Pollution and its Control - I
(Air, Noise and Radioactive Pollution)

(04 credits)

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(16 hrs)

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Credit II: Control of land degradation and soil pollution

(16 hrs)

- 1.1. Control of soil pollution
- 1.3. Soil conservation and control of soil erosion

- 1.2. Waste lands and their reclamation
- 1.4. Sustainable agricultural practices
- 1.5. Integrated pest management

Credit III: Water pollution

(16 hrs)

- 1.1. Sources and types of water pollution
- 1.2. Lake eutrophication and stream pollution
- 1.3. Petroleum hydrocarbons and marine pollution
- 1.4. Ground water pollution
- 1.5. Biocides and Heavy metals and their impact on aquatic life

Credit IV: Control of water pollution

(16 hrs)

- 1.1. Water and waste water standards
- 1.2. Control of eutrophication and restoration of lakes
- 1.3. Wetland conservation
- 1.4. Role of aquatic plants in pollution abatement
- 1.5. Control of Stream pollution and Groundwater Management

ENS14203CR: Laboratory Course

(04 credits)

Course Contents

1. Determination of silt load of a stream / river
2. Estimation of total dissolved and suspended solids in water
3. Determination of rate of soil erosion in different ecosystems
4. Estimation of dissolved oxygen, BOD, COD and dissolved organic matter in different waters
5. Estimation of organic carbon and organic matter in different soils samples
6. Estimation of nitrogen (NH_3 , NO_2 and NO_3) and phosphorus (ortho- and total) in different waters
7. Estimation of phosphorus and nitrogen content in different soil samples
8. Estimation of dissolved silica and sulphate in different water bodies
9. Estimation of gaseous pollutants (SO_x , NO_x) and SPM in industrial emissions
10. Determination of SO_x , NO_x and SPM in ambient air
11. Qualitative and quantitative estimation of phytoplankton and periphyton community in different aquatic habitats
12. Qualitative and quantitative analysis of zooplankton in relation to eutrophication
13. Study of leaf pigment by paper chromatography and TLC methods
14. Comparative anatomical study of mesophytes, hydrophytes and xerophytes
15. Chemical characterization of ground water
16. Study of dose – effect relationships in important toxicants/pollutants
17. Estimation of protein and carbohydrate content in biological samples
18. Application of diversity indices in aquatic and terrestrial ecosystems
19. Spring and stream order classification
20. Biochemical tests for different enzymes

- 1.2. Waste lands and their reclamation
- 1.4. Sustainable agricultural practices
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(16 hrs)

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ENS14203CR: Laboratory Course

(04 credits)

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9. Estimation of gaseous pollutants (SO_x, NO_x) and SPM in industrial emissions
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17. Estimation of protein and carbohydrate content in biological samples
18. Application of diversity indices in aquatic and terrestrial ecosystems
19. Spring and stream order classification
20. Biochemical tests for different enzymes

DISCIPLINE CENTRIC ELECTIVE

ENS17204DCE: Atmospheric Science

(04 credits)

Unit I: The atmosphere

- 1.1.Introduction to atmospheric science
- 1.2.Atmospheric dynamics
- 1.3.Basic structure and mechanism of atmospheric general circulation,
- 1.4. Monsoon systems, cyclones, anticyclones, jet streams, ENSO
- 1.5.Air-sea interactions

Unit II: Climatology

- 1.1.Fundamentals of climatology
- 1.2.Classification of climate: Koppen's and Trewartha
- 1.3.Climatic zones of India
- 1.4.Climate of J&K
- 1.5. Paleo-climatology and climate change

Unit III: Atmospheric aerosols

- 1.1.Introduction and types of aerosols
- 1.2.Sources, transformation, geographical distribution and atmospheric effects
- 1.3.Chemical composition of aerosols
- 1.4.Carbonaceous aerosols: Black carbon
- 1.5.Global cooling versus global warming

Unit IV: Atmospheric data analysis

- 1.1.Dry and wet atmospheric deposition
- 1.2.LIDARS, SODARS, weather RADARS
- 1.3.Remote-sensing techniques (WP-RASS)
- 1.4. Self recording instruments, radiosondes, radiometersondes, ozone sonde
- 1.5. Climate modeling

ENS17205DCE: Environmental Microbiology

(04 credits)

Unit I: Microbial ecology

- 1.1.History and scope of microbiology
- 1.2.General account of micro-organisms
 - a. Bacteria
 - b. Fungi, algae and viruses
 - c. Protozoa
- 1.3.Interactions between microbes and other organisms
- 1.4. Factors affecting growth of microorganisms
- 1.5. Brief introduction to thermophiles, barophiles, acidophiles, alkalophiles and psychrophiles

Unit II: Microbes and environment

- 1.1. Nature and function of micro-organisms in soil, water and air
- 1.2. Microbial spoilage of food and its preservation
- 1.3. Microbial activity in sewage disposal
- 1.4. Application of micro-organisms in the control of

- a. Oil pollution
- b. Chemical pollution - pesticides, synthetic polymers, and metals
- c. Bio-deterioration of materials
- 1.5. Role of microbes in fixation and solubilization / mineralization of nutrients: carbon, nitrogen, phosphorus, sulphur

Unit III: Microorganisms and human health

- 1.1. Human health and environment: MMR, IMR, Life expectancy, morbidity
- 1.2. Status of communicable diseases in India
- 1.3. Epidemiology (reservoir of infection, communicability and control)
 - a. Air borne diseases: tuberculosis, influenza viruses
 - b. Soil borne diseases: tetanus and gas-gangrene
 - c. Water and food borne diseases: cholera, typhoid, giardiasis, hepatitis
- 1.4. Allergic diseases
- 1.5. Insect vectors of human diseases like malaria, dengue, encephalitis, and their control

Unit IV: Industrial microbiology

- 1.1 Major products of industrial microbiology - Antibiotics, amino acids and biopolymers.
- 1.2 Fermentation technology and bioprocessing
- 1.3 Role of microbiology in metallurgy.
- 1.4 Basic techniques in molecular biology - PCR and electrophoresis
- 1.5 Biosafety levels in microbiology labs.

ENS17206DCE: Green Environment

(02 Credits)

Unit II: Ecotourism

- 1.1. Ecotourism: concept and significance
- 1.2. Tourism in National Parks, sanctuaries, wetlands and other landscapes
- 1.3. Concept of tourism carrying capacity
- 1.4. Tourism policy
- 1.5. Ecotourism potential in J&K

Unit IV: Green cities

- 1.1. Concept of green buildings and cities
- 1.2. Green belt
- 1.3. Consumer behavior
- 1.4. Sustainable urban traffic management
- 1.5. Green city: a case study

ENS17207DCE: Ecological Tour

(02 credits)

During 2nd semester, students are required to go for institutional visit to various academic and research institutions outside Jammu & Kashmir carrying 02 credits and will form a component of Elective Allied. One credit will be given for participation and one credit for Tour report and viva voce.

- a. Oil pollution
- b. Chemical pollution - pesticides, synthetic polymers, and metals
- c. Bio-deterioration of materials
- 1.5. Role of microbes in fixation and solubilization / mineralization of nutrients: carbon, nitrogen, phosphorus, sulphur

Unit III: Microorganisms and human health

- 1.1. Human health and environment: MMR, IMR, Life expectancy, morbidity
- 1.2. Status of communicable diseases in India
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- 1.2 Fermentation technology and bioprocessing
- 1.3 Role of microbiology in metallurgy.
- 1.4 Basic techniques in molecular biology - PCR and electrophoresis
- 1.5 Biosafety levels in microbiology labs.

ENS17206DCE: Green Environment

(02 Credits)

Unit II: Ecotourism

- 1.1. Ecotourism: concept and significance
- 1.2. Tourism in National Parks, sanctuaries, wetlands and other landscapes
- 1.3. Concept of tourism carrying capacity
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Unit IV: Green cities

- 1.1. Concept of green buildings and cities
- 1.2. Green belt
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COURSE DESCRIPTIONS GENERIC ELECTIVE

ENS17GE01: Basics of Ecology and Environment (2 credits)

Unit I

- 1.1 Importance of environment
- 1.2 Components of environment-Atmosphere, hydrosphere, lithosphere and biosphere
- 1.3 Human and environment relations
- 1.4 Environment and development
- 1.5 Tools for environmental management

Unit II

- 1.1 Structure and functions,
- 1.2 Natural and managed ecosystem
- 1.3 Ecosystem goods and services
- 1.4 Ecological Succession
- 1.5 Ecological Interactions

ENS17GE02: Biogeography (2 credits)

Unit 1

- 1.1. Biodiversity and its importance
- 1.2. Threats to biodiversity
- 1.3. Hotspots of Biodiversity
- 1.4. Major biomes of the world: Distribution and characteristic features
- 1.5. Biogeography: Processes and patterns

Unit II

- 1.1. Geographical classification and zones
- 1.2. Zoogeographic realms of the world: Palaearctic, Nearctic, Neotropical, Oriental, Australian and African
- 1.3. Dispersal: Means, modes and barrier
- 1.4. Migrations
- 1.5. Conservation Biogeography

ENS17GE03: Analytical Instrumentation (02 credits)

Unit I

- 1.1. Stoichiometry
- 1.2. Titrimetry and gravimetry
- 1.3. Visible and UV spectroscopy
- 1.4. Atomic absorption spectrophotometry
- 1.5. Principle and applications of microscopy

Unit II

- 1.1. Chromatography-Basic Principle and its classification
- 1.2. Ion-exchange Chromatography
- 1.3. Gas liquid Chromatography/GC-MS
- 1.4. HPTLC and HPLC
- 1.5. Spectro-fluorimetry

ENS17GE04: Environmental Issues (03 credits)

Unit I

- 1.1. History and nature of human population growth
- 1.2. Natural resources, current status and types of resources
- 1.3. Resource depletion

Course Descriptions 3rd SEMESTER

CORE COURSES

ENS17301CR: Natural Resources

(4 credits)

Unit I: Mineral resources

- 1.1. Classification of mineral resources
- 1.2. Metals and minerals from land and their global distribution
- 1.3. Metals and minerals from oceans and their global distribution
- 1.4. Metals and mineral deposits in India with special reference in J&K
- 1.5. Environmental consequences of mineral exploitation

Unit II: Water resources

- 1.1. Inventory of earth's water resources: Surface and groundwater
- 1.2. Water resources of India with special reference to Kashmir
- 1.3. Global water budget
- 1.4. Surface and ground water resources: Global consumption pattern
- 1.5. Water resource management

Unit III: Bio-resources

- 1.1. Animal resources: current status with special reference to India
- 1.2. Fishery resources of India with special reference to J&K
- 1.3. Plant resources
- 1.4. Forest resources of India: Timber and non timber
- 1.5. Rangelands

Unit IV: Energy resources

- 1.1. Renewable energy resources
- 1.2. Non-renewable energy Resources
- 1.3. Nuclear energy
- 1.4. Concept of green fuels
- 1.5. Hydrogen as a source of energy

ENS17302CR: Environmental Impact Assessment

(04 credits)

Unit I: Fundamentals of EIA

- 1.1. Environment impact assessment: Concept, objectives and approaches
- 1.2. Strategic environmental assessment
- 1.3. EIA guidelines 2006 and amendments
- 1.4. Protocol for environment impact statements
- 1.5. Public participation in environmental decision making

Unit II: EIA methodologies

- 1.1. EIA methods
- 1.2. Baseline data generation
- 1.3. Air and water quality assessment
- 1.4. Ecological assessment
- 1.5. Social impact assessment

Unit III: EIA Case studies

- 1.1. Hydro power, irrigation and drainage
- 1.2. Industrial estates and Parks
- 1.3. Highways and Railways
- 1.4. Thermal power projects
- 1.5. Cement and Chemical industries

