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| Semester | : | II | | | |
| Course No. | : | VAC-121 | Credit Hrs. | : | 3(2+1) |
| Course Title | : | Environmental Studies and Disaster Management | | | |
| Gradual Common Course across all UG Degrees | | | | | |

SYLLABUS

- Objectives :** (i) To expose and acquire the knowledge on the environment,
(ii) To gain the state-of-the-art skill and expertise on management of disasters.

THEORY

Introduction to Environment - Environmental studies - Definition, scope and importance - Multidisciplinary nature of Environmental Studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere. Natural Resources: Classification - Forest resources. Water resources. Mineral resources, Food resources. Energy resources. Land resources. Soil resources. Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem. Types of Ecosystems. Biodiversity and its conservation: Introduction, Definition, Types. Biogeographical Classification of India. Importance and Value of Biodiversity. Biodiversity Hotspots. Threats and Conservation of Biodiversity.

Environmental Pollution: Definition, Cause, Effects and Control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Light pollution. Solid Waste Management: Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, Effects and Control measures of urban and industrial wastes. Social Issues and the Environment: Urban problems related to energy. Water conservation, Rain water harvesting, Watershed management. Environmental Ethics: Issues and possible solutions, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Human Population and the Environment: Environment and Human Health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and Human health.

Disaster Management - Disaster: Definition-Types-Natural Disasters: Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves. Man-made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, National disaster management framework; Financial arrangements; Role of NGOs, Community-based organizations and media in disaster management. Central, state, district and local administration in disaster control; Armed Forces in disaster response; Police and other organizations in disaster management.

PRACTICAL

Visit to a local area to document environmental assets river/forest/grassland/hill/mountain. Energy: Biogas production from organic wastes. Visit to wind mill/hydro power/solar power generation units. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and unpolluted system. Visit to local polluted site- Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of *E. coli* in water sample. Assessment of Suspended Particulate Matter (SPM). Study of simple ecosystems - Visit to pond/ river/ hills. Visit to areas affected by natural disaster.

TEACHING SCHEDULE

THEORY [VAC-121]

| Lecture No. | Topic | Sub-topics/ Key Points | Weightage (%) |
|-------------|--|--|---------------|
| 1 | Introduction to Environmental Studies | Definition, Scope and Importance; Multidisciplinary nature | 4 |
| 2 | Segments of Environment | Spheres of Earth – Lithosphere, Hydrosphere, Atmosphere and Different Layers of Atmosphere. | 4 |
| 3 - 5 | Natural Resources | Classification of resources; Forest, water, mineral, food, energy, land, and soil resources | 10 |
| 6 - 7 | Concept of an Ecosystem | Concept, Structure, Function and Energy flow in ecosystems | 5 |
| 8 - 9 | Types of Ecosystems | Terrestrial, Aquatic, Agroecosystems, Forest ecosystems and