

SYLLABUS FOR CHOICE BASED CREDIT SYSTEM

Hons. In Environment and Water Management

(Six Semester Course)

SEMESTER- I

COURSE	CODE OF PAPER S	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-1	Fundamental Of Env. Sc.-I	04	12
	C-2	Environment and its pollution -I	04	
	P-1	Practical based on C1 & C2	02+02= 04	
(B) Ability Enhancemen t Compulsory Course	AECC	MIL (Language)	02	02
(C) General Elective	Ge-1	Physics/Chemistry/Botany/Zoology/Math	04	06
		Practical -GE	02	
			Total Credits	20

SEMESTER- II

COURSE	CODE OF PAPERS	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-3	Introduction of fluid mechanics	04	12
	C-4	Environment and its pollution-II	04	
	P-2	Practical based on C3 & C4	04	
(B) Ability Enhancement Compulsory Course	AECC	Environmental Science	02	02
(C) General Elective	Ge-2	Physics/Chemistry/Botany/Zoology/Math	04	06
		Practical -GE	02	
			Total credits	20

SEMESTER- III

COURSE	CODE OF PAPER S	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-5	Water resources and management	04	18
	C-6	Water treatment and Management	04	
	C-7	Atmosphere and global climate change	04	
	P-3	Practical based on C5, C6 & C7	06	
(B) Skill Enhancement Course	SEC-I	Remote sensing, geographic information system and modelling	02	02
(C) General Elective	Ge-1	Physics/Chemistry/Botany/Zoology/Math	04	06
		Practical -GE	02	
			Total credits	26

SEMESTER- IV

COURSE	CODE OF PAPER S	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-8	Land and soil conservation management	04	18
	C-9	Ecology and ecosystems	04	
	C-10	Environmental legislation and policy	04	
	P-4	Practical based on C8, C9 & C10	06	
(B) Skill Enhancement Course	SEC-II	Environmental impact & risk assessment	02	02
(C) General Elective	GE-2	Physics/Chemistry/Botany/Zoology/Math	04	06
		Practical -GE	02	
			Total credits	26

SEMESTER- V

COURSE	CODE OF PAPER S	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-11	Biodiversity & conservation	04	12
	C-12	Physics and chemistry of environment	04	
	P-5	Practical based on C11 & C12	04	
(B) Discipline Specific Elective	DSE-I	Natural resource and management and sustainability	04	04
(C) Discipline Specific Elective	DSE-II	Tools and technique	04	04
		Practical based on DSE-I & DSE-II	04	04
			Total credits	24

SEMESTER- VI

COURSE	CODE OF PAPER S	NAME OF PAPERS	CREDI T	TOTA L CREDI T
(A) CORE COURSE	C-13	Entrepreneurship Development	04	12
	C-14	Wild Life and evolution Biology	04	
	P-6	Practical based on C13 & C14	04	
(B) Discipline Specific Elective	DSE-III	Natural Hazards and Disaster management Management	04	04
(C) Discipline Specific Elective	DSE-IV	Environmental Chemistry and solid waste management	04	04
		Practical based on DSE-III & DSE-IV	04	04
			Total credits	24

Final Credits = 20+20+26+26+24+24 =

140 Credits

FIRST SEMESTER

CORE COURSE 01

C-01- Fundamentals of environment science

(lec 30)

Introduction to ecology:

Ecosystem Concept, System approach in ecological modeling and its application (Primary Productivity & Secondary Productivity). Energy flow, Different types of Ecosystem, concept of Remote Sensing in data collection and Vegetation mapping. Ecological adaptation in aquatic & desert conditions (with some plants and animal association).

Environmental Chemistry

Acid–Base Equilibrium, Preparation of chemical solutions (N & M) required for environmental studies. Buffer in water system, Knowledge of Basic standards of pollution as per BIS, CPCB. Xenobiotic compounds—Degradation and degradative pathways.