Unit IV: Ecological modeling

- 1.1. Role of models in ecology
- 1.2. Components of a model
- 1.3. Classes of mathematical models
- 1.4. Models of population (growth and interaction) and pollutant dispersal
 - a. Lotka – Volterra model
 - b. Leslie's matrix model
 - c. Gaussian plume model
- 1.5. Modeling of air quality, water quality and noise characteristics

ENS17303CR: Laboratory Course

(04 credits)

Course Contents

1. Case studies based on environmental laws
2. Survey of different residential areas for determining the prevalence of different air, water, soil and food borne diseases
3. EIA – Leopold Matrix method and case studies
4. Socio-economic studies – preparing of questionnaire and case studies
5. Computation of standard deviation, standard error and coefficient of variation
6. Computation of correlation and regression
7. One way and two way classification of ANOVA
8. Land use / land cover classification from satellite data
9. Delineation of drainage of a given area from satellite data
10. Delineation of point, line and polygon themes
11. Waste auditing of any institution/ organization
12. Working and design of treatment plants
13. Spring and stream order classification
14. Study of colonization potential of periphyton on artificial substrates
15. Study of morphogenetic response of explants on media
16. Collection and demonstration of the pharmacognostic characters of important medicinal plants
17. Comparative anatomical study of mesophytes, hydrophytes and xerophytes
18. Collection and identification of common aquatic macrophytes
19. Field trip to National park/wildlife sanctuary/industrial area
20. Study of insect fauna in different environments

Unit III: EIA Case studies

- 1.1. Hydro power, irrigation and drainage
- 1.2. Industrial estates and Parks
- 1.3. Highways and Railways
- 1.4. Thermal power projects
- 1.5. Cement and Chemical industries

Unit IV: Ecological modeling

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 - a. Lotka – Volterra model
 - b. Leslie's matrix model
 - c. Gaussian plume model
- 1.5. Modeling of air quality, water quality and noise characteristics

ENS17303CR: Laboratory Course

(04 credits)

Course Contents

1. Case studies based on environmental laws
2. Survey of different residential areas for determining the prevalence of different air, water, soil and food borne diseases
3. EIA – Leopold Matrix method and case studies
4. Socio-economic studies – preparing of questionnaire and case studies
5. Computation of standard deviation, standard error and coefficient of variation
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19. Field trip to National park/wildlife sanctuary/industrial area
20. Study of insect fauna in different environments

DISCIPLINE CENTRIC ELECTIVE

ENS17304DCE: Environmental Laws

(04 credits)

Unit I: Environmental Protection

- 1.1. Environment protection: Provisions of constitution (article 21, 48A, 51A, and 253)
- 1.2. National efforts on environmental protection, laws and policy in India
- 1.3. International efforts for environment protection (Stockholm, Kyoto protocol)
- 1.4. CITES (1973)
- 1.5. Earth Summit

Unit II: National Laws-I

- 1.1. Indian forest act (1927), forest conservation Act (1980) and rules (1981)
- 1.2. Wildlife protection Act (1972) and amended (2002) and J & K wildlife (protection) Act (1978) as amended in (2002)
- 1.3. The Water (Prevention and Control of Pollution) Act (1974) as amended up to (1988) and rules (1975)
- 1.4. The Air (Prevention and Control of Pollution) Act as amended by amendment Act (1987) and rules (1982)
- 1.5. The Environmental (Protection) Act (1986)

Unit III: National Laws-II

- 1.1. Hazardous waste management and handling rules (1989)
- 1.2. Biomedical waste (management and handling) rules (1998)
- 1.3. Noise pollution (regulations and control) rules (2000)
- 1.4. Municipal solid wastes (management and handling) rules (2000)
- 1.5. The EPA rules (1986)

Unit IV: National Laws-III

- 1.1. Biological diversity Act (2002)
- 1.2. Public liability insurance act (1991)
- 1.3. Intellectual property rights and patent act (2005)
- 1.4. National environment tribunal act (1995)
- 1.5. National green tribunal act (2010)

ENS17305DCE: Environmental Biotechnology

(04 credits)

Unit I: Introduction to environmental biotechnology

- 1.1. Biotechnology
 - a. Concept and environmental relevance
 - b. Environmental risks
- 1.2. Elementary information of gene transfer, brief account of cloning vehicles
- 1.3. Recombinant DNA technology and its applications.
- 1.4. Environmental Genomics: A key to understanding biology, pathophysiology and disease
- 1.5. Molecular taxonomy: documenting biodiversity by DNA barcoding

Unit II: Eco-friendly role of animals

- 1.1. Vermiculture technology
 - a. Earth worms and soil productivity
 - b. Earthworm culture and vermi-composting

- 1.2. Aquaculture improvement through biotechnology
- 1.3. Fish farming through biological wastes
- 1.4. Stem cell and animal cloning
- 1.5. Biological control of insects -definition, principles and control mechanisms

Unit III: In-vitro storage of plants

- 1.1 Tissue culture: Concept and importance
- 1.2 Micropropagation: Techniques and application
- 1.3 Conservation: Short term, medium term and long term
- 1.4 Recent developments in cryopreservation
- 1.5 Biotechnology in biodiversity conservation: Germplasm conservation , Gene banks and DNA banks

Unit IV: Biotechnology in environmental management

- 1.1. Biosensors and bioindicators
- 1.2. Biotechnology in pollution control
- 1.3. Biodegradation and bioremediation
- 1.4. Emerging environmental biotechnological trends
- 1.5. Genetically modified organisms and bio-safety: a general account

ENS17306DCE: Remote Sensing and GIS

(02 credits)

Unit I: Remote-sensing

- 1.1. Concept and overview of remote sensing: Concept of resolution-spatial, spectral, radiometric and temporal
- 1.2. Remote Sensing satellites: LANDSAT & IRS satellite series
- 1.3. Electromagnetic spectrum: EMR sources-active & passive, radiation laws
- 1.4. Fundamentals of image interpretation and processing
- 1.5. Aerial photographs and their types on the basis of look angle

Unit II: Geographic information system

- 1.1. Global positioning system : Basic principles and functioning
- 1.2. Development of GIS, functional requirements of GIS: hardware configuration and software modules
- 1.3. Geographic data: Spatial and non-spatial, data models: raster and vector
- 1.4. Remote sensing and GIS integration
- 1.5. Application of remote sensing and GIS in:
 - a. Monitoring and management of biodiversity
 - b. Integrated watershed development and
 - c. Environmental impact assessment

ENS17307DCE: Ecological Tour to Ladakh

(02 credits)

During 3rd semester, students will be required to go for the field study tour within Jammu & Kashmir carrying 02 credits which will form a component of the elective allied. One credit will be given for participation and one credit for field collection, tour report and viva-voce.

- 1.2. Aquaculture improvement through biotechnology
- 1.3. Fish farming through biological wastes
- 1.4. Stem cell and animal cloning
- 1.5. Biological control of insects -definition, principles and control mechanisms

Unit III: In-vitro storage of plants

- 1.1 Tissue culture: Concept and importance
- 1.2 Micropropagation: Techniques and application
- 1.3 Conservation: Short term, medium term and long term
- 1.4 Recent developments in cryopreservation
- 1.5 Biotechnology in biodiversity conservation: Germplasm conservation , Gene banks and DNA banks

Unit IV: Biotechnology in environmental management

- 1.1. Biosensors and bioindicators
- 1.2. Biotechnology in pollution control
- 1.3. Biodegradation and bioremediation
- 1.4. Emerging environmental biotechnological trends
- 1.5. Genetically modified organisms and bio-safety: a general account

ENS17306DCE: Remote Sensing and GIS

(02 credits)

Unit I: Remote-sensing

- 1.1. Concept and overview of remote sensing: Concept of resolution-spatial, spectral, radiometric and temporal
- 1.2. Remote Sensing satellites: LANDSAT & IRS satellite series
- 1.3. Electromagnetic spectrum: EMR sources-active & passive, radiation laws
- 1.4. Fundamentals of image interpretation and processing
- 1.5. Aerial photographs and their types on the basis of look angle

Unit II: Geographic information system

- 1.1. Global positioning system : Basic principles and functioning
- 1.2. Development of GIS, functional requirements of GIS: hardware configuration and software modules
- 1.3. Geographic data: Spatial and non-spatial, data models: raster and vector
- 1.4. Remote sensing and GIS integration
- 1.5. Application of remote sensing and GIS in:
 - a. Monitoring and management of biodiversity
 - b. Integrated watershed development and
 - c. Environmental impact assessment

ENS17307DCE: Ecological Tour to Ladakh

(02 credits)

During 3rd semester, students will be required to go for the field study tour within Jammu & Kashmir carrying 02 credits which will form a component of the elective allied. One credit will be given for participation and one credit for field collection, tour report and viva-voce.

- 1.2. Aquaculture improvement through biotechnology
- 1.3. Fish farming through biological wastes
- 1.4. Stem cell and animal cloning
- 1.5. Biological control of insects -definition, principles and control mechanisms

Unit III: In-vitro storage of plants

- 1.1 Tissue culture: Concept and importance
- 1.2 Micropropagation: Techniques and application
- 1.3 Conservation: Short term, medium term and long term
- 1.4 Recent developments in cryopreservation
- 1.5 Biotechnology in biodiversity conservation: Germplasm conservation , Gene banks and DNA banks

Unit IV: Biotechnology in environmental management

- 1.1. Biosensors and bioindicators
- 1.2. Biotechnology in pollution control
- 1.3. Biodegradation and bioremediation
- 1.4. Emerging environmental biotechnological trends
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ENS17306DCE: Remote Sensing and GIS

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- 1.5. Application of remote sensing and GIS in:
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Course Descriptions 4th SEMESTER

CORE COURSES

ENS17401CR: Environmental Engineering

(04 credits)

Unit I: Fundamentals of environmental engineering

- 1.1. Environmental engineering: Introduction and scope
- 1.2. Sewage and storm water drainage
- 1.3. Planning of housing drainage
- 1.4. Environmental sanitation
- 1.5. Ventilation and air conditioning

Unit II: Drinking water treatment

- 1.1. Methods of water purification: flocculation, sedimentation, sedimentation with coagulation
- 1.2. Filtration: sand filters, pressure filters, horizontal filters
- 1.3. Disinfection and desalination of water
- 1.4. Chemical treatment: adsorption, gas stripping, ion exchange
- 1.5. Reverse osmosis and distillation

Unit III: Sewage treatment

- 1.1. Wastewater treatment plants: Concept, methods and design
 - a. Primary
 - b. Secondary
 - c. Tertiary
- 1.2. Sludge and its disposal techniques
- 1.3. Natural methods of sewage disposal
- 1.4. Biology of sewage treatment
- 1.5. Reclamation and reuse of industrial and domestic wastewater

Unit IV: Solid and hazardous waste management

- 1.1. Solid wastes: sources, generation and their characteristics
- 1.1. Hazardous waste: sources and generation and their characteristics
- 1.2. Disposal and management of solid, industrial and hazardous wastes,
- 1.3. Hospital waste management
- 1.4. Site remediation

ENS17402CR: Biodiversity and Resource Management

(04 credits)

Unit I: Biogeography

- 1.1. Geographical classification and zones
- 1.2. Major biomes of the world: Distribution and characteristic features
- 1.3. Zoogeographic realms of the world: Palaearctic, nearctic, neotropical, oriental, australian and african
- 1.4. Dispersal: Means, modes and barriers, island life
- 1.5. Migrations

Course Descriptions 4th SEMESTER

CORE COURSES

ENS17401CR: Environmental Engineering

(04 credits)

Unit I: Fundamentals of environmental engineering

- 1.1. Environmental engineering: Introduction and scope
- 1.2. Sewage and storm water drainage
- 1.3. Planning of housing drainage
- 1.4. Environmental sanitation
- 1.5. Ventilation and air conditioning

Unit II: Drinking water treatment

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- 1.1. Solid wastes: sources, generation and their characteristics
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ENS17402CR: Biodiversity and Resource Management

(04 credits)

Unit I: Biogeography

- 1.1. Geographical classification and zones
- 1.2. Major biomes of the world: Distribution and characteristic features
- 1.3. Zoogeographic realms of the world: Palaearctic, nearctic, neotropical, oriental, australian and african
- 1.4. Dispersal: Means, modes and barriers, island life
- 1.5. Migrations

Unit II: Biodiversity

- 1.1. Biodiversity: Status and importance, India as a mega-diversity nation
- 1.2. Endemism: Factors controlling distribution of flora and fauna
- 1.3. Hot Spots and cold spots, concept of native and exotic species
- 1.4. Biodiversity decline: Drivers of change and pressures
- 1.5. Threatened species categories of IUCN; concept of extinction threshold and extinction debt

Unit III: Biodiversity Management

- 1.1. Forest conservation: social forestry and joint forest management
- 1.2. Management of rangelands
- 1.3. Fishery resource management
- 1.4. Monitoring and management of bio-diversity
- 1.5. Biodiversity Conservation
 - a. In-situ conservation: National parks, sanctuaries, biosphere reserves, Ramsar Sites
 - b. Ex-situ conservation: botanical gardens, zoological parks, zoos, seed banks, in-vitro conservation

Unit IV: Management of natural resources

- 1.1. Concept and strategies of sustainable development
- 1.2. Management of mineral resources
- 1.3. Management of fresh water resources
- 1.4. Energy crisis and conservation of energy resources
- 1.5. Concept of ecological footprint and carbon sequestration

ENS17403CR: Project Work

(04 credits)

The project work shall be of practical nature and the candidate has to carry out the project work related to environment under the supervision of concerned teacher.

