

Semester I

Title: Environmental Sciences

Course No. UESTS – 101

Credits: 2

Time: 2 Hours

Semester Exam: 40

Sessional Assessment: 40

The Environment and Ecosystem

- I. Concept of Environment and Environmental Studies
- II. Ecosystem: Structure and Components
- III. Food Chain, Food Web and Ecological Pyramids
- IV. Biogeochemical Cycles: Nitrogen Cycle and Phosphorus Cycle
- V. Ecological Succession: Concept, Types, Process, Hydrosere

Environmental Pollution and Disaster Management

- I. Definition, Causes, Effects and Control Measures of Environmental Pollution; Air, Water, Soil and Noise Pollution
- II. Solid Waste Management, E- Waste
- III. Global Warming and Climate Change

- IV. Acid Rain, Ozone Layer Depletion
- V. Disasters and their Management: Floods, Earthquake, Cyclones and Landslides

Environmental Treaties, Laws and Ethics

- I. Environmental Treaties: Montreal Protocol, Kyoto Protocol, CBD
- II. Environmental Laws of India:
 - a. Environmental Protection Act, 1986
 - b. Air (Prevention and Control of Pollution) Act, 1981
 - c. Water (Prevention and Control of Pollution) Act, 1974
 - d. Wildlife Protection Act, 1972
- III. National Green Tribunal, 2010
- IV. Environmental Ethics
- V. Need for Sustainable Development

Field/Practical Work:

All the students are required to undertake the following field/practical work:

- I. To record the biodiversity of any visited area.
- II. Identify the natural resources of your area.
- III. Identify the sources of energy used in your area.
- IV. Visit to a health centre for recording of common water/air/food borne diseases of your area.

Note for Paper Setting:

- a. Question Paper will consist of two sections A and B. Section A will consist of 6 short answer type questions, two from each unit, out of which candidate has to answer any five questions and each question would be of 2 marks. Section B would consist of THREE long answer type questions of 10 marks each, one from each unit, with internal choice.
- b. Internal assessment test of 10 marks will be based on questions from syllabus/field visit.

Semester II

Title: Environmental Sciences

Course No. UESTS – 201

Credits: 2

Time: 2 Hours

Semester Exam: 40

Sessional Assessment: 40

Biodiversity and its Conservation

- I. Definition, Concept, Levels and Values of Biodiversity
- II. Biodiversity of India, India as a megadiversity nation, Hotspots of Biodiversity
- III. Threats to Biodiversity (Habitat Loss, Poaching of Wildlife, Man- wildlife Conflict)
- IV. Conservation of Biodiversity: Insitu and Exsitu Conservation
- V. Ecotourism: Concept of Protected Area Network

Natural Resources and their Conservation

- I. Forest resources: Uses and Conservation of forests and consequences of deforestation
- II. Water resources: Uses and Consequences of over-utilisation, Concept of Rainwater

Harvesting and Watershed Management, Water Conflicts

- III. Food resources: Sources of Food, Food Problems- Indian Scenario, Impacts of modern agriculture on environment (Fertiliser- Pesticide Problems, Water logging and Salinity), Organic farming
- IV. Energy resources: Renewable and Nonrenewable energy resources, Growing Energy Needs and Alternate Energy resources
- V. Land resources: Global landuse pattern, Soil Erosion, Desertification, Wasteland Reclamation

Environmental and Human Health

- I. Human Population Growth
- II. Common diseases: Air borne diseases (Chickenpox, Tuberculosis, Influenza), Waterborne and foodborne diseases (Cholera, Diarrhoea, Malaria)
- III. HIV/AIDS: Symptoms, causes and control measures
- IV. Drug Addiction: Causes, Symptoms and Prevention; Drug Abuse in India
- V. Role of IT in Environment and Human Health

Field/Practical Work:

All the students are required to undertake the following field/practical work:

- VI. To record the biodiversity of any visited area.
- VII. Identify the natural resources of your area.
- VIII. Identify the sources of energy used in your area.
- IX. Visit to a health center for recording of common water/air/food borne diseases of your area.

