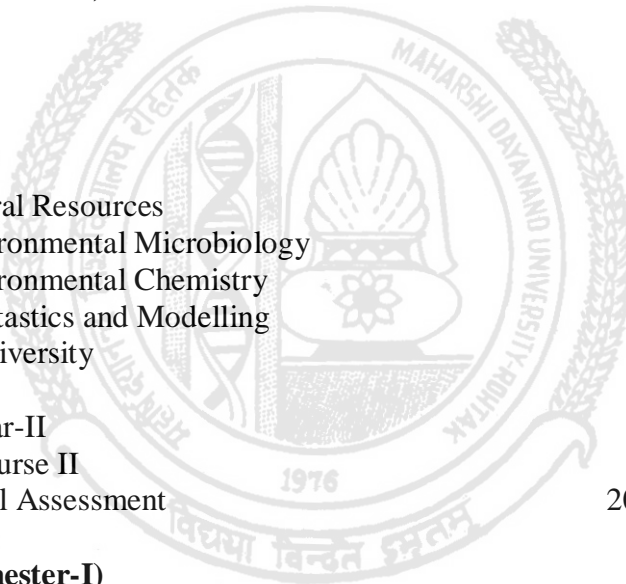


Syllabus M.Sc Environmental Sciences

Semester-I	Full nomenclature of paper	Max. Marks
ENV-201	Environmental Toxicology	80
ENV-202	Environmental Biology	80
ENV-203	Analytical Techniques	80
ENV-204	Solid Waste Management	80
ENV-205	Environmental Pollution	80
	Seminar-I	50
	Lab course I	150
	Internal Assessment	20 in each theory paper
Total Marks (Semester-I)		700

Semester-II		
ENV-206	Natural Resources	80
ENV-207	Environmental Microbiology	80
ENV-208	Environmental Chemistry	80
ENV-209	Biostastics and Modelling	80
ENV-210	Biodiversity	80
	Seminar-II	50
	Lab course II	150
	Internal Assessment	20 in each theory paper
Total Marks (Semester-I)		700



Syllabus M.Sc Environmental Sciences

Semester-III	Full nomenclature of paper	Max. Marks
ENV-211	Environmental Laws	80
ENV-212	General Concept of Environmental Sciences	80
ENV-213	Environmental Biotechnology	80
ENV-214	Elementary concept of Physical Environment	80
ENV-215	Environmental Impact Assessment	80

Seminar-III	50
Lab course III	150
Internal Assessment	20 in each theory paper

Total Marks (Semester-III) 700

Semester-IV	Full nomenclature of paper	Max. Marks
ENV-216	Environmental geology	80
ENV-217	Environmental Management and Planning	80
ENV-218	Resource Management	80
ENV-219	Remote Sensing and GIS	80
ENV-220	Project Report	80

Seminar-IV	50
Lab course IV	150
Internal Assessment	20 in each theory paper

Total Marks (Semester-IV) 700

Syllabus for M.Sc Environmental Science (1st and 2nd Semester)

Semester-I

ENV - 201 Environmental Toxicology

Max. Marks : 80

Time : 3 Hours.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight question will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Toxic chemicals in the environment - air, water & their effects, Pesticides in water, Biochemicals aspects of arsenic, cadmium, lead mercury, carbon monoxide, ozone and PAN pesticide.

Unit - 2

Mode of entry of toxic substance, biotransformation of xenobiotics detoxification, Carcinogens in air, chemical carcinogenicity, mechanism of carcinogenicity, Environmental carcinogenicity testing.

Unit - 3

Insecticides, MIC effects. Concept of major, trace and Rare Earth Element (REE)- possible effects of imbalance of some trace elements

Unit - 4

Biogeochemical factors in environmental health,. Epidemiological issues goiter, fluorosis, arsenic poisoning.

References :

1. Environmental chemistry - Sodhi
2. Principals of Environmental chemistry - Manhan
3. Environmental hazards & human health R.B. Philip
4. Toxicology - principles & applications - Niesink & Jon devries
5. Parasitology - Chatterjee
6. Preventive & Social medicines – Perk

M.Sc. Environmental Science
Semester-I
ENV - 202 Environmental Biology

Max. Marks : 80
Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Definition, principles and scope of ecology, human ecology and human settlements, evolution, origin of life and speciation, Ecosystem stability-cybernetics and ecosystem regulation, evolution of biosphere.