The distribution should be as follows:

- **Part I:** Identification of problem area and general description
- **Part II:** Study of specific literature in detail pertaining to the statement of the problem
- **Part III:** Developing a solution, methodology or proposing a hypothesis to solve the problem
- **Part IV:** Experimental analysis, results, discussion, conclusion and recommendations

Each student has to submit the dissertation of the project work for evaluation. The student has to give seminar (internal) and viva voce (external) of the project work.

Unit II: Biodiversity

- 1.1. Biodiversity: Status and importance, India as a mega-diversity nation
- 1.2. Endemism: Factors controlling distribution of flora and fauna
- 1.3. Hot Spots and cold spots, concept of native and exotic species
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- 1.1. Forest conservation: social forestry and joint forest management
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- 1.4. Monitoring and management of bio-diversity
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 - a. In-situ conservation: National parks, sanctuaries, biosphere reserves, Ramsar Sites
 - b. Ex-situ conservation: botanical gardens, zoological parks, zoos, seed banks, in-vitro conservation

Unit IV: Management of natural resources

- 1.1. Concept and strategies of sustainable development
- 1.2. Management of mineral resources
- 1.3. Management of fresh water resources
- 1.4. Energy crisis and conservation of energy resources
- 1.5. Concept of ecological footprint and carbon sequestration

ENS17403CR: Project Work

(04 credits)

The project work shall be of practical nature and the candidate has to carry out the project work related to environment under the supervision of concerned teacher.

The distribution should be as follows:

- **Part I:** Identification of problem area and general description
- **Part II:** Study of specific literature in detail pertaining to the statement of the problem
- **Part III:** Developing a solution, methodology or proposing a hypothesis to solve the problem
- **Part IV:** Experimental analysis, results, discussion, conclusion and recommendations

Each student has to submit the dissertation of the project work for evaluation. The student has to give seminar (internal) and viva voce (external) of the project work.

- 1.2.Theory and practice of managing the establishment, composition, and development of the forest
- 1.3.Urban forest ecology
- 1.4. Agro-ecosystems: Concept, structural and functional components
- 1.5. Role of biodiversity in agro-ecosystems, Food security and agriculture

Unit IV: Desert and grassland ecology

- 1.1. Ecological complexity of the desert commies
- 1.2. fauna and flora of the deserts
- 1.3. Ladakh cold desert
- 1.4. Grasslands ecology: evolution and types
- 1.5. Biodiversity and conservation in grasslands

ENS17406DCE: Environmental Planning and Auditing

(02 credits)

Unit I

- 1.1.Environmental planning – importance and objectives
- 1.2.Land use planning
- 1.3.Urban development and environmental planning
- 1.4.Rural development and environmental planning
- 1.5. Role of ethics, aesthetics and science in environmental planning

Unit II

- 1.1.Principles and guidelines of environmental auditing
- 1.2.Preparation of environmental audit report
- 1.3.Waste audit procedures – sources, types and management of wastes
- 1.4.ISO 9001 and 9002
- 1.5.ISO 14000

ENS17407DCE: Restoration Ecology

(02 credits)

Unit I: Concepts in restoration ecology

- 1.1. The basic principles and concepts of restoration ecology
- 1.2. Characteristics of degraded and restored ecosystems
- 1.3. Ecological indicators in restoration
- 1.4. Theory and practice of restoring animal and plant diversity
- 1.5. Ecological principles of the restoration of native ecosystems

Unit II: Restoration planning

- 1.1. Goals and objectives
- 1.2. Adaptive management and monitoring
- 1.3. Ethics of restoration
- 1.4. Role of public-private partnership in restoration
- 1.5. Measuring progress and success of restoration programs

- 1.4. Environment and human health
- 1.5. Environmental degradation

Unit II

- 1.1 Air pollution
- 1.2 Water pollution
- 1.3 Soil Pollution
- 1.4 Noise pollution
- 1.5 Radioactive pollution

ENS17GE05: Crenobiology

(02 Credits)

Unit I

- 1.1.Springs as critical biotopes
- 1.2.Classification of springs
- 1.3.Spring discharge and biology of spring biotopes
- 1.4. Delineation of spring protection zones
- 1.5.Vulnerability assessment and mapping of spring waters

Unit II

- 1.1.Inventory and monitoring of springs
- 1.2.Spring water geochemistry and recharge
- 1.3.Springs as ecosystems
- 1.4. Case study of major springs
- 1.5.Conservation and management of spring ecosystems

ENS17GE06: Industrial Ecology

(02 credits)

Unit I

- 1.1. Basic principles of green chemistry
- 1.2. Application and need of green chemistry
- 1.3. Concept of green economy, green growth and low carbon development
- 1.4. Introduction to industrial ecology and its relation to the concept of sustainability
- 1.5. Principles and objectives of industrial ecology

Unit II

- 1.6. Industrial symbiosis, industrial ecosystems and eco industrial parks
- 1.7. Ecology and biomimicry
- 1.8. Future and challenges of industrial ecology
- 1.9. Concept of green technology
- 1.10. Ecomark scheme and eco-friendly products

ENS17GE07: Strategic Environmental Assessment

(02 credits)

Unit I:

- 1.1. Origin of EIA:
- 1.2. Concept and objectives of EIA
- 1.3. EIA process
- 1.4. Baseline data collection
- 1.5. EIA guidelines 2006

Unit II:

- 1.1 Protocol for environment impact statements
- 1.2 EIA methods
- 1.3 Strategic environmental assessment
- 1.4 SEA process
- 1.5 Case studies

Credit IV: Environmental economics**(16 hrs)**

- 1.1. Environmental economics: Definition and scope
- 1.2. Population, poverty and environment
- 1.3. Concept of intangibles and externalities
- 1.4. Environmental evaluation methods: Hedonic pricing, contingent evaluation and household production function
- 1.5. Carbon credits and trading

ENS14108EO: Plant morphogenesis, Cyto-genotoxicity & Herbal Medicine (04 credits)**Credit I: Plant morphogenesis and regeneration****(16 hrs)**

- 1.1. Initiation, nutrition and maintenance of plant cell and tissue culture
- 1.2. Cellular totipotency, initiation of callus cultures and its characteristics
- 1.3. Cell differentiation and organogenesis
- 1.4. Suspension culture
- 1.5. Tissue culture studies of some threatened medicinal plants of Kashmir Himalaya

Credit II: Herbal medicine and health care**(16 hrs)**

- 1.1. Traditional Herbal Medicines for Healthcare and Management of Human diseases
- 1.2. Medicinal and aromatic materials from plants
- 1.3. Benefits of Medicinal and aromatic plant materials
- 1.4. Industrial utilization of medicinal plants
- 1.5. Phytochemical and anti microbial studies of some medicinal plants

Credit III: Cyto-genotoxicity**(16 hrs)**

- 1.1. Necrosis, apoptosis and inflammation
- 1.2. Somatic and genetic risk of environmental pollutants.
- 1.3. Cancer latency, threshold and non-threshold model of cancer
- 1.4. Mechanism of chemical carcinogens (free radicals and alkylating agents)
- 1.5. Classification of carcinogens (physical, chemical and biological agent)

Credit IV: Toxicogenomics (Testing protocols)**(16 hrs)**

- 1.1. Ames test and micronucleus test
- 1.2. Chromatid and chromosome aberration
- 1.3. Screening, tier testing and test batteries for mutagenicity testing
- 1.4. FISH technique
- 1.5. Use of Comet assay in environmental toxicology

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- Essentials of Geology. Chernicoff, Fox, Venkatakrishnan
- Physical Geology. Monroe & Wicander
- Concepts of Ecology. E.J. Kormondy
- Atmosphere, Weather & Climate. R.G. Barry & R.J. Chorley
- Environment: Principles & Applications. Chris Park.
- Earth Systems. W.G. Ernst
- Environmental Science - Physical Principles & Applications. Boeker & Grondelle
- Fundamentals of Physical Environment. Briggs, Smithson, Addison & Atkinson
- Atmosphere, Weather & Climate. R.G. Barry & R.J. Chorley
- Geosystems: An Introduction to Physical Geography. Robert W. Christopherson
- Introducing Physical Geography. Alan Starhler & Arthur Starhler
- Earths Dynamic Systems. W.K. Hamblin & E.H. Christiansen
- Soils in our Environment. Miller and Gardiner
- Fundamentals of Soils. J. Gerrard
- Environmental Science. Enger and Smith
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- An Introduction to Analytical Chemistry. S.A. Iqbal & M. Satake
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- Issues in Environmental Economics. Hanley and Roberts
- Importance of Wildlife Conservation from Islamic Perspective. H.S.A. Yahya
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- Environmental psychology. Annete Bolger
- Environment and Society. Francis Moore
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General Instructions for the Candidates

1. The first semester is of 24 credit weightage.
2. A candidate has compulsorily to opt for 12 credits from the core component.
3. A candidate has a choice to opt for any 12 credits (3 papers) out of minimum of 16 credits (4 papers) offered as Electives (Allied).
4. A candidate can earn more than the minimum required credits (i.e., more than 96 credits for four Semester programme) which shall be counted towards the final result of the candidate.

Semester – I (*Course Work*)
ESS-107L: Embedded System Design Lab

Lecture	Hours per Week		Credits	Maximum Marks		Total	Examination Hours
	Tutorial	Practical		Internal	End Term		
0	1	6	0	70	80	150	3 Hours

List of Experiments

1. To write basic ALP for PIC 16F84/16F877A microcontroller.
2. Interfacing of LED with PIC16F84/16F877A Microcontroller.
3. Interfacing a Switch with PIC16F84/16F877A Microcontroller.
4. Interfacing of both LED and Switch with 16F84/PIC16F877A Microcontroller.
5. Matrix keypad interfacing with 16F84/PIC16F877A Microcontroller.
6. PIC 16F84/16F877A Microcontroller and Seven segment interfacing.
7. Development of Software for Timer peripheral.
8. PIC 16F84/16F877A Microcontroller and LCD Interfacing.
9. Using of internal EEPROM.
10. ADC Interfacing: a) 8-bit ADC Interfacing, b)10-bit ADC Interfacing.
11. PWM signal generation at various frequencies.
12. Interfacing of PIC16F877A Microcontroller and sensor having analog output.
13. Interfacing of PIC16F877A Microcontroller and sensor having digital output.
14. Interfacing PC to PIC16F877A Microcontroller using UART.
15. Interfacing of RF Transmitter and Receiver with PIC16F877A Microcontroller.
16. PIC16F877A Microcontroller and Seven Segment Display interfacing using SPI
17. PIC16F877A Microcontroller and LCD Interfacing using SPI.
18. PIC16F877A Microcontroller and LCD Interfacing using I2C.
19. Case study of Embedded Real Time Operating systems.

Semester – I (*Course Work*)
ESS-108L: Advanced Digital System Design and Wireless Communication Lab

Lecture	Hours per Week		Credits	Maximum Marks		Total	Examination Hours
	Tutorial	Practical		Internal	End Term		
0	1	6	0	70	80	150	3 Hours

List of Experiments

Experiments on Advanced Digital System Design

1. Review Experiments using Cadence Virtuso tool kit on the design of
 - Combinational logic circuits
 - Sequential logic circuits
 - Arithmetic circuits
2. Experiments on the design of subsystems on Cadence Virtuso tool kit.
3. Learning Layout in Cadence Virtuso tool kit.
4. Programs using VHDL on the design of
 - Combinational logic circuits
 - Sequential logic circuits
 - Arithmetic circuits

Experiments on Wireless Communication

5. To Demonstrate Infrastructure and Adhoc wireless Network.
6. To establish the connectivity between devices using Bluetooth and infrared
7. To Design a wireless communication System using RF transmitter and receiver kit/RF Modules.
8. To configure a wireless network using Raspberry PI/Arduino/LPC Boards.
9. To design a wireless network using Wi-Fi IEEE 802.11 Wireless Module Hardware.
10. To configure the Simple Web Server using Raspberry PI/Arduino/LPC Boards.
11. Ten Experiments on Wireless Communication and Networks using Matlab.

Semester – I (*Course Work*)
ESS-107L: Embedded System Design Lab

Lecture	Hours per Week		Credits	Maximum Marks		Total	Examination Hours
	Tutorial	Practical		Internal	End Term		
0	1	6	0	70	80	150	3 Hours

List of Experiments

1. To write basic ALP for PIC 16F84/16F877A microcontroller.
2. Interfacing of LED with PIC16F84/16F877A Microcontroller.
3. Interfacing a Switch with PIC16F84/16F877A Microcontroller.
4. Interfacing of both LED and Switch with 16F84/PIC16F877A Microcontroller.
5. Matrix keypad interfacing with 16F84/PIC16F877A Microcontroller.
6. PIC 16F84/16F877A Microcontroller and Seven segment interfacing.
7. Development of Software for Timer peripheral.
8. PIC 16F84/16F877A Microcontroller and LCD Interfacing.
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15. Interfacing of RF Transmitter and Receiver with PIC16F877A Microcontroller.
16. PIC16F877A Microcontroller and Seven Segment Display interfacing using SPI
17. PIC16F877A Microcontroller and LCD Interfacing using SPI.
18. PIC16F877A Microcontroller and LCD Interfacing using I2C.
19. Case study of Embedded Real Time Operating systems.

Semester – I (*Course Work*)
ESS-108L: Advanced Digital System Design and Wireless Communication Lab

Lecture	Hours per Week		Credits	Maximum Marks		Total	Examination Hours
	Tutorial	Practical		Internal	End Term		
0	1	6	0	70	80	150	3 Hours

List of Experiments

Experiments on Advanced Digital System Design

1. Review Experiments using Cadence Virtuso tool kit on the design of
 - Combinational logic circuits
 - Sequential logic circuits
 - Arithmetic circuits
2. Experiments on the design of subsystems on Cadence Virtuso tool kit.
3. Learning Layout in Cadence Virtuso tool kit.
4. Programs using VHDL on the design of
 - Combinational logic circuits
 - Sequential logic circuits
 - Arithmetic circuits

Experiments on Wireless Communication

5. To Demonstrate Infrastructure and Adhoc wireless Network.
6. To establish the connectivity between devices using Bluetooth and infrared
7. To Design a wireless communication System using RF transmitter and receiver kit/RF Modules.
8. To configure a wireless network using Raspberry PI/Arduino/LPC Boards.
9. To design a wireless network using Wi-Fi IEEE 802.11 Wireless Module Hardware.
10. To configure the Simple Web Server using Raspberry PI/Arduino/LPC Boards.
11. Ten Experiments on Wireless Communication and Networks using Matlab.

Semester – II (*Course Work*)
ESS-207L: ARM Cortex Microcontroller Lab

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Total	Examination Hours
	Tutorial	Practical			End Term			
0	1	6	0	70	80	150	3 Hours	

List of Experiments

1. Exploring GPIO lines of LPC1768 and interfacing it with LEDs and blinking it in different fashion.
2. Interface Switch and Relay to LPC1768. If a switch is pressed then the relay would be ON and if another switch is pressed relay would be OFF.
3. Interface 16X2 LCD to LPC1768 and display a string on it.
4. Study UART protocol and perform following experiments in polling mode as well as Interrupt mode. a) Transmit a string of characters on UART; b) Receive a string of characters on UART.
5. Interfacing Seven Segment Display to LPC1768.
6. Write a program to show digital values using on chip ADC.
7. Interfacing TFT display to LPC1768.
8. Implementing ETHERNET protocol using LPC1768.
- Additional Experiments (using Cortex M4) (Any Three)**
9. Explore GPIO lines of ARM Cortex M4 and interface Matrix Keypad to it and display key code of the corresponding key pressed.
10. Study I2C protocol and interface I2C based EEPROM to ARM Cortex M4 and write and read a character on EEPROM.
11. Study SPI protocol and interface SPI based EEPROM to ARM Cortex M4 and write and read a character on EEPROM.
12. Write a program to set and display date and time of on chip RTC.
13. Write a program to generate different wave form like square, triangular, Sine wave using DAC.
14. Study CAN protocol and Write a program for CAN self-test
15. Write a program to understand watch dog timer.

Semester – II (*Course Work*)
ESS-208L: CPLD and FPGA Lab

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Total	Examination Hours
	Tutorial	Practical			End Term			
0	1	6	0	70	80	150	3 Hours	

List of Experiments

1. Study of Xilinx boards.
2. Study of Actel boards.
3. Designing combinational and sequential circuits on FPGA Kit.
 - a) Adders and subtractors.
 - b) Multiplexers and demultiplexers
 - c) Encoders and decoders
 - d) Flip-Flops
 - e) Counters
 - f) Shift Registers
 - g) RAM
 - h) Basic Microprocessor
4. Designing combinational and sequential circuits using VHDL.
 - a) Counters
 - b) Shift Registers
 - c) RAM
 - d) Basic Microprocessor
5. Experiments on FPGA applications

Semester – II (*Course Work*)
ESS-207L: ARM Cortex Microcontroller Lab

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Total	Examination Hours
	Tutorial	Practical			End Term			
0	1	6	0	70	80	150	3 Hours	

List of Experiments

1. Exploring GPIO lines of LPC1768 and interfacing it with LEDs and blinking it in different fashion.
2. Interface Switch and Relay to LPC1768. If a switch is pressed then the relay would be ON and if another switch is pressed relay would be OFF.
3. Interface 16X2 LCD to LPC1768 and display a string on it.
4. Study UART protocol and perform following experiments in polling mode as well as Interrupt mode. a) Transmit a string of characters on UART; b) Receive a string of characters on UART.
5. Interfacing Seven Segment Display to LPC1768.
6. Write a program to show digital values using on chip ADC.
7. Interfacing TFT display to LPC1768.
8. Implementing ETHERNET protocol using LPC1768.
- Additional Experiments (using Cortex M4) (Any Three)**
9. Explore GPIO lines of ARM Cortex M4 and interface Matrix Keypad to it and display key code of the corresponding key pressed.
10. Study I2C protocol and interface I2C based EEPROM to ARM Cortex M4 and write and read a character on EEPROM.
11. Study SPI protocol and interface SPI based EEPROM to ARM Cortex M4 and write and read a character on EEPROM.
12. Write a program to set and display date and time of on chip RTC.
13. Write a program to generate different wave form like square, triangular, Sine wave using DAC.
14. Study CAN protocol and Write a program for CAN self-test
15. Write a program to understand watch dog timer.

Semester – II (*Course Work*)
ESS-208L: CPLD and FPGA Lab

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Total	Examination Hours
	Tutorial	Practical			End Term			
0	1	6	0	70	80	150	3 Hours	

List of Experiments

1. Study of Xilinx boards.
2. Study of Actel boards.
3. Designing combinational and sequential circuits on FPGA Kit.
 - a) Adders and subtractors.
 - b) Multiplexers and demultiplexers
 - c) Encoders and decoders
 - d) Flip-Flops
 - e) Counters
 - f) Shift Registers
 - g) RAM
 - h) Basic Microprocessor
4. Designing combinational and sequential circuits using VHDL.
 - a) Counters
 - b) Shift Registers
 - c) RAM
 - d) Basic Microprocessor
5. Experiments on FPGA applications

Semester – III (Course Work)
ESS-306L: Mixed Signal and DSP Systems Lab

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Total	Examination Hours
	Tutorial	Practical			End Term			
0	1	6	4	70	80		150	3 Hours

List of Experiments

Experiments on Mixed Signal Systems

Design of following using in standard technology node

1. Current Mirrors.
2. Single stage amplifier
3. Source follower
4. Differential Amplifier
5. Gilbert Cell
6. Operational Amplifier
7. PLL
8. Bandgap Reference
9. Digital to Analog Converters
10. Analog to Digital Converters

Experiments on DSP

11. Write a program to implement convolution of $x(n)$ with $h(n)$ using linear convolution and verify the result $y(n)$ as below. $x(n) = [1, 1, 1, 1, 0.5, 0.5, 0.5, 0.5]$, $h(n) = [0.3, 0.25, 0.2, 0.15, 0.1, 0.05]$ and $y(n) = [0.3, 0.55, 0.75, 0.9, 0.85, 0.775, 0.675, 0.6, 0.4, 0.25, 0.15, 0.075, 0.025]$
12. Write a program for circular convolution of the following inputs $x(n)$ and $h(n)$ and Verify the output $y(n)$ as given below: $x(n) = [1, 1, 1, 2, 1, 1]$, $h(n) = [1, 1, 2, 1]$ and $y(n) = [6, 5, 5, 6, 6, 7]$
13. Implement an 8-point DFT for the inputs $x(n)$ and verify the result as $X(K)$. Where, $x(n) = [1, 1, 1, 1, 1, 1, 0, 0]$ and $X(K) = [6, -0.707-j1.707, 1-j, 0.707+j0.293, 0, 0.707-j0.293, 1+j, -0.707+j1.707]$.
14. Find IDFT of the sequence $X(K) = [11110000]$. Verify that $x(n) = [0.5, 0.125+j0.30175, 0, 0.125+j0.05175, 0, 0.125-j0.05175, 0, 0.125-j0.30175]$
15. Generate the following waveforms using TMS320XX DSP kit and verify the outputs for different frequencies (1KHz, 2KHz etc.) a) Sine wave, b) Square wave
16. Tone Generation using the DAC of TMS320XX DSP kit. a) Generate a simple tone of a fixed frequency (1 KHz), b) Generate multiple tones at frequencies starting from 300Hz to 3 KHz with an increment of 100Hz each tone for duration of 1second using timer interrupt.
17. Design an FIR Low pass Filter with following specification. $f_p = 1500\text{Hz}$, $f_s = 2000\text{Hz}$, Pass band attenuation = 0.01dB, Stop band attenuation = 40dB and $F_s = 8000\text{Hz}$ using Kaiser window. Real-time Implementation of FIR filters: a) Generate the filter coefficients using Kaiser Window for a low pass FIR filter for the specification as given in experiment 1 of module 2, b) Apply an input signal through ADC and implement the filter on ARM Cortex M3/M4. Vary the input signal frequency and observe the output on an Oscilloscope, c) Repeat the filter for Band pass and High pass, d) Repeat the same with hamming window.
18. Perform FFT analysis for the signal input through ADC and display the input signal as well as the FFT output on PC using Probe point facility. Perform FFT operation for 16, 32 and 64-point FFT. Compute the power spectrum $X(K) * X(K) = |X(K)|^2 = X_{\text{real}}^2 + X_{\text{imag}}^2$ and plot the same in PC.
19. DTMF Tone Generation and Detection and its implementation: a) Generate DTMF Tones. Detect the DTMF tone input through the ADC, b) Implement the program with Goertzel algorithm.
20. Filter design using TMS Processor.

Semester – III (*Course Work*)

ESS-307P/I: Pre Project/Pre-Internship

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Examination Hours
	Tutorial	Practical			End Term	Total	
0	1	6	4	70	80	150	3 Hours

Pre-Project Description

In the Pre-Project work, students shall choose a specific topic/area for their project. A supervisor will be assigned to each student, who at the beginning of the 3rd semester shall provide a syllabus and plan of study including relevant research papers to the student. Each student at the end of the course will submit a survey report regarding the final project and the same will be evaluated for final award of the course. Each Pre-Project work shall be evaluated for correctness, length and breadth of the background work undertaken by the student.

Pre-Internship Description

In Pre-Internship, students shall choose a specific domain for their Internship and identify prospective organizations and apply for Internship programmes. For Pre-Internship work, a counselor will be assigned to each student, who at the beginning of the 3rd semester shall guide him/her regarding identifying the prospective organizations and applying therein. At the successful completion of this course, students will: be able to articulate the mechanics of locating internships and behaving professionally; have produced the tools necessary to secure an appropriate internship; have created a professional portfolio that highlights their accomplishments. The student at the end of the course will submit a survey report regarding the procedure adopted and efforts made by the student in securing an Intern position and the same will be evaluated for final award of the course.

Semester – IV (*Internship*)

ESS-401I: Internship

Lecture	Hours per Week		Credits	Internal	Maximum Marks		Examination Hours
	Tutorial	Practical			End Term	Total	
0	0	48	24	200	700	900	3 Hours

Description

Internship shall be of six months (Minimum 18 weeks) duration and a student can accumulate 24 credits on successful completion of internship.

- Internships shall be considered as six months (not less than 18 weeks) of supervised learning carried out at industry or some academic institution of excellence. Students are encouraged to apply for internship in 3rd semester to companies or academic institutions so that its commencement is ensured at the beginning of 4th semester.
- The head of the Department and counsellor will collect a mid-term feedback to ensure smooth progress towards the completion of internship. At the time of completion of the internship, a certificate (satisfactory/unsatisfactory) and marks from concerned person of the organization shall be collected by the head of the Department. An Internship committee comprising of Head of the Department, External Expert, counsellor, and two faculty members of the department shall collect the report from the student and evaluate it. The certificate from the organization where internship was carried will be given due consideration. If the certificate is unsatisfactory then the Internship committee will review the matter and if they agree with the given certificate, the student has to carry on the internship again at same or different place.

Semester – IV (*Thesis*)
ESS-402T: Project and Thesis

Lecture	Hours per Week			Credits	Internal	Maximum Marks		Examination Hours
	Tutorial	Practical				End Term	Total	
0	0	48		24	200	700	900	3 Hours

Description

Project and Thesis shall be of six months (Minimum 18 weeks') duration and a student can accumulate 24 credits on successful completion of Project. This is in addition to pre-project work in 3rd semester wherein students shall choose a specific topic/area for their project and undertake its study.

- A thesis committee comprising of the head of the Department, external expert, supervisor and at least two more faculty members will serve thesis and oral examiners for each student pursuing thesis.
- A soft copy of the thesis in .pdf format (in specific style) should be sent to thesis committee, before its final submission. The Thesis committee shall examine it for suitability of publication (including any possible plagiarism) before the thesis goes in print and for binding.
- The external marks of 700 shall be evaluated with a breakup 500 for viva-voce and evaluation of thesis/project and 200 for a publication/s in indexed journal/conference. The publication will be verified by the thesis committee on the day of viva-voce.
- The publication must be the sole work of the student. Further, for conference publication, the student should produce presentation certificate to the thesis committee.

PROCESSING OF ANIMAL BASED FOODS (PRACTICAL) (0+0+4)

1. Survey of meat and fish products available in market.
2. To study slaughtering and dressing of meat animals.
3. Study of post-mortem changes.
4. Meat cutting and handling.
5. Evaluation of meat quality.
6. Preparation of various meat products such as: Meat pickle & cured meat
7. Meat emulsion and sausage manufacture.
8. Preparation and evaluation of traditional meat products.
9. Shelf-life studies on processed meat products.
10. Slaughtering of poultry.
11. Determination of meat to bone ratio in Chicken.
12. To evaluate freshness of fish.
13. To determine meat to bone ratio of fish.
14. Dressing of fish and calculation of dressing percentage.
15. Preparation of fish products such as fish cutlets, pickle, curry.
16. Experiments in dehydration, freezing, canning, smoking and pickling of fish and meat.
17. Visit to local slaughterhouse.
18. Quality evaluation of eggs.
19. Preservation of eggs.
20. Functional properties of eggs.

Dairy Science

- Quantative estimation of milk constituents such as moisture, total solids, fat.
- Determination of acidity of milk.
- Determination of specific gravity of milk.
- Platform tests on given samples of milk.
- Determination of adulterants in milk-water, urea, starch, sucrose etc.
- Detection of preservatives in milk.
- COB test.
- Visit to local milk processing plant.
- Preparation of common milk products
- Flavoured milks.

- Yoghurt.
- Butter.
- Ice-cream.

References:

1. Outlines of Dairy Technology by S. K. De
2. Chemistry and Testing of Dairy products by H.V. Atherton & J.A. Newlander
3. Milk and dairy Product Technology by Edger Spreer.
4. Dairy Chemistry by H.H. Sommer
5. Lawre. R. A. & Ledward, D. A. (2006). Lawres Meat Science 7th Ed. Woodhead Publishing Company, Cambridge, England.
6. Throntons Meat Hygiene.
7. Principles of Meat Science by Forest.
8. Developments in Meat Science by Lawrie.
9. Processed Meats by Pearsons.

FOOD PLANT DESIGN: FRUITS AND VEGETABLES BASED (1+1+0)

Unit I

- Scope of fruit/vegetable processing in J&K.
- Problems of fruit processing in J&K.
- Selection of site for fruit processing plant.
- Layout for a fruit processing plant.
- Building requirements for a fruit processing plant.
- Plant and machinery requirements for fruit processing.
- Water quality requirements for fruit processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a fruit processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a fruit/vegetable processing plant.

Students will be required to formulate a detailed project report for setting up a fruit/vegetable based processing plant. It may involve manufacture of products like juices, concentrates, jams, jellies, dehydrated products, canned products etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

FOOD PLANT DESIGN: CEREAL BASED (1+1+0)

Unit I

- Scope of cereal processing in J&K.
- Problems of cereal based processing plants in J&K.
- Selection of site for cereal based processing plant.
- Layout for a cereal processing plant.
- Building requirements for a cereal based processing plant.
- Plant and machinery requirements for cereal processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a cereal processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a cereal based processing plant.

Students will be required to formulate a detailed project report for setting up a cereal based processing plant. It may involve manufacture of products like bread, cookies, cakes, muffins etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

FOOD PLANT DESIGN: CEREAL BASED (1+1+0)

Unit I

- Scope of cereal processing in J&K.
- Problems of cereal based processing plants in J&K.
- Selection of site for cereal based processing plant.
- Layout for a cereal processing plant.
- Building requirements for a cereal based processing plant.
- Plant and machinery requirements for cereal processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a cereal processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a cereal based processing plant.

Students will be required to formulate a detailed project report for setting up a cereal based processing plant. It may involve manufacture of products like bread, cookies, cakes, muffins etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

FOOD PLANT DESIGN: DAIRY BASED (1+1+0)

Unit I

- Scope of milk processing in J&K.
- Problems of milk processing in J&K.
- Selection of site for milk processing plant.
- Layout for a milk processing plant.
- Building requirements for a milk processing plant.
- Plant and machinery requirements for milk processing.
- Water quality requirements for milk processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a milk processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a milk processing plant.

Students will be required to formulate a detailed project report for setting up milk based processing plant. It may involve manufacture of products like dhahi, cheese, butter; processing and packaging of fluid milk, etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

SMALL SCALE PROCESSING OF FRUITS, VEGETABLES & CEREALS (0+1+1)

Unit-I (Tutorial)

➤ Production Facilities

1. Site
2. Building
3. Processing equipments
4. Services
5. Sanitation

Unit-II (Practical)

1. Preparation of squashes, Crush, Juices
2. Preparation of Jam, Candy
3. Preparation of Pickle
4. Preparation of Tomato Ketchup
5. Preparation of Bread
6. Preparation of Cakes
7. Preparation of Cookies

References:

1. Preservation of fruits & Vegetables by Siddappa et al 1999. ICAR, New Delhi
2. Preservation of Fruits & Vegetables by Srivastava & Kumar, 1996. Intl. Book publishing Co. Lucknow
3. Small Scale Fruit & Vegetable Processing & Products (Production methods, Equipment Assurance Practices) UNIDO Technology Manual.
4. Stanley P.Cauvain & Lindas S. Young. Baked Products. Blackwill Publishing.
5. Stanley P.Cauvain & Lindas S. Young. The Chorleywood Bread Process. CRC Publications.
6. Bakery Technology & Engineering by Samueal A. Matz.

Religion in Ancient India
Course code: HS17409OE

Unit-I

A. Text and Tradition:

- I. Brahminical
- II. Buddhist
- III. Jain

B. Making of a Religious Traditions

- I. Brahmanical
- II. Buddhism
- III. Jainism

Unit-II

A. Understanding and Interpretations of Various Religious Dissents:

- I. Syncretism,
- II. Mahayan Buddhism Tantricism
- III. Kashmiri Saivism

B. Orientalism and Indian Religious Traditions and Beliefs

Selected Readings:

- | | |
|--|---|
| Bagchi, Prabodh Chandra. | <i>Studies in the Tantras</i> , Calcutta, 1939. |
| Banerjee, J. N. | <i>Pauranic and Tantric Religion</i> , Calcutta, 1966. |
| Bhandarkar, R. G. | <i>Vaisnavism and Minor Religious Systems</i> , Strasburg, 1913. |
| Chakravarti, Chintaharan. | <i>The Tantras: Studies on Their Religion and Literature</i> , Calcutta, 1972. |
| Champakalakshmi, R and Gopal. S. (eds) | <i>Tradition Dissent and Ideology: Essays in Honour of Romila Thapar</i> , Delhi, 1973. |
| Dasgupta, S. N. | <i>A History of Indian Philosophy</i> , Vol. 1, Motilal Banarsidass, 1997. |
| Isayeva, Natalia. | <i>From Early Vedanta to Kashmiri Saivism</i> , reprint, Delhi, 1965. |
| James, William. | <i>The Varieties of Religious Experience</i> , London, 1952. |
| Keown, Damien. | <i>Buddhism A Very Short Introduction</i> , Oxford, 2000. |
| Kilam, Jiya Lal. | <i>A History of Kashmiri Pandits</i> , Srinagar. |
| Knott, Kim. | <i>Hinduism A Very Short Introduction</i> , Oxford, 2000. |
| Koul, Anand. | <i>"The Life Sketch of Lalleshwari: A Great Hermitess of Lel Ded"</i> . Indian Antiquary, 1961. |
| Majumdar, R. C. | <i>"Evolution of Religio-Philosophic Culture in India". The Cultural Heritage of India</i> , Vol. 4, The Religions, Calcutta, 1973. |
| Mishra, K. | <i>Significance of Tantric Tradition</i> , Varanasi, 1981. |
| Witzel, Michael. | <i>"The Brahmins of Kashmir."</i> In <i>Study of the Nilmata-Aspects of Hinduism in Kashmir</i> , Kyoto, 1994. |

Revivalist/ Reformist Movements in Modern India

Course code: HS17209GE

Unit-I

Reform/Revivalist Movements: Concepts and Trends:

- I.** Objectives and Nature of Reform/Revivalist Movements
- II.** Scope of Reform/Revivalist Movements
- III.** Limitations of Reform/Revivalist Movements

Unit-II

Hindu Reform/Revivalist Movements:

- I.** Brahmo Samaj
- II.** Arya Samaj
- III.** Prathna Samaj
- IV.** Theosophical Society
- V.** Young Bengal Movement

Selected Readings:

- Ahmad, Qiammu ddin, *Wahabi Movement in India*, 1966, New Delhi.
- Chand, Tara. *History of the Freedom Movement in India*, Vol II and III, Ministry of Information and Broadcasting .New Delhi
- Data, K.K, *Social History of Modern India*, Macmillan New Delhi
- Sen Amit. *Notes on the Bengal Renaissance*, Peoples publishing House, Bombay
- Jonnes Kenneth, *Socio Religious Reform Movements in British India*. O.U.P New Delhi
- Joshi, V.C (ed.), *Ram Mohun Roy and the Process of Modernisation in India*, vikas Publishing house ,Delhi
- Hardy Peter. *Muslims in British India*, Camberidge, 1972
- Malik Hafeez. *Muslim National in India and Pakistan* ,Washington 1963
- Metcalf, Barbara, D. *Muslin Revivalism in British India*, New Jersey, 1982
- Mujeeb. Mohammad. *Indian Muslims*, London, 1957
- Pannikar, K, M. *Culture, Ideology and Hegemony*, Tulika New Delhi

Semester II

Indian Economy and Society (1757-1947)

Course code: HS15206GE

Unit I

- I. Historiography of Colonial Economy
- II. Decline of Indigenous Industries: The De-Industrialization Debate
- III. Agrarian Settlements
- IV. Commercialization of Agriculture
- V. Drain of Wealth: A Conceptual Debate

Unit II

- I. Famine and Famine Policy
- II. Indian Capitalistic Development
- III. Foreign Trade and Balance of Payment
- IV. Fiscal Policy

Unit III

- I. Orientalism and Utilitarianism
- II. Socio-religious Reform Movements: Conceptual Framework, Limitations and Significance
- III. Modern Education
- IV. Press and Middle Class
- V. Women and Gender

Selected Readings:

- Bandyopadhyay, Shekhar, 2004, From Plassey to Partition. Orient Longman.
- Bagchi, A. K., 1972, Private Investment in India, 1900-1939, Cambridge University Press.
- Basu, Aparna, 1981, Essays in the History of Indian Education, New Delhi.
- Basu, Aparna, 1974, The Growth of Education and Political Developments in India, Oxford University Press.
- Bhatia, B.M, 1963, Famines in India, Asia Publishing House
- Bhattacharya, Sabyasachi, 1971, Financial Foundations of the British Raj, Shimla
- Bhattacharya, Neeladri, Essays on Commercialization of Agriculture.
- Bhattacharya, S., 1998, Introduction to the Contested Terrain: Perspectives on Education in India, Orient Longman. .
- Bose, Sugata and Jalal, Ayesha. 2004. Modern South Asia. Oxford University Press.

- Bose, Sugata, 1993, Peasant Labour and Colonial Capital, Cambridge University Press.
- Chabbra, G.S., 1962, Advanced Study in the History of Modern India. Sharanjit Books.
- Chand, Tara., 1961, History of the Freedom Movement in India. Delhi.
- Chandavarkar, Rajnarayan, 1994, The Origins of Industrial Capitalism in India. Cambridge university Press.
- Chandra, Bipin, 1966, Rise and Growth of Economic Nationalism in India. New Delhi: Peoples Publishing House
- Chandra, Bipin, 1979, Nationalism and Colonialism in Modern India. New Delhi: Orient Longman.
- Chandra, Bipin, 2009, History of Modern India. Orient Blackswan.
- Charles Worth, Neil, 1982, British Rule and Indian Economy, 1800- 1914. Macmillan.
- Chatterji, B., 1992, Trade, Tariffs and Empire. Oxford University Press.
- Cain, P. J and A.G Hopkins, 1993, British Imperialism: Innovation and Expansion, 1688- 1914. London and New-York: Longman. .
- Chandra, Bipin. 2009, Essays on Colonialism. Orient Blackswan.
- Cohn, Bernard, 1966, Colonialism and its forms of Knowledge, Oxford University Press.
- Desai, A. R., 1979, Peasant Struggles in India. Bombay: Oxford University Press.
- Dutt, R.C., 1956, Economic History of India under Early British Rule, London.
- Dutt, R.P. 1949, India Today, Bombay
- De, Barun, 1976, Essays in the Honour of S.C Sarkar. People's Publishing House.
- Dirks, Nicholas, 1992, Castes of Mind, Princeton □ Books.
- Farquhar, J. N., 1967, Modern Religious Movements in India, Munshiram Manoharlal.
- Fisher, Michel H., 1991, Indirect Rule in India, Oxford University Press.
- Forbes, Geraldine, 1998, Women in Modern India. Cambridge University Press.
- Ghosh, S. C., 1995, The History of Education in Modern India. Orient Longman.
- Guha, Ramachandra, 1991. The Unquiet Woods, Ecological Change and Peasant Resistance in Himalayas. Oxford University Press.



Elective (GE)-

MCJ17006GE

Citizen Journalism

Unit I

Concept

Modes of transmission:

Mainstream Electronic and Print Media

Social Media

Unit II

Essential skills of a Citizen Journalist

Citizen Journalist: A loose cannon or a responsible journalist

Credibility Issue of Citizen Journalist

CJ journalism- An extension of traditional media or emergence of new media?

Critical study of Michael Buerk's 2009 *BBC* documentary *CJ-Democracy or Chaos?*

(Practical Exercise: Two minutes video clip to be submitted immediately after the classwork)

3rd semester

MCJ17006GE. Citizen Journalism

Total Marks: 50 (Term Examination: 25, Continuous Assessment Test: 25)

Syllabus Choice Based Credit System (CBCS)

for M.A Persian 2017 onwards

SEMESTER I

(3 core courses, each course of 4 credits)

PER17101CR :-Classical Persian Literature Poetry (Ghazal & Rubai)

Critical Study of the poets and Translation and Explanation of the below mentioned text:

Credit - 1st

انتخاب از غزلیات سعدی شیرازی:

- ا- شب فراق که داند که تا سحر چندست -
- ب- مادرین شهر غریبیم و درین ملک فقیر -
- ج- شب است و شاهد شمع و شراب و شیرینی -
- د- من ندانستم از اول که تویی مهر و وفایی -

Credit - 2nd

انتخاب از غزلیات حافظ شیرازی:

- ا- صبحدم مرغ چمن با گل خواسته گفت -
- ب- دوش دیدم که ملائک در میخانه زدند -
- ج- ستاره ای بد زشید و ماه مجلس شد -
- د- بیا تا گل برافشانیم و می در ساغر اندازیم -

Credit - 3rd

انتخاب از غزلیات خواجو کرمانی:

- ا- اگر سرم برود در سرو فانی شام -
- ب- گویا عزم ندارد که شود روزا مشب -
- ج- دیشب درآمد از درم آن ماه چهره ست -
- د- در چمن دوش ببوی تو گذر میکردم -

Credit - 4th

انتخاب از رباعیات عمر خیام:

- ا- افسوس که نامه جوانی طی شد -
- ب- این قافله عمر عجب می گذرد -

- ج۔ درکار گاہ کوزہ رستم دوش۔
د۔ پیش ازمن و تو لیل و نہاری بوده است۔

Books Recommended For Study

- ۱۔ بوستان ادب از دکتر شمس الدین احمد۔
- ۲۔ دیوان حافظ۔ بہ تصحیح پرفیسر نذیر احمد قاسم غنی۔ و مقدمہ
- ۳۔ کلیات سعدی۔ چاپ فروغی۔
- ۴۔ رباعیات عمر خیام۔
- ۵۔ شعر الجم از شبلی نعمانی۔ ۵ جلد۔
- ۶۔ تاریخ تحول شعر فارسی۔ از زین العابدین مومتمن۔
- ۷۔ دی باخیام۔ از علی دشتی۔
- ۸۔ سخن و سخنوران۔ فروزانفر بدیع الزمان۔
- ۹۔ باکاروان حلہ۔ دکتر عبدالحسین زرین کوب۔
- ۱۰۔ گلستان عجم ترجمہ باکاروان حلہ مطبوعہ اسلام آباد۔
- ۱۱۔ جام جہان نما۔ محمد علی اسلامی ندوش۔
- ۱۲۔ در مکتب حافظ از زرین کوب۔
- ۱۳۔ صور خیال در شعر فارسی از دکتر شفعی کدکئی انتشارات نیل۔

PER17102CR:- Classical Persian Prose.

Critical study of the prescribed books, authors and translation of the text given below.

Credit - 1st

انتخاب از سیاست نامہ از نظام الملک طوسی
۱۔ فصل ہفتم: اندر بر رسیدن از حال عامل وقاضی..... و شرط سیاست

Credit - 2nd

انتخاب از چہار مقالہ (مجمع النوادر)۔ از نظامی عروضی سمرقندی

مقالہ دوم: در ماہیت علم شعر و صلاحیت شاعر۔ از ص ۱۶۸ تا ۱۸۰

Credit - 3rd

انتخاب از گلستان سعدی شیرازی
جدال سعدی بامدعی در بیان تو انگری و درویشی
حکایت اول دوم سوم چهارم

Credit - 4th

انتخاب از تاریخ مسعودی معروف به تاریخ بیهقی تألیف ابوالفضل محمد بن حسین بیهقی
آمدن رسول از بغداد به گاهای درگذشتن القادر بالله خلیفه عباسی

In the examination there will be four Credits in this course - with an alternative choice - and the students will be required to attempt all the four. The Credits will be designed to test students critical understanding of the thematic and formal aspects of prescribed text.

Books Recommended For Study

- ۱- ”بهار ادب“ انتخاب از نثر کلاسیک فارسی با هتنام دکتر شمس الدین احمد -
- ۲- گزیده های از نظم و نثر فارسی - نثر کهن - متن های تاریخی از انتشارات فرهنگ و هنر -
- ۳- سبک شناسی - از ملک اشعر ابهار -
- ۴- نور و ظلمت در تاریخ ادبیات ایران از میخائل - ترجمه از اسد پور پیرانفر -
- ۵- چهار مقاله تصحیح دکتر محمد معین (دیباچه) -
- ۶- دیداری با اهل قلم از شادروان دکتر غلام محسین یوسفی - ۲ جلد
- ۷- قلمرو سعدی - علی دشتی -
- ۸- گنجینه سخن - دکتر ذبیح الله صفا -
- ۹- گلستان سعدی به کوشش - نوالله ایزدپرست

PER17103CR:- Communication and Skills

Credit - Ist

Introduction to the Basic Persian Language & Grammar. Question answer word meaning make sentences. Fill in the blanks from the prescribed book.

Persian Language training course, Preliminary Advance Level- vol.2. by Mehdi Zarghamian.

Credit - 2nd

Translation and study from Persian to Urdu or English of the Ist five chapters of the prescribed book.

Persian Language training course, Preliminary Advance Level- vol.2. by Mehdi Zarghamian.

Credit - 3rd

Translation and study from Persian to Urdu or English of the Last five chapters of the prescribed book.

Persian Language training course, Preliminary Advance Level- vol.2. by Mehdi Zarghamian.

Credit - 4th

- (A) Translation of Unseen passages of English or Urdu into Persian.
- (B) Conversation in Persian and Viva Voce Test.

INSTRUCTIONS FOR THE PAPER SETTER:

In the examination there will be four Credits in this course with an alternative choice and students will be required to attempt all the four. The Credits will be designed to test students close knowledge and proper understanding of the Persian Language. In Credit-II four passages and Credit-III four passages should be given and students should be asked to translate two passages (Paper setter will translate any Four passages from the book into Urdu or English and then ask the students to translate Two passages into Persian). Viva- Voce examination will be conducted by the Head of the Department and concerned teacher.

PER17104DCE:- History of Persian Literature. (Farsi-e-Bastan)

Credit - Ist

۱- اطلاعات درباره مضوعاتی برگزیده زیر:
فارسی باستان - پهلوی - فارسی دری - اوستا

Code: SW-103-CR
Course Name: Social Problems
Total Credits=03

Teaching Hours: 48

Objectives:

- *To sensitize the learner about the emergence of various Social problems.*
- *To understand and apply professional skills to deal with Social problems.*

Unit I: Understanding Social Problems

- Social Conformity and Deviance
- Social Problems Concept, Types of Social Problems: Economic, Social and Psychological
- Social Problems in Kashmir
- Social Work response to Social Problems

Unit II: Social Problems -1

- Poverty and its Social Dynamics
- Drug Addiction
- Suicide
- Terrorism

Unit III: Social Problems -2

- Problems of Women-Dowry, Domestic Violence, Female foeticide.
- Problems of children-Child labour, Child abuse.
- Problems of Youth- Unemployment, Youth Unrest.
- Problems of Elderly- Old age, Destitution.

Suggested Readings

- Cohen, A.K., 1968: *Deviance and Control*, New Delhi: Prentice Hall of India
- Desai, A.R., 1986: *Agrarian Struggle in India after Independence*, New Delhi: Oxford University Press.
- Domenach, J.M., 1981: *Violence and its Causes*, Paris: UNESCO.
- Merton, R.K., 1957: *Social Theory and Social Structure*, New York: The Free Press.
- Shukla, K.S., 1988: *Collective Violence: Challenge and Response*, New Delhi: IIP.
- Singh, Y., 1988: *Modernization of Indian Tradition*, New Delhi: Thomson Press.
- Srinivas, M.N., 1966: *Social Change in Modern India*, New Delhi: Allied Publishers.
- Wallance, W.L., 1969: *Sociological Theory*, London: Hienemann.
- Mandelbaum, D.G., 1970: *Society in India* (Vol. 1), Bombay: Popular Prakashan.
- Coser, L.A., 1979: *The Functions of Social Conflict*, Glencoe: Free Press.

SEMESTER 1

Code: SW 101-CR

Course Name: History & Philosophy of Social Work

Total Credits=03

Teaching Hours: 48

Objectives:

- *Familiarize learner to the core values and philosophy of Social Work profession.*
- *Enable the learner understands and differentiate social work and other related terms.*

Units I: Social Work and Related Concepts

- Social Work, Social Welfare, Social Services, Social Reform Social Movement,
- Social Justice, Human Rights and Voluntary action.
- Social Work: Nature, Goals, Values.
- Methods, Functions and Skills.

Unit II: Historical Development of Social Work

- Development of Social Work: in U.K., U.S.A. and India.
- Major Social Reform movements in the 19th century in India: Muslim, Hindu and Dalit Movement.
- Gandhi's contribution to Social Change and Reform.
- Sarvodaya Movement.

Unit III: Social Work as a Profession

- Basic Requirements of a Profession: Code of ethics.
- Present State of Social work as a Profession.
- Social work principles and their application in different Socio-Cultural settings.
- Approach in Social Work: Systems, Radical, Existential.

Code: SW106-GE

Course Name: Conflict Mitigation and Peace Building

Total Credits=03

Teaching Hours: 48

Objectives

- *Intends to help the students understand, appreciate and subsequently intervene in situations of conflict and violence from early warning to post-conflict reconstruction and restoration.*
- *Aims to provide the students an understanding of the conflict zones from across the world including inter-state conflict.*

Unit I: Understanding Conflict

- Definitions and Contents of Conflict-Understanding of the concepts such as Violence, Non-Violence, Riot, Feud, Rebellion, Genocide.
- Overview of Social, Economic and Political Conflict.
- Sources and Causes of Conflict

Unit II: Conflict Analysis

- Conflict as a Social Process-Economics of Conflict,
- Relevance of Conflict for Social Work
- Characteristics of divided Societies and deep-rooted Conflicts-Instances of Communal/Ethnic/Caste/Racial conflict from India and other conflict sites from across the globe

Unit III: Conflict Analysis

- Areas and People in Conflict-cases from Global South and Global North, the Political Economy of Conflict-role of Hegemonic States
- Political, Economic, Social Challenges-steps and Processes etc.
- Conflict induced trauma interventions- Use of Social Work Methods and Skills

Suggested Readings

- Hall-Cathalla,D.,1990: *The Peace Movement in Israel 1967-1987*, New York: St. Martin's Press
- Elizabeth Warnock Fernea & Mary Evelyne Hocking (eds.). 1992: *Israeli and Palestinians: The Struggle For Peace*, Austin: University of Texas Press
- Paul Lederach, J.,1997: *Building Peace : Sustainable Reconciliation in Divided Societies*, Washington: USIP
- Gordon & Gordon., (ed). 1991: *Israel/Palestine: The Quest For Dialogue*, New York: Orbis
- Weiner, Y. (ed) 1998: *The Handbook of Interethnic Coexistence*, New York: Continuum
- Hurwitz, D. (ed) 1992 : *Walking the Redline: Israelis in the Search of Justice for Palestine*, Philadelphia: New Society Publisher
- Smith, Anthony. 1986: *Ethnic Origins of Nations*, Oxford: Blackwell.

Code: SW206-GE

Course Name: Women's Studies: An Overview

Total Credits=03

Teaching Hours: 48

Objectives:

- *Understand the Concept of Gender.*
- *To develop understanding of the Issues related to Gender.*

Unit 1: Introduction to Women's Studies

- Key Concepts, Needs and Scope.
- Historical and Social Contexts.
- Situating Women in Everyday Roles: Family, Class, Religious and Social Systems.
- Marginalisation: Social, Economic and political.

Unit II: Issues and Response

- Violence: Understanding Violence against women in various settings (Home, Office, Public Spaces) and Roles (Girl child, Orphans, pre- and post-marriage, old age)
- Health: Issues related to reproductive health, nutrition,
- Representation: Media Representations and Stereotyping.

Unit III: Women and Conflict

- Women as Victims of armed conflict
- Women as survivors of Armed Conflict(half widows, widows, orphans)
- Women and Rights: Constitutional provisions and laws, Differences between written laws and lived realities.

Suggested Readings

- Singh, A., (ed). (1988): *Invisible hands*, New Delhi: Sage Publication.
- Agarwal, B.,(ed)(Undated): *Structure of Patriarchy*, New Delhi.
- Dube, L & Palsiwala., (eds) (1989) *Structure & strategies women, work & family in Asia*, New Delhi: Sage.
- Sardamoni,K (ed)., (1992) :*Ending Household*. New Delhi: Sage.
- Uberoi P- (ed)., (1996):. *State Sexuality & Social Reforms*, New Delhi.
- Ratna ,K (ed)., 1996: *Feminist Terrains in Legal Domains*, New Delhi: Kali .
- Zaya,H (ed).,1995: *Forging Identities: Gender Communities and Multiple patriarchies*, New Delhi.

Code: SW207-GE

Course Name: Management and Welfare of Marginalized Communities

Total Credits=3

Teaching Hours: 48 Hours

Objectives:

- To develop in the learner an understanding of the population problem and its socio-economic consequences
- To sensitize the learner about the population problems and its impact on society;
- To develop in learner an understanding of the problems of weaker sections, discrimination, exploitation, and need for welfare services.

Unit I Classification

- Meaning, Criteria, Classification.
- Different Group: Scheduled Castes, Scheduled Tribes, Other Backward Classes, Minorities.
- Demographic Profile, Constitutional provisions and Legislative Measures.
- Protective Discrimination Reservation Policy, Free Legal Aid

UNIT II Minorities

- The National Commission for Minorities Act 1992 and its Functions in safeguarding the Interests of Minorities. Minorities and National Integration
- Other Backward classes- Scope and Definition.
- Commission for Linguistic Minorities.
- Implementation of 15- point programme for the Welfare of Minorities.

Unit III Developmental initiatives

- National Commission for the Scheduled Castes/ Scheduled Tribes.
- Development programmes: Special Component plan for the Scheduled Castes. The 20-Point programmes, Finance and Development Corporations.
- National Scheme of liberation and rehabilitation of Scavengers.

Suggested Readings

- Beteille, Braj A. 1992: *The backward Classes in Contemporary India*, New Delhi: Oxford University Press.
- Beteille, Braj A. 1997: *Caste: Old and New*, Jaipur: Rawat Publications.
- Omvedt, Gail. 1994: *Dalits and the democratic Revolution*, New Delhi: Sage Publication,
- Shah, G. 1990: *Social Movements in India*, New Delhi: Sage Publications.
- Sharma, K.L. 1998: *Social stratification in India*, Jaipur: Rawat Publications.
- Wignaraja, P. 1993: *New Social Movements in the South: Empowering the People* New Delhi: Vistar Publication, ,
- Gulalia Akash., 2003: *Scavengers in twenty first century: Realities of rehabilitation*, New Delhi: Mohit Publications.

Code: SW 208-OE
Course Name: Child Rights
Total Credits=03

Teaching Hours: 48hrs

Objective:

- Understanding issues of Children and available social policy responses.

Unit I

- Child and childhood: concept and definition
- Socialization: concept, development of self, internalisation of social norms
- Demographic Profile: rural, urban, gender and age disaggregated
- Profile of children in difficult circumstances, vulnerable children, children requiring care and protection: child labour, street children, disability, juvenile justice, substance
- abuse, child abuse, HIV / AIDS

Unit II:

- Constitutional provisions and major national policies in India: child welfare policy
- health, education, labour policies related to children etc
- Juvenile Justice Act (JJA)
- Child Labour Act
- United Nation Convention on the Rights of the Child (UNCRC)
- The Millennium Development Goals
- Rights Based Approach

Unit III. Analytical Field Study

The analytical field study shall be conducted during the course. Students shall select one of the Field Projects in Advocacy and Rights Based Movements with children as active partners to conduct the in-depth analytical study. The key focus of this study would be to:

- Conduct a situational analysis of the issue,
- Examine critically the existing interventions of the movement,
- Identify rights based intervention in the area and delineate suggestions for project and policy interventions.

Suggested Readings

- Bajpai, Asha.,2003: *Child Rights in India: Law, Policy and Practice*. New Delhi: Oxford University Press
- Banerjee, B. G., 1987: *Child Development and Socialisation*, New Delhi : Deep & Deep Publication
- Baroocha, Pramila. Pandit.,1999: *Hand book on Child*, New Delhi : Concept Publishing Com.
- Bhalla, M. M.,1985: *Studies in Child Care*, Delhi : Published by NIPCCD
- Bossare, James H. S.,1954: *The Sociology of Child Development*, New York : Harper & Brothers
- Chaturvedi, T. N.,1979: *Administration for Child Welfare*, Admin, New Delhi : Indian Institute of Pub.

Code: SW-306-GE

Course Name: Disability Studies

Total Credits=03

Teaching Hours: 48

Objectives:

- Critically appraise theoretical and conceptual perspective with regard to disability and appropriate sources of research evidence in order to inform effective assessment, decision making and interventions
- Understand issues and concerns related to persons with disability and their caregivers
- Facilitate the integration and synthesis of theoretical concepts and social work tasks relevant to the field by imbibing social work values.

Unit 1 Disability

- Disability: Definition, causes, types and Prevalence of various disabilities. Prevention and
- Management of disabilities at primary, secondary and tertiary levels. Societal attitudes towards
- Persons with disability. Historical perspective (Psychological and sociological) in India and abroad (UK, USA).

Unit II Policies and Laws

- Governmental measures and programmes for Persons with Disabilities
- Nationalized Institutions for the PWD (NIVH, NIPH, NIOH, NIMH)
- Persons with Disability Act 1995, Rehabilitation Council of India Act , 1992, National Trust
- Act 1999, National Policy on Persons with Disabilities, UN Conventions and declarations of
- Person s with disabilities. Models (Social, Medical, Institutional and Charity), Millennium development goals, CBR guidelines and Matrix in Community based rehabilitation, Right Based Twin Track Approach,

Unit III Rehabilitation

- Multidisciplinary rehabilitation team a and their roles: Process of rehabilitation early identification, treatment, fitment of aids and appliances, education, vocational rehabilitation,
- Role of NGOs and INGOs, Role of Social Workers for persons with disability, Intervention
- Methods and strategies at individual, family and community level

Suggested Readings

- Gajendragadkar.,(ed.) 1983: *Disabled in India*, Mumbai: Somaiye Pub.
- Oliver, M.,1983: *Social Work with the disabled*, London: Macmillan.
- Banerjee, G., 2001: *Legal Rights of Person with Disability*, New Delhi: RCI.
- Kundu C.L., (ed). 2003 :*Disability Status India*, New Delhi, Rehabilitation Council of India
- Bigby, Christine et.al. (eds.) 2007: *Planning and Support for People with Intellectual Disabilities: Issues for Case Managers and Other Professionals*. London: Jessica Kingsley Publishers
- Government of India,1993: *National Policy for Persons with Disabilities*. New Delhi: Ministry of Social Justice and Empowerment.
- Mani, D. Ram.,1988: *The Physically Handicapped in India*. New Delhi: Shilpa Publications.
- Wilson, S., 2003: *Disability, Counseling and Psychotherapy: Challenges and Opportunities*. Basingstoke: Palgrave Macmillan.

Code: SW 307-GE

Course Name: Social Work and Correctional Services

Total Credits=03

Teaching Hours: 48

Objectives:

- *To sensitize the learner about the concept of crime and criminology.*
- *To elucidate the role of social work interventions viz crime and criminology.*

Unit I: Crime and Criminology

- Crime and Criminology: Concept and Scope
- Classification of crimes: Sutherland, Bonger, Lemert, Clinard and Quinney
- Juvenile Delinquency: Meaning, Definition, Causes, Prevention and Control
- Punishment: Concept, Definition and Theories

Unit II: Theories of Crime

- Classical Theories
- Biogenic Theories
- Psychogenic Theories
- Sociogenic Theories.

Unit III: Social Work and Correction

- Correctional Social Work: Meaning, Scope
- Correctional Techniques: Counseling, Guidance, Vocational Training & Behavior Modification
- Social Work measures with the Police, the Judiciary and the prison staff - Job stress, burn out and other issues.

Suggested Readings

- Ahuja, Ram.,1984: *Criminology*, Meerut: Minakshi Publications.
- Barnes, H.E. & Teeters, N.K., 1966: *New Horizons in Criminology*, New Delhi: Prentice –Hall of India Pvt. Ltd.
- Clinard, Marshall B., 1974: *Sociology of Deviant Behaviour*, New York: Holt, Rinehart and Winston.
- Chockalingam, K., (ed.). 1985: *Readings in Victimology- Towards Victim Perspectives in Criminology*, Madras: Raviraj Publications.
- Gibbons, Don C., 1978: *Society, Crime and Criminal Careers: An introduction to Criminology*, New Delhi: Prentice –Hall of India Pvt. Ltd.
- Johnson, Elmer. Hubert. 1978: *Crime, Correction and Society*, Dorsey: Home Wood Ill.

Code: SW-308-OE

Course Name: Personality Development and Soft Skills

Total Credits=03

Teaching Hours: 48

Objectives:

- *To help students to build upon their existing knowledge and understanding on issues related to personality development.*
- *To help students to understand leadership and motivation skills*
- *to help students to overcome from various obstacles in attaining the goals in their life*

Unit I: Personality

- Introduction to Personality, Basics of Personality
- Human Growth and Behaviour
- Techniques in Personality Development- self Confidence, Goal Setting, Time Management, Stress Management, self-Acceptance and Self growth
- Major Theories of Personality

Unit II: Communication and Motivational skills

- Need for Communication, Process of Communication
- Written and Verbal Communication, Visual Communication, Signs, Symbols and Signals of Communication, Silence as mode of Communication.
- Motivation: Meaning, Theories (Content and Process)
- Techniques of Motivation

Unit III: Individual Interaction

- Basic Interaction Skills – Within family, Society
- Decision Making, Problem Solving Skills
- Leadership Skills
- Styles of Leadership

Suggested Readings

- Anastasi, A., 1987: *Psychological testing*, New York: McMillan Revised Edition,
- Davidoff, L. L.,(1976: *Introduction to Psychology*, New York :McGraw Hill Inc.
- Hurlock E.B.,1995: *Developmental Psychology*, New Delhi: Tata McGraw Hill.
- Morgan, C . T. & King , R.A., 1975: *Introduction to Psychology*, New York: McGraw Hill.
- Munn Norman, L.,1967: *Introduction to psychology*, New Delhi: Oxford and IBH,
- Page, J.D.,1967:*Abnormal psychology*, New York :John Wiley & Sons,

Code: SW406-GE
Course Name: Urban Studies
Total Credits=03

Teaching Hours: 48

Objectives:

- *To enable students to understand the unique nature of urban community*
- *To develop sensitivity and commitment for working with urban poor*
- *To provide knowledge on the government and voluntary efforts towards urban development.*

Unit 1: Urban Communities

- Urban Community: Meaning, characteristics, Rural Urban linkages and Contrast.
- City -Meaning, Classification, Urban Agglomeration, Sub-Urbs, Satellite Towns, Hinterlands, New Towns, Metropolis, Megalopolis,
- Major problems of Urban Communities in India: Housing, Drug Addiction, Juvenile delinquency, Prostitution/Commercial-sex, Crime, Pollution
- Migration – Concept, Causes, Types and Theories.

Unit 2: Urbanisation

- Urbanisation & Urbanism: Meaning and Characteristics; Trends in Urbanization Process.
- Theories of urbanization, Unorganized/Informal Sectors: Concept, characteristics; Unorganised Labour.
- Slum: Concept, Factors Contributing to Slum Development, Consequences and Issues. Slums programmes of improvement and eradication; Role of Social Work
- National Slum Policy- Slum Clearance Board- its Functions.

Unit 3: Urban Community Development and Governance:

- Urban Community Development: Concept and Principles.
- History of Urban Community Development.
- Review of Urban community Development Programmes. Current Programmes.
- 74th Amendment of the Constitution. Structure and Functions of Local Bodies.

Suggested Readings

- Ara, y. & Abbasi., 1995: *Urbanisation and its Environmental Impacts*, New Delhi: Discovery publications.
- Clinard, Marshall B.,1970 *Slums and Community Development*, New York: The Free press.
- Ramachandran.,1989: *Urbanisation and Urban System in India*, New Delhi: Oxford University Press,
- Stanly, Selwyn.,2005: *Social Problems and Issues: Perspectives for intervention*, New Delhi: Allied Publications.
- Thudipara, Jacob Z,. 1993:*Urban Community Development*, New Delhi: Rawat Publications.
- UN Habitat., 2003:*The Challenges of Slums*, London: Earthscane Publications Ltd.

Code: SW404- DCE

Course Name: Micro Finance, Self-help and Women Empowerment

Total Credits=03

Teaching Hours: 48

Objectives:

- 1. Introducing students to Credit and Evolution of Microfinance.*
- 2. Apprising students on Microfinance as a tool of poverty Alleviation.*
- 3. Understand the basic concepts of Self-help groups.*

Unit I Microfinance

- Evolution of Credit System: Credit to Microcredit.
- Sources of Credit: Formal and Informal
- Microfinance: Origin ,Structure and Function
- Pioneers in Microfinance.

Unit II Microfinance and Self Help Groups

- Microfinance and Poverty Alleviation.
- Concept, Evolution and Functions of Self Help Groups.
- Stages and Models of Self Help Groups.
- Monitoring, Evaluation and Impact Assessment of Savings and Credit Programmes

Unit III Microfinance and Women Empowerment

- Women Empowerment: Meaning and Scope
- Measures and Dimensions of Empowerment.
- Microfinance and Women Empowerment
- Challenges and hurdles to empowerment

Suggested Readings

- Meenai, Z., 2003: *Women Empowerment through Credit Based SHGs*”, New Delhi.: Akbar Book.
- Ganesamurthy, V.S., 2007: *India economic Empowerment of Women*, New Delhi New Century Publications.
- Lalitha, N., 2008: *Readings in Microfinance*, New Delhi.: Dominant Publishers and Distributors.
- Karmakar, K.G., 1999: *Rural Credit and Self Help Groups, Micro finance needs & concepts in India*, New Delhi: Sage publications.
- Verma, S.B., 2005: *Rural empowerment through, SHGS, NGO's & PRI's*, Y.T. Pavar, New Delhi: Deep & Deep publications.
- Ahmad, Rais., 2009: *Micro Finance and Women Empowerment*, New Delhi :Mittal Publication.

Code: SW408-OE

Course Name: Social Work and HIV/AIDS

Total Credits=3

Teaching Hours: 48 Hours

Objectives:

- To provide learners an understanding regarding the nature of HIV/AIDS and various socio-economic, political, legal, psychological and psychosocial dimensions related to the AIDS epidemic.
- To develop appropriate attitudes and skills in learners for effective interventions (Education, Counselling, Support, care, advocacy and referral services),
- To provide them an opportunity to develop capacity to think analytically on issues which have an impact on Policy.

Unit I HIV/AIDS

- Definition; Prevalence in the world, India and J&K;
- Symptoms of HIV/AIDS, Causes.
- Public Health Implications - Role of Prevention – Importance of Communication; Treatment Approaches; Services - VCTC, PPTCT and Related Services.

Unit II Psycho-Social Implications

- Psycho-Social Implications of HIV on infected and affected persons with Special reference to women and children;
- Stigma and its implications for marginalisation of PLWHA;
- Community based Care and Support Programmes.

Unit III: Social Work Response

- **Role of Social Worker:** in working with Persons infected/affected with HIV/AIDS.
- Social worker as a Counsellor; Ethical issues in Counselling.
- Role of UNAID, NACO, JKSACS, NGOs and media in the prevention and control of HIV/AIDS.
- Field Visits

Suggested Readings

- Gulalia, Akash., 2008: *Social Work Practice with Mobile Population vulnerable to HIV/AIDS*, New Delhi: Mohit Publications.
- Bloom, D. & Lyons, V.J., 1993: *Economic Implications of AIDS in Asia*, New Delhi: UNDP.
- Getzel, S.G., 1997: Group Work Services to People with AIDS, In Grief, L. G. & Ephross, H.P.(ed.) *Group Work with Populations at risk*, New York: Oxford University Press.
- Thomas, G., 1997: *AIDS, Social Work and Law*, New Delhi: Rawat Publications
- Jayasurya, D.C., (ed.). 1995: *HIV-Law, Ethics and Human Rights*, New Delhi: UNDP.
- United Nations, 1998: *HIV/AIDS and Human Rights - International Guidelines*, Geneva: United Nations.