Note for Paper Setting:

- a. Question Paper will consist of two sections A and B. Section A will consist of 6 short answer type questions , two from each unit, out of which candidate has to answer any five questions and each question would be of 2 marks. Section B would consist of THREE long answer type questions of 10 marks each, one from each unit, with internal choice.
- b. Internal assessment test of 10 marks will be based on questions from syllabus/field visit.

Skill Enhancement Courses in Environmental sciences

Semester III

Title: Solid Waste Management

Course number: UESTS 301

Credits: 4

Time of Examination: 3 hours.

Marks:

Semester Examination: 80 marks

Sessional Assessment: 20 marks

Unit 1

- 1.1 Solid waste: Concept and Current scenario
- 1.2 Sources and classification of Solid Waste
- 1.3 Factors affecting the generation of Solid Waste
- 1.4 Evolutionary Concept of Legislative measures
 - a) Related to Environment
 - b) Related to Solid Waste Management

Unit 2

Effects of solid waste disposal on Environment

2.1 Impact of solid waste on Environment, Human and Plant Health

2.2 Impact of Solid Waste and Industrial waste on Water Quality and Aquatic life

2.3 Mining waste and Land Degradation

2.4 Effects of landfill leachate on soil and groundwater

Unit 3 Solid Waste Collection and Processing Techniques

3.1 Handling and segregation of solid waste at source and methods of separation

3.2 Solid waste reduction techniques

3.3 Collection of solid waste

3.4 Solid waste processing methods (storage, conveying, compacting, shredding, pulping, granulating etc.)

Unit 4: Solid Waste Management Techniques

4.1 Management of organic waste

a) composting

b) Vermicomposting

c) Farmyard manure

4.2 Solid waste disposal

a) Sanitary landfills

b) incineration

c) pyrolysis

d) gasification

4.3 Management of e-waste

4.4 Site selection and criteria siting criteria for sanitary landfills

Unit 5: Integrated waste management and Waste to Energy(WTE)

5.1 Concept of integrated waste management: Community Participation in Solid Waste Management

5.2 Waste Management Hierarchy

5.3. Refuse Derived Fuel (RDF)

5.4. Different Waste to Energy (WTE) Processes: Combustion, Pyrolysis, Landfill Gas (LFG), recovery etc.

Field Visit/Practical:

1)Field Visit to various industries.

2)Field visit to Solid Waste Disposal Site

3)Best out of waste: Making items from waste materials.

4) Class test of 20 marks based on syllabus

Semester IV

Title: ENVIRONMENTAL IMPACT ASSESSMENT

Course number: UESTS 401

Credits: 4

Time of examination: 3 hours

Marks:

Semester Examination: 80 marks

Sessional Assessment: 20 marks

Unit 1

1.1 EIA: Concept and historical background

1.2 General Process of EIA

1.3 Environmental Impacts to be considered in EIA process and their types

1.4 Prediction and assessment of various environmental impacts

Unit 2

EIA Methodology

2.1 Adhoc and Checklist method

2.2 metrics method and overlay method

2.3 Cost benefit analysis

2.4 Network and Modelling methods

Unit 3 Documentation and Reporting

3.1 Environmental Impact Statement

3.2 Environmental audit

3.3 Reviewing of EIA/EIS

3.4 People's participation in EIA

Unit 4:

4.1 Rapid EIA

4.2 Social Impact Assessment

4.3 Resettlement and rehabilitation

4.4 Environmental Management Plan (EMP)

Unit 5

5.1 EIA Regulations in India (EIA notifications)

5.2 Status of EIA in India

5.3 Current Issues in EIA

5.4 Case study of hydro power projects/ thermal projects

Internal Assessment:

Internal Assessment Test of 20 marks will be based on questions from syllabus.