Environmental Microbiology

Study of different microbes in their natural environment. Role of microbes in relation to environmental management.

PRACTICALS:-

Basic knowledge and field visit regarding local Flora & Fauna (Quadrant studies).
Size, no., frequency, density, abundance, terrestrial fauna of college campus,
Study of aquatic Flora and fauna from any lake.

FIRST SEMESTER

CORE COURSE 02

C-02- Environment and its pollution -1

(lec 30)

Environment

Definition, Components (atmosphere, hydrosphere, lithosphere , their composition & interaction).

Environmental pollution—

Definition, cause and impact on different system of environment (Resource consumption, deforestation, industrialization, agriculture, urbanization and transport).Population ecology.

Types of pollution

Water pollution--(Sources, impact & control management)

Surface water and Ground water

Organic pollutants-- Biopesticides , Surfactants , Detergents and Volatile compounds.

Inorganic pollutants (including nutrients , salts and heavy metals) Biological pollution, Thermal pollution.

Offshore and Inshore oil pollution.

Effect of pollution on water quality & aquatic life in surface water bodies, Oxygen economy, Eutrophication in lakes & reservoirs.

Noise pollution--(Sources, impact & control management)

Level of noise pollution as determined by WHO, BIS, CPCB.

Soil pollution--(Sources, impact & control management)

Soil erosion & land degradation (conservation practices)

Radio active pollution--(Sources, impact & control management)

Ionic and nonionic radiations.

PRACTICALS:-

Qualitative study of Phytoplankton, Quantitative study of Phytoplankton by lucky's drop method.

Sedgewick plankton counting method.

SECOND SEMESTER

CORE COURSE 04

C-04 Environment and its pollution—II

(lec 30)

Air pollution--(Sources , impact & control management)

Criteria pollutants- Carbon monoxides, Oxides of nitrogen & sulfur , Particulate matters, Hydrocarbons, Photochemical smog and Ozone.

Basic knowledge of different hazards (Green house effect, Global warming, Ozone layer depletion & Acid rain.

Different types of solid wastes—

(Municipal solid waste , Non hazardous Industrial solid waste ,Major waste producing industries).Hazardous wastes and their major sources.

PRACTICALS:-

Measurements of total dust and dust fall rate.

Visit in a municipal waste disposal system.

Practice oriented models (working or non working).

SECOND SEMESTER

CORE COURSE 03

C-03 Introduction to Fluid Mechanics (lec 30)

Properties of flow

Density, Specific weight, specific volume, Specific Gravity, Viscosity, Compressibility, Surface Tension & Capillarity.

Kinematics of flow

Introduction, Types of fluid flow ; Steady and unsteady flow , Uniform and nonuniform flow , laminar and turbulent flow, Compressible & incompressible flow , Rotation and irrotational flow. One, two, three Dimensional flow of fluid, Resistance to flow in one dimensional system , Darcy-weisbach equation. Rate of flow, Continuity equation, Velocity and acceleration, Stream function. Dynamics of fluid flow: Introduction, Bernoullies equation, Conservation of mass and momentum – energy equations.

Flow through pipes

Introduction, Loss of energy in pipes, Major and minor losses, Hydraulic gradient and total energy line. Flow through pipes in series, Flow through parallel pipes, flow through branched pipes, Flow through Equivalent pipes, Measurement of flow in pipes,

Flow in open channel

Introduction, Gradually varied and rapidly varied flow, Open channel sections, Measurement of flow in open channel, Velocity distribution.

PRACTICALS:-

Flow visualization

Measurement of discharge in a open laboratory channel by area velocity method using a pitot tube.

Measurement of discharge in an open laboratory channel by area velocity method using a current meter.

Measurement of discharge in an open laboratory channel using flumes (venturimeter) & notches.

Measurement of discharge of discharge in a pipe using orifice meter, venturimeter.

Determination of resistance co-efficient in a uniform channel flow & pipe flow.

THIRD SEMESTER

CORE COURSE 05

C-05 WATER RESOURCES AND MANAGEMENT

Introduction to hydrology

Precipitation, infiltration, evaporation, transpiration, run off, hydrological cycle.

Hydrological budget, water balance – global & regional surface water hydrology.

Surface water hydrology:

Runoff process, estimation of runoff & hydrograph

Ground water hydrology:

Aquifers, ground water hydraulics, safe yield, ground water collection system

Various uses of water

Agricultural , domestic , industrial power, generation, and inland navigation.

Management of water under extreme conditions; flood, salinity, draught etc.

Concept of distribution system and water losses during use,

Water quality protection for open wells and ponds.

Micro water shed management,

coastal water management,

rain water harvesting.

Practicals:-

Measurement of Pan evaporation and its comparison with penman equation,

Lysimeter experiment on the same site collection of hydrological data, rainfall, evaporation measurement, stream gauging, use of remote sensing in data collection.

THIRD SEMESTER

CORE COURSE 06

C-06 Water Treatment And Management

(lec 30)

Quality of water in different sources, Water quality monitoring

Water treatment process

Conventional water treatment process; Coagulation & flocculation, sedimentation, filtration, disinfection, water softening. Specific water treatment processes; Removal of iron & magnesium, desalination.

Quality and characteristics of domestic waste water.

Waste water treatment processes; primary treatment, secondary treatment, tertiary (advanced) treatment.

Waste water treatment including nitrogen and phosphorus removal.

Treatment and disposal of sludge.

Characteristics and treatment of a few typical industrial waste water.

Maintenance of effluent treatment plants.

Performance studies of a few typical treatment plants.

Waste water disposal and reuse.

Practicals:-

Estimation of water quality parameters such as turbidity, color, solids, alkalinity, acidity, PH, hardness, sulphate, chloride, fluoride, iron and manganese.

Colorimetric measurement of some heavy metals in effluent estimation of waste water characteristics of some typical waste water as per pollution control board requirement including DO, BOD, COD, Total kjheldahi, nitrogen and phosphates.

THIRD SEMESTER

CORE COURSE 07

C-07 Atmosphere & Global Climate Change

(lec 30)

Evolution and development of Earth's atmosphere; atmospheric structure and composition; Earth's energy balance; energy transfers in atmosphere; Earth's radiation budget; green house gases(GHG's); greenhouse effect; Movement of air masses; atmosphere and climate; *El Nino* and *La Nina*; tropical cyclone; Indian monsoon and its development, Meteorological parameters (temperature, relative humidity, wind speed and direction, precipitation);atmospheric stability and mixing heights; temperature inversion; Wind rose diagram and wind direction frequency, Lapse rate, plume behavior; Gaussian plume model. Plume and plume rise, Dispersion of pollutants.

Stack gas emission and their measurement, Threshold limiting values.

Air pollution control—particulate emission control, Control of mobile source's emissions.

Role of microbes and higher plants in air pollution abatement.

Disposal of hazardous water.

Chemistry of atmospheric particles and gases; smog – types and processes; photochemical processes;

ions and radicals in atmosphere; acid-base reactions in atmosphere; trends of global warming and climate change;

PRACTICALS:-

Determination of Bacteriological assessment of sample water (MPN,E.Coli).

Study of Industrial Effluent treatment plant and a pollution control plant(15 days in each plants).

Visit to Industries employing Air Pollution Control Equipment.

Preparation of flow chart for environmental monitoring/ stack emission.

Third semester
SKILL ENHANCEMENT COURSE (I)

**REMOTE SENSING, GEOGRAPHIC INFORMATION
SYSTEM & MODELLING**

Theory (Lectures: 30)

Unit 1: Remote Sensing: definitions and principles; electromagnetic (EME) spectrum; interaction of EMR with Earth's surface; spectral signature; satellites and sensors; aerial photography and image interpretation.

Unit 2: Geographical Information Systems: definitions and components; spatial and non-spatial data; raster and vector data; database generation; database management system; land use/ land cover mapping; overview of GIS software packages; GPS survey, data import, processing, and mapping.

Unit 3: Applications and case studies of remote sensing and GIS in geosciences, water resource management, land use planning, forest resources, agriculture, marine and atmospheric studies.

Unit 4: Basic elements of statistical analyses: sampling; types of distribution – normal, binomial, poisson; measurements of central tendency and dispersion; skewness; kurtosis; hypothesis testing; parametric and non-parametric tests; correlation and regression; curve fitting; analysis of variance; ordination.

FOURTH SEMESTER

CORE COURSE 9: ECOLOGY AND ECOSYSTEMS

CREDITS- 04

Unit 1: Introduction

Basic concepts and definitions: ecology, landscape, habitat, ecozones, biosphere, ecosystems, ecosystem stability, autecology; synecology; major terrestrial biomes.

Unit 2: Ecology of individuals

Liebig's Law of the Minimum; Shelford's Law of Tolerance; ecological niche; types of niche: niche, fundamental niche, realized niche; niche breadth.

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Unit 3: Ecology of communities

Biomass, stability, keystone species, ecotone and edge effect; mimicry; ecological succession: primary and secondary successions, models and types of successions, climax community concepts, examples of succession.

Unit 4: Ecosystem ecology

Types of ecosystem: forest, grassland, lentic, lotic, estuarine, marine, desert, wetlands; ecosystem structure and function; abiotic and biotic components of ecosystem; ecosystem boundary; ecosystem

Unit 5: Biogeochemical cycles and nutrient cycling

Carbon cycle; nitrogen cycle; phosphorus cycle; sulphur cycle; hydrological cycle; nutrient cycle models; ecosystem input of nutrients; biotic accumulation; ecosystem losses.

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Deleted: Hutchinsonian niche, fundamental niche, realized niche; niche breadth; niche partitioning; niche Differentiation. ¶

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Practicals –

Visit of water treatment plant. Visit of sewage treatment plant in your locality

FOURTH SEMESTER

CORE COURSE 10

CORE COURSE 10: ENVIRONMENTAL LEGISLATION AND POLICY

Unit 1: Introduction

Forest Act 1865, Fisheries Act 1897; Independent India: Van Mahotsava 1950, National Forest Policy 1952, Orissa River pollution and prevention Act 1953.

Unit 2: Environmental legislation

Legal definitions (environmental pollution, natural resource, biodiversity, forest, sustainable development); Article 48A (The protection and improvement of environment and safeguarding of forests and wildlife); Article 51 A (Fundamental duties).

Unit 3: Legislative Instruments

The Indian Forest Act 1927; The Wildlife (Protection) Act 1972; The Water (Prevention and Control of Pollution) Act 1974; The Forests (Conservation) Act 1980; The Air (Prevention and Control of Pollution) Act 1981; The Environment (Protection) Act 1986; Motor Vehicle Act 1988; The Public Liability Insurance Act 1991; Noise Pollution (Regulation and Control) Rules 2000; The Biological Diversity Act 2002; The Schedule Tribes and other Traditional Dwellers (Recognition of Forests Rights) Act 2006; The National Green Tribunal Act 2010; scheme and labeling of environment friendly products, Ecomarks.

Practicals:-

Practice oriented course/Project/Seminars/Practical training

FOURTH SEMESTER

CORE COURSE 08: LAND AND SOIL CONSERVATION AND MANAGEMENT

Unit 1: Introduction

Land as a resource, soil health; ecological and economic importance of soil; types and causes of soil degradation; soil degradation on agriculture; need for soil conservation and restoration of soil fertility.

Unit 2: Fundamentals of soil science

Soil formation; classification of soil; soil architecture; physical properties of soil; soil texture; soil temperature; soil acidity and alkalinity; soil salinity and soil organic matter; nitrogen, sulphur, potassium, phosphorus.

Unit 3: Soil degradation - causes

Soil nature and types of soil erosion; non-erosive and erosive soil degradation; losses of soil moisture and its regulation; nutrient depletion; soil pollution due to mining and mineral extraction, industrial and urban development, toxic organic chemicals, and organic contaminants in soils; fertilizers and fertilizer management; recycling of soil nutrients.

Unit 4: Landuse changes and land degradation

Land resources: types and evaluation; biological and physical phenomena in land degradation; deforestation, desertification; habitat loss, loss of biodiversity; range land degradation; land salinization; human population pressure, poverty, socio-economic and institutional factors.

Practicals:-

Estimation of soil ph level, alkalinity, acidity, moisture, phosphorous,

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Fourth semester

SKILL ENHANCEMENT COURSE (II)

ENVIRONMENTAL IMPACT AND RISK ASSESSMENT Lectures)

Theory (30

Unit 1: Environmental impact assessment (EIA): definitions, introduction and concepts; rationale and historical development of EIA; scope and methodologies of EIA; role of project proponents, project developers and consultants; Terms of Reference; impact identification and prediction; baseline data collection; Environmental Impact Statement (EIS), Environmental Management Plan (EMP)

Unit 2: Rapid EIA; Strategic Environmental Assessment; Social Impact Assessment; Cost-Benefit analysis; Life cycle assessment; environmental appraisal; environmental management - principles, problems and strategies; environmental planning; environmental audit; sustainable development.

Unit 3: EIA regulations in India; status of EIA in India; current issues in EIA; case study of hydropower projects/ thermal projects.

Unit 4: Risk assessment: introduction and scope; project planning; exposure assessment; toxicity assessment; hazard identification and assessment; risk characterization; risk communication; environmental monitoring; community involvement; legal and regulatory framework; human and ecological risk assessment.

FIFTH SEMESTER

CORE COURSE 11: BIODIVERSITY AND CONSERVATION

UNIT I:-BIODIVERSITY

Concept of biodiversity, biogeographical classification of India, biodiversity at global, national & local level, values of biodiversity, mega biodiversity zones, India as a mega biodiversity nation, National biodiversity Action plan.

UNIT 2:- CONSERVATION OF BIODIVERSITY

In situ conservation (biosphere reserves, National parks, wildlife sanctuaries)

Ex situ conservation (botanical gardens, zoological gardens, gene banks)

Role of local communities and traditional knowledge in conservation, biodiversity hotspot, Red data book(IUCN), afforestation, social forestry: agroforestry, joint forestry management.

Unit 3: Threats to biodiversity (10 lectures)

Natural and anthropogenic disturbances; habitat loss, habitat degradation, and habitat fragmentation;

climate change; pollution; hunting; over-exploitation; deforestation; overgrazing; man wildlife conflicts; consequences of biodiversity loss.

Unit 4: Biodiversity estimation (10 lectures)

Sampling strategies and surveys: floristic, faunal, and aquatic; qualitative and quantitative methods:

scoring, habitat assessment, richness, density, frequency, abundance, evenness, diversity, biomass

estimation; community diversity estimation: alpha, beta and gamma diversity; molecular techniques:

Practicals:-

Survey report on local areas diversity.

Survey report on zoological gardens or botanical gardens.

FIFTH SEMESTER

CORE COURSE 12 Physics and Chemistry of Environment

Total Lectures -

45

A) Gravimetry – Precipitation, co-precipitation, washing & ignition of precipitation, organic precipitants, Applications.

B) Titrmetry – Acid, Base, Redox and Complexometric titration – principal & application

C) Spectrophotometry – Lambert – Beer's Law, Instrumentation & Application

D) Atomic Absorption Spectrophotometry & Flame Photometry – Principal, Instrumentation & Application.

E) Turbidimetry & Nephelometry - Principal, Instrumentation technique & Application.

F) Separation Techniques – Chromatography, Solvent extraction, Principal of adsorption Chromatography – Mechanism, Principal, technique & Application.

PRACTICALS:-

Study of gravimetry meter, nepheloturbidity meter, titration method.

Fifth semester

DISCIPLINE SPECIFIC ELECTIVE I

Natural resource management and sustainability

Unit 1: Introduction

Resource and reserves; classification of natural resources; renewable and non-renewable resources; resource degradation; resource conservation; resource availability and factors influencing its availability; land resources; water resources; fisheries and other marine resources; energy resources; mineral resources; human impact on natural resources; ecological, social and economic dimension of resource management.

Unit 2: Natural resources and conservation

Forest resources: economic and ecological importance of forests, forest management strategies, sustainable forestry; water resources: supply, renewal, and use of water resources, freshwater shortages, strategies of water conservation; soil resources: importance of soil, soil conservation strategies; food resources: world food problem, techniques to increase world food production, green revolution.

Unit 3: Mineral resources

renewable and non-renewable resources: distribution and availability nature, scope and analysis of local and global impacts of energy use on the environment; fossil fuelburning and related issues of air pollution, greenhouse effect, global warming; nuclear energy and related issues such as radioactive waste, Current and future energy use patterns in the world and in India; evolution of energy use over time; alternative sources as green energy (biofuels, wind energy, solar energy, geothermal energy; oceanenergy; nuclear energy); need for energy efficiency; energy conservation and sustainability;

PRACTICALS:-

Determination of infiltration rate from a controlled plot experiment.

Measurement of discharge and calculation of seepage loss in a canal reach soil moisture,

Fifth semester

DISCIPLINE SPECIFIC ELECTIVE II

DSE-II TOOLS AND TECHNIQUE

(LEC 35)

- a) BOD Incubator:- Applications, principal & technique.
- b) hot air oven:- Applications, principal & technique.
- c) Bacterial Incubator:- Applications, principal & technique.
- d) Centrifuge:- Applications, principal & technique.
- e) PH meter:- Applications, principal & technique.
- f) Conductivity meter:- Applications, principal & technique.
- g) Autoclave:- Applications, principal & technique.
- h) Venturimeter, Orifice meter, Pitot tube:- Applications, principal & technique.
- i) microscope:- Applications, principal & technique.

Practicals:-

Study of all equipment present in the laboratory.

SIXTH SEMESTER

CORE COURSE 13

C13. Entrepreneurship Development

Total Lectures 60

- Need, Scope and Characteristics of entrepreneurship. Special Scheme for technical entrepreneur STED.
- Identification of opportunity
- Exposure to demand based, resource based, service based, import substitute and export promotion industries.
- Market survey Technique.
- Need, scope and approaches for project formation
- Criteria for principles of product selection and development
- Structure of project report
- Choice of Technology, Plant and Equipment.
- Institutions financing procedure and financial incentives.
- Financial ratio and their significance.
- Books of accounts, financial statements and fund flow analysis.
- Energy requirement and Utilization.
- Resources management - Men, Machine and Materials.
- Critical Path Method (CPM) and Project Evaluation Review Techniques (PERT) as planning tools for establishing SSI.
- a) Creativity and innovation
- b) Strength Weakness Opportunity and Threat (SWOT) Techniques

Techno – economic feasibility of the project

- Plant Layout and Process planning for the product
- Quality control, quality assurance and testing of the product
- Elements of marketing and sales management.
- a) Nature of product and market strategy
- b) Packaging and advertising
- c) After sales service.
- Costing and pricing.
- Management of self and understanding human behavior.
- Sickness of small scale industries and their remedial measure
- Coping with uncertainties, stress management and positive reinforcement

- (a) Licensing registration
- (b) Municipal bye laws and insurance coverage
- Important provisions of Factory Act, Sales of Goods Act, Partnership Act.
 - (a) Dilution control
 - (b) Social responsibility and Business Ethics .
- Income tax, Sales tax and Excise Rules.

Practicals:-

Project work on environment (02 months)

SIXTH SEMESTER

CORE COURSE 14

C- 14 Wildlife biology & Evolution biology

Total Lectures 30

Unit 1: Introduction

Lamarck's concept of evolution; Darwin's Evolutionary Theory: variation, adaptation, struggle, fitness and natural selection; Mendelism; spontaneity of mutations; The Evolutionary Synthesis.

Unit 2: Wildlife biology

Concept of wildlife, importance of wildlife, endangered species, conservation

Management of wildlife and their habitats

Institutional support systems in understanding wildlife status of this country

Basic principles of wildlife management; Role of Biology in management; the need for wildlife management; Lion, Rhino etc and habitat management techniques.

Unit 3. Wildlife farming:

Objectives, management design, wildlife products: skins, meat, musk, etc food. Hygiene disease control, breeding.

Behavioral, ecology and evaluation: An interconnected approach (including proximate and ultimate mechanisms, and casual and functional explanations in behavioral) ecology

Practicals:-

Project work on environment (01 month)

Sixth semester

DISCIPLINE SPECIFIC ELECTIVE III

DSE-II NATURAL HAZARDS AND DISASTER MANAGEMENT (LEC 35)

UNIT I:- NATURAL HAZARDS

Earthquake: seismic waves, epicenter.

Volcanoes: causes of volcanism.

Geographic: floods types and nature frequency of flooding.

Landslide: causes and types of landslide.

Draught: types of draught, meteorological cyclone & hurricanes; tsunamis: causes and location of tsunamis, coastal erosion, coastal zones management.

UNIT II:-ANTHROPOGENIC HAZARDS

Deforestation: deforestation & landslide hazards associated with it; Role of construction along river banks in elevating flood hazards. Wildfire and biophysical hazards, Bhopal gas disaster, minamata disaster.

UNIT III:- DISASTER MANAGEMENT IN INDIA

Lessons from the past considering the examples of Bhuj Earthquake, Tsunami disaster, Bhopal tragedy, Role of government body such as NDMC & IMD, 'Phailin' cyclone management in 2013.

Practicals:-

Survey report on Jamshedpur flood areas: reason and control measures.

Project report on any recent disaster management in India.

Sixth semester

DISCIPLINE SPECIFIC ELECTIVE IV

DSE-IV ENVIRONMENTAL CHEMISTRY & SOLID WASTE
(LEC 35)

Unit 1 : RADIOACTIVITY

Natural and artificial radioactivity and their effects on ecosystem.

Unit 2 : AIR CHEMISTRY

Composition and segment of air, particles, ions and radicals in the atmosphere, chemical processes for formation of inorganic and organic particulate matter. Thermochemical and photochemical reactions in the atmosphere, chemistry of nitrogen, ozone and CO₂ in atmosphere.

Unit 3 : WATER CHEMISTRY

Structure and physio-chemical properties of water- Sedimentation, Coagulation, filtration, Redox potential, complexation in natural and waste water, Hydrological cycle, role of water in environment.

Unit 4 : SOIL CHEMISTRY

Inorganic and organic components, synthetic fertilisers (N.P.K) and their interaction with different component of soil, Nitrogen pathway, N.P.K. in soil, significance of C N-ratio.

Unit 5 : CHEMICAL TOXICOLOGY

Toxic chemicals in air and water, Biochemical aspect of Arsenic, Cadmium, Lead, Mercury Carbon monoxide, ozone, PAN.

Unit 6: solid waste

Sources and generation of solid waste, their classification and chemical composition; characterization of municipal solid waste; hazardous waste and biomedical waste. Impact of solid waste on environment, human and plant health; effect of solid waste and industrial effluent discharge on water quality and aquatic life; mining waste and land degradation; effect of landfill leachate on soil characteristics and ground water pollution.

Practicals:-

Soil testing:-

To calculate the Moisture content in soils and Ph level of soils

To calculate the Ph level of water.

Project development on ozone layer or ozone depletion.