UNIT - II

Ecosystem structure and functions, abiotic and biotic component, Energy flow, food chain, food web, Ecological Pyramids-types, biogeochemical cycles, ecological succession, Ecads and ecotypes.

UNIT - III

Population ecology- density, natality, mortality, survivorship curves, age distribution, growth curves and models, r & k selection, population interactions- Mutualism, Parasitism, Predator- Prey relations, System Theory and Ecological Model.

UNIT - IV

Earth's major ecosystem - terrestrial and aquatic ecosystem, soil microorganism and their functions, coastal management, criteria employed for disposal of pollutants in marine ecosystem, coastal water system and man-made reservoirs, biology and ecology of reservoirs.

References

1. Basic ecology - E. P. Odum
2. Ecology and field biology - R.L. Smith
3. Ecology - P.D. Sharma
4. Fundamentals of ecology -E.P. Odum
5. Principles of ecology – Rickleff

**M.Sc. Environmental Science
Semester-I**

ENV - 203 Analytical Techniques

Max. Marks : 80
Time : 3 Hours.

Note : 1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Principles and application of Spectrophotometry (UV-Visible spectrophotometry), Titrimetry, Gravimetry, Colourimetry, NMR, ESR, Microscopy-phase, light and fluorescence microscopes, Scanning and Transmission electron microscopes.

Unit - 2

Chromatographic techniques (Paper chromatography, thin layer chromatography, ion exchange chromatography, Column chromatography), Atomic absorption spectrophotometry, cytophotometry and flow cytometry, Fixation and staining, Principles and techniques of nucleic acid hybridization and Cot curves, Principle of biophysical method used for analysis of biopolymer structure, Hydrodynamics methods, Plasma emission spectroscopy.

Unit - 3

Electrophoresis, solid and liquid scintillation, X-ray fluorescence, X-ray diffraction. Flame photometry, Gas-liquid chromatography, High pressure liquid chromatography - autoradiography, Ultracentrifugation.

Unit- 4

Methods for measuring nucleic acid and protein interactions, DNA finger printing Molecular markers RFLP, AFLP, RAPD, Sequencing of proteins and nucleic acids, southern, northern, western blotting techniques, PCR polymerase chain reaction.

References :

1. Principles of Biophysical chemistry - Uppadahay -Uppadahay - and Nath.
2. Analytical Techniques - S.K. Sahani

**M.Sc. Environmental Science
Semester-I**

ENV - 204 Solid Waste Management

Max. Marks : 80
Time : 3 Hours.

Note : 1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Sources, generation, classification & composition of solid wastes. Solid waste management methods - Sanitary land filling, Recycling, Composting, Vermi composting, Incineration, energy recovery from organic waste.

Unit - 2

Solid Waste Management Plan, Waste minimization technologies, Hazardous Waste Management, Sources & Classification, physicochemical properties, Hazardous Waste Control & Treatment.

Unit - 3

Hospital Waste Management. Hazardous Waste Management & Handling rules, 1989 & 2000 (amendments)

Unit- 4

Disaster Management, Fly ash generation & utilization, Primary, secondary & tertiary & advance treatment of various effluents.

References :

1. Solid Waste Management CPCB. New Delhi.
2. Ecotechnology for pollution control & environmental management - By R.K. Trivedi & Arvind Kr.
3. Basic Environmental Technology - J.A. Nathanson

**M.Sc. Environmental Science
Semester-I**

ENV - 205 Environmental Pollution

Max. Marks : 80
Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Air pollution- natural and anthropogenic sources of pollution, primary and secondary pollutants, transport and diffusion of pollutants, gas laws governing the behaviour of pollutants in the atmosphere, Methods of monitoring and control of air pollution, SO₂, NO_x, CO, SPM.

UNIT - II

Water pollution - types sources and consequences of water pollution, physico-chemical and bacteriological sampling, Analysis of water quality, standards, sewage and wastewater treatment and recycling, water quality and standards.

UNIT - III

Soil pollution chemical and bacteriological sampling as analysis of soil quality, soil pollution control, industrial waste effluents and heavy metals and their interactions with soil components.

UNIT - IV

Noise pollution - sources of noise pollution, measurement and indices, Marine pollution, sources of marine pollution and its control, Effects of pollutants on human beings, plants, animals and climate, air quality standards and air pollution.

References

1. Air pollution and control - K.V.S.G. Murlikrishan
2. Industrial noise control - Bell & Bell
3. Environmental engineering -Peary
4. Introduction to environmental engineering and science
- Gilbert Masters.

**M.Sc. Environmental Science
Semester-II**

ENV - 206 Natural Resources

Max. Marks : 80
Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Sun as a source of energy, solar radiations and its spectral characteristics fossil fuels- classification, composition, physico- chemical characteristics and energy content of coal, petroleum and Natural gas.

UNIT - II

Principles of generation of hydroelectric power, tidal power, thermal energy conversion, wind, geo thermal energy, solar collectors, photovoltaic, solar ponds, oceans.

UNIT - III

Nuclear energy- fission and fusion, bio energy -energy from biomass and biogas, anaerobic digestion, energy use patterns in different parts of the world. Impacts of large scale exploitation of solar, wind, hydro and ocean energy.

UNIT - IV

Mineral resources and reserves, ocean ore and recycling of resources, Environmental impact of exploitation, processing and smelting of Mineral, oceans as need areas for exploitation of Mineral resources.

References

1. Living in the environmental - T.J. Miller.
2. Natural resource conservation - Owen & Chiras.
3. Encyclopedia Energy - I & II.

**M.Sc. Environmental Science
Semester-II**

ENV - 207 Environmental microbiology

Max. Marks : 80
Time : 3 Hours.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Microbiology- organisms in nature & their importance, sampling, culture & cultivation of microorganisms, microbes in service of nature & mankind, Batch culture & continuous culture of microbes for commercial use.

Unit - 2

Microbial Reactors, genetically modified microbes & their uses in Environmental management recycling & up gradation technologies, Production of products, energy form waste.

Unit - 3

Biogas technology, plant design, construction, operation, biogas form organic wastes, water weeds, land fills, microbiology of anaerobic fermentation.

Unit - 4

Biotransformation, bioconversion, bioremediation, phytoremediation technology fermentation technology, development of stress tolerant plants, Environmental problems & Environmental monitoring through microorganism, microbiology of water, air and soil, microbes as pathological agent in plant, animal and man.

References :

Principles of microbiology - Pelzar
Microbial bio technology - A.N. Glazer
Microbial ecology - R.M. Atlas
Molecular biology - H.D. Kumar
Environmental bio Technology - Sayler & Fox

M.Sc. Environmental Science
Semester-II

ENV - 208 Environmental Chemistry

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Stoichiometry, Gibb's energy, Chemical potential, Chemical equilibria, acid-base reactions. Solubility product, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, Radio nuclides.

UNIT - II

Classification of elements, chemical speciation, Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matter. Thermochemical and photochemical reactions in the atmosphere.

UNIT - III

First law of thermodynamics, enthalpy, adiabatic transformations, second law of thermodynamics, Carnot's cycle, entropy, Gibb's free energy, chemical potential, phase equilibria, Gibb's Donnan equilibrium, third law of thermodynamics, enzymes catalysis, Michaelis/ Menten equation.

UNIT - IV

Oxygen and ozone chemistry, Chemistry of air pollutants, Photochemical Smog, Chemistry of water, concept of D.O., B.O.D., and C.O.D, water treatment : Sedimentation, Coagulation, Filtration, tertiary and advanced treatment, redox potential. Inorganic and organic components of soil, nitrogen pathways and NPK in soils.

References

1. Environmental Chemistry - G.S. Sodhi
2. Environmental Chemistry - Mannhan
3. Fundamentals of soil science - Henry D. Futh
4. Textbook of limnology - G.A. Cole
5. Environmental Chemistry - Sharma and Kaur

M.Sc. Environmental Science
Semester-II
ENV - 209 Environmental modelling and Biostatistics

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Measurement of central tendency - mean (Geometric and Harmonic), median, mode, Measurement of dispersion moments, standard deviation, skewness and kurtosis, Correlation and linear regression of one independent variable, Basic laws and concepts of probability

UNIT - II

Definition of random variable, density function, Basic concepts of binomial and normal distributions. Sampling measurement and distribution of attributes, moments, matrices and simultaneous linear equations, tests of hypothesis and significance.

UNIT - III

Role of modelling in environmental sciences, Model classification deterministic models, stochastic models, steady state models, dynamic models, different stages involved in model building. Simple microbial growth kinetics monod equation, methods for formulation of dynamic balance equations mass balance procedures.

UNIT - IV

Models of population growth and interactions Lotka Volterra model, Leslies matrix model, Point source stream pollution, Box model, Gaussian plume model, Linear, simple and multiple regression models, validation and forecasting.

References

1. Dynamics of Environmental Bioprocesses-Modelling and simulation-Snape and Dunn.
2. Environmental Modeling - Jorgensen

**M.Sc. Environmental Science
Semester-II**

ENV - 210 Biodiversity

Max. Marks : 80
Time : 3 Hours.

Note : 1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Biodiversity - definition, hot spots of Biodiversity, strategies for Biodiversity Conservation, National Parks, Sanctuaries and Biosphere reserves, gene pool.

Unit - 2

Aquatic common flora and fauna in India - phytoplankton, zooplankton and macrophytes, terrestrial common flora and fauna in India - forests, endangered and threatened species.

Unit - 3

Strategies for Biodiversity Conservation, cryopreservation, gene banks, tissue culture and artificial seed technology, new seed development policy 1988, conservation of medicinal plants.

Unit- 4

International conventions, treaties and protocols for Biodiversity Conservation, Biodiversity in the welfare of mankind, Species concept, Biological nomenclature theories of biological classification.

References :

1. Global Biodiversity - W.R. L.IUCN
2. Ecology of natural resource - Ramade
3. Ecology - P.D. Sharma

Syllabus for M.Sc. Environmental Science (3rd and 4th Semester)

M.Sc. Environmental Science Semester-III ENV - 211 Environmental Laws

Max. Marks : 80
Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Scheme of labelling of environmentally friendly products (ecomark). Public liability Insurance Act, 1991. Provision of constitution of India regarding environment (article 48 A & 58A).

UNIT – II

Environmental policy resolution, legislation, public policy strategies in pollution control. Wild life protection act, 1972 amended 2002. Forest conservation act, 1980. Indian forest act 1927.

UNIT - III

Air (prevention & control of pollution) Act 1981 as amended by amendment 1987 & rule 1982. Motor vehicle act, 1988, The environment (protection) Act, 1986, rules 1986.

UNIT – IV

The water (prevention & control of pollution) Act, 1974 as amended by amendment 1978 & rules 1975. Environment protection issues & problems, international & national efforts for environment protection.

References

1. Environmental administration & law - Paras Diwaa.
2. Environmental planning, policies & programs in India - K.D. Saxena.

M.Sc. Environmental Science
Semester-III
ENV - 212 General Concept of Environmental Sciences

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Composition of atmosphere, vertical and horizontal distribution of temperature, Relationship of earth with sun, Insolation and heat budget of earth atmospheric system.

UNIT - II

Winds, Coriolis force, Global pressure belt system Monsoons, Lapse rates, Vertical stability of atmosphere, Humidity and precipitation, Cyclones and anticyclones, Mixing heights, Wind roses.

UNIT - III

Classification of aquatic systems, Salient features of lentic, lotic and marine systems, ocean deposits, ocean wave, currents, tides, Marine biology, coral reefs, Ice sheet and sea level changes.

UNIT - IV

Global warming, Ozone hole, Western disturbances, El-nino, La-nino, Green house gases and their effects, Environmental ethics, History of climate change, Milankovitch's theory of climate change.

References

1. Climatology - D.S. Lal
2. Physical geography - Savinder Singh
3. Oceanography - Sharma and Vittal
4. The Atmosphere an introduction - F.K. Lutgens

M.Sc. Environmental Science
Semester – III
ENV - 213 Environmental Biotechnology

M.M. : 80
Time : 3 Hrs.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit-I

The scope of environmental biotechnology; Biodegradation of macromolecules; biodegradation of xenobiotics; Vermicomposting. Heavy metal pollution; Bioremediation of metal contaminated soils, spilled oil and grease deposits and synthetic pesticides. Biosensors to detect environmental pollutants. Microorganisms and organic pollutants; Extremophiles. Fermentation technology (Bioreactors).

Unit-II

Basic techniques in genetic engineering: Genetic manipulation, Restriction endonucleases, Introduction of cloned genes into new hosts using plasmid and phage vector systems. RFLP, Polymerase chain reaction, Environmental genomics/metagenomics-a general account, Microbes and environmental management.

Unit-III

Basic concept of genetic engineering of plants and its applications- herbicide and stress tolerant plant. Biotechnology strategies in forestry and wasteland management. Biotechnology in biodiversity conservation: gene banks, germplasm conservation and DNA Banks. Genetically modified organisms and Biosafety- a general account.

Unit-IV

Bioenergy, ethanol fermentation. Liquid waste treatment; Biofilters, activated sludge systems; membrane bioreactors. Biotechnological approaches for solid waste management, Phytotechnology-terrestrial and aquatic phytosystems, metal phytoremediation, nutrient film techniques, algal treatment systems.

References

1. Manahan, S.E. 1997. Environmental Science and Technology. Lewis, New York.
2. Metcalf and Eddy (Eds). 2003, Wastewater Engineering: Treatment and Reuse, Tata McGraw-Hill, New Delhi.
3. Nelson, G.C. 2001. Genetically Modified Organisms in Agriculture: Economics and Politics. Academic Press.
4. Evans, G.M. and Furlong J.C. 2003. Environmental Biotechnology: Theory and Application. John Wiley and Sons.
5. Thomas, J.A. and Fuchs, R. 2002. Biotechnology and Safety Assessment. Academic Press.
6. Wang L.K. Hung Y.T. and Shamma N.K.(Eds). 2006. Advanced Physicochemical Treatment Processes. Springer-Verlag New York, LLC.

M.Sc. Environmental Science
Semester-III
ENV - 214 Elementary Concept of Physical Environment

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Definition, Principles and scope of Environmental Science. Earth, Man and Environment, Ecosystem, Pathways in Ecosystems, Physico- chemical and biological factors in the Environment.

UNIT - II

Geographical classification and zones. Structure and composition of Biosphere. General relationship between landscapes, biomes and climates.

UNIT - III

Primary differentiation and formation of core, mantle and crust. Igneous, sedimentary and metamorphic rocks, weathering, erosion, transportation and deposition of earth's material by running water, wind and glaciers.

UNIT - IV

Mass and energy transfer across the various interphases, Material Balance, Heat Transfer processes, scales of Meteorology, various kinds of lapse rates, vertical stability of atmosphere, cloud classification & formation.

References

1. Ecology - P.D. Sharma
2. Concepts of physical environment- Savinder Singh
3. The Atmosphere- an Introduction- F.K. Lutagens
4. Atmospheric weather and climate - Navarra.

M.Sc Environmental Science
Semester – III
ENV - 215 Environmental Impact Assessment

M.M. : 80
Time : 3 Hrs.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Introduction to environment impact analysis, Environmental impact statement and Environmental management plan, ISO14000, EIA guidelines 1994, Notification of Govt. of India.

Unit - 2

Impact assessment methodologies, Generalized approach to impact analysis. Case study: EIA of some dam, procedure for reviewing Environmental impact analysis and statement.

Unit - 3

Guidelines for Environmental Audit, Baseline information and prediction (land, water, atmosphere, energy), Restoration and rehabilitation technologies.

Unit - 4

Risk analysis - definition of risk, Environmental risk analysis, risk assessment and risk management, Basic steps in risk assessment - hazard identification, dose- response assessment, exposure assessment, Risk characterization.

References :

1. Environmental Impact Assessment- John Glasson.
2. Methods of Environmental Impact Assessment - Morris and the rivell.
3. Environmental Impact Assessment - L. W. Canter.
4. Chemical principles of Environmental pollution - Lalloway and Ayers.
5. Industrial Environment - Assessment and strategy - S.K. Aggarwal

M.Sc. Environmental Science
Semester-IV
ENV - 216 Environmental Geology

Max. Marks : 80
Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Earth processes, Geological cycle, Tectonic cycle, Rock cycle, Hydrological cycle, Biogeochemical cycles, Special problems of time and scale in geology, concept of residence time and rates of natural cycles.

UNIT - II

Catastrophic geological hazards, Prediction and perception of the hazards and adjustment to hazardous activities.

UNIT - III

River flooding- causes, nature and frequency of floods. Landslides- causes, intensity and magnitude. Volcanism nature extent and causes, Volcanism and climate. Avalanches causes and effects.

UNIT - IV

Mineral and human use, geology of mineral resources, EIA of mineral development, recycling of mineral resources.

References

1. Environmental geology- Edward A. Keller
2. Physical geology - C.W. Montgomery.
3. Geology of India - National book trust series.

M.Sc. Environmental Science
Semester-IV
ENV - 217 Environmental Management and Planning

Max. Marks : 80

Time : 3 Hours.

Note

1. Nine questions will be set in all.
2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting one from each section.

UNIT - I

Role of NGO's public participation in environmental movements, Concepts of Environmental education and awareness International environmental initiatives - the club of Rome report, Stockholm Declaration, environmental ethics.

UNIT - II

Vehicular pollution and urban air quality, Fly ash utilization, Eutrophication and restoration of Indian lakes, Wet land conservation, Water crisis-conservation of water. Narmada dam, Tehri dam, Almetti dam.

UNIT - III

Basic concepts of environmental planning, Environmental priorities in India, Land use planning : The land use plan (India). Soil surveys in relation to land use planning. Methods of site selection and evaluation, global imperatives, soil erosion, Formation and reclamation of Usar, alkaline and saline soil, waste lands and their reclamation, Desertification and its control.

UNIT - IV

Urban planning and rural planning for India. Sustainable development- principles and practices in relation to economics and ecology. Cost-benefit analysis- its relevance. Ramsar convention on wetlands, Vienna convention and Montreal Protocol, Kyoto protocol, Earth Summit, Agenda-21.

References

1. Natural Resource Conservation Owen and Chiras.
2. Environmental planning, policies and programs in India
- K.D. Saxena.
3. Conservation Ecology- G.W.Cox.
4. Global Biodiversity - W.R. L. IUCN

M.Sc. Environmental Science
Semester-IV
ENV - 218 Resource Management

M.M. : 80
Time : 3 Hrs.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Resource management meaning & concept, management of rangelands & watersheds, management of Agricultural system.

Unit - 2

Management of waste resources, Management of forests, effects of deforestation. Management of fresh water ecosystem conservation strategies for non-renewable energy resources.

Unit - 3

Wildlife Management & conservation efforts for threatened species, Water Management, Ganga Action Plan, Yamuna Action Plan, Environmental priorities in India.

Unit- 4

Reclamation & Management of waste lands, soil erosion, soil conservation, rural planning & land use pattern. Sustainable development, urban planning for India, Land use policy for India.

References :

1. Natural resources conservation -Oliver Ss. Owen.
2. Living of environment - T.J. Miller
3. Ecology of Natural resources - Ramade
4. Environmental Science- Cunningham Saigo
5. Restoration of degraded lands- J.S. Singh

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M.Sc Environmental Science
Semester – IV
ENV - 219 Remote sensing and Geographical Information

M.M. : 80
Time : 3 Hrs.

Note : 1. Nine questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question 1 and four by selecting one from each section.

Unit - I

Definition, Introduction and scope of remote sensing. Electromagnetic radiation, atmosphere window, Platforms, Sensors and type of scanning systems. Basic characteristics of sensors; salient features of sensors used in LANDSAT, SPOT and Indian remote sensing satellites.

Unit - 2

Aerial photography- vantage point, cameras, Filters and types of films. Elements of visual image interpretation. Multispectral Remote sensing, Microwave Remote sensing, Photogrammetry - Introduction, Stereo- scopic vision, Projection types.

Unit - 3

Digital image and image structure, Image restoration and image and image enhancement. Image classification. Remote sensing application in Forestry, Ecology and environment, Landuse, Agriculture, soils and geology, Disaster management.

Unit - 4

GIS technology and its uses in environmental science, Hardware and software requirement for GIS. Conceptual model of spatial information, Conceptual model of non spatial information. GPS.

References :

1. Introduction to Environmental remote sensing - Curtis
2. Principles of Remote sensing - Lily and kliffer.
3. Remote sensing of the Environment – Jenson