Semester V

Title: Green Technology

Course number: UESTS 501

Credits: 4

Time of examination: 3 hours

Marks:

Semester Examination: 80 marks

Sessional Assessment: 20 marks

Unit 1

1.1 Definition and concept: Green Technology, Green energy, Green infrastructure, Green economy, Green chemistry

1.2 Sustainable Consumption of Resources

1.3 3R approach

1.4 Energy Conservation

Unit 2

2.1 Green infrastructure: Green buildings, Need and Relevance of green buildings over conventional buildings

2.2 Green planning, Landuse planning

2.3 Concepts of green cities, Waste Reduction, Green Belts, CNG fuelled public transport

2.4 Eco-Mark Certification: It's Importance and Implementation

Unit 3

3.1 Green Chemistry: Introduction, Principles and Recognition of green criteria

3.2 Green Products: Biodegradable products and Bioaccumulative products 3.3 ISO 14000

3.4 Green Nanotechnology

Unit 4

Applications of Green Technology

4.1 Greenhouse Gas Emission reduction

4.2 Carbon Capture and Storage technologies

4.3 Pollution reduction and removal: Flue Gas Desulphurisation, Catalytic Converters

4.4 Successful Green Technologies: Wind Turbines, Solar Panels etc.

Unit 5 Sustainable Future

5.1 Reduction of Ecological Footprints

5.2 Major challenges and their resolution in implementation of Green Technology

5.3 Green Practices to conserve Natural Resources: Organic Agriculture Agroforestry etc.

5.4 UNEP's Green Economy Initiative

Field Visit/ Practical:

Prepare a report on the Ecofriendly products being used in your area.

Visit to industrial units to observe the use of Green Technology.

To prepare a model of an ideal green building.

To prepare a working model of Solar Panel or Windmill.

Semester VI

Title: Pollution Abatement Techniques

Course number: UESTS 601

Credits: 4

Time of examination: 3 hours

Marks:

Semester Examination: 80 marks

Sessional Assessment: 20 marks

Unit 1

- 1.1 Atmosphere: Structure and Composition
- 1.2 Air Pollution: Introduction, Sources and Effects
- 1.3 Air Pollution Control Technology: Raw material changes, Process/Operation changes, Equipment modification, Condensation, Adsorption, Absorption gravity settling, Filtration, Wet scrubbing
- 1.4 Control of emissions from Automobiles: Redesigned Engines, Catalytic Converter

Unit 2

- 2.1 Water Pollution: Introduction, Definition, Causes of Water Pollution

2.2 Effects of Water Pollution: Eutrophication, Algal Blooms, Bioaccumulation, Nitrate Pollution, Heavy Metal Pollution

2.3 Control of water pollution: Wastewater Treatment

2.4 Bioremediation

Unit 3

3.1 Noise Pollution: Causes and Effects 3.2 Noise pollution Control Techniques: a) Sound insulation

b) Sound Absorption

c) Vibration Damping

d) Vibration Isolation

3.3 Control in Transmission Path: Installation of Barriers and Closures, Green Mufflers

3.4 Control at Receiver:

a) Using protective equipment

b) Job Rotation to reduce exposure

Unit 4 Soil Pollution and Control

4.1 Soil Pollution: Definition and Sources of soil pollution

4.2 Soil Degradation: Soil Erosion, Modern Agriculture

4.3 Effects of soil pollution on Soil Quality and Productivity

4.3 Control Measures of soil degradation: Biofertilizers, Organic Farming, Biological Pest Management
4.4 Sustainable Landuse Planning

Unit 5 Case studies

5.1 Bhopal Gas Tragedy, London Smog
5.2 Minamata Incident Japan, Arsenic Poisoning, West Bengal

5.3 Love Canal Tragedy, New York, Endosulfan Tragedy, Kerala

5.4 Yamuna River Pollution

Field Visit /Practical/ Test

Visit to industrial units to observe the use of pollution control technology at various steps.

Class test of 20 marks based on the syllabus.

Note for Paper Setting:

Paper will consist of THREE Sections 'A' , 'B' , 'C'.

Section 'A' will consist of 5 short answer questions of 3 marks each, representing all units i.e. at least ONE from each unit. All questions would be compulsory. Candidate has to restrict the answers in 70 to 80 words.

Section 'B' will consist of 5 short answer questions of 7 marks each, representing all units i.e. at least ONE from each unit. All questions would be compulsory. Candidate has to restrict the answers in 250 to 300 words.

Section 'C' will consist of 4 long answer type questions of 15 marks each out of which candidate has to attempt any TWO. Candidate has to restrict the answer in 500 to 600 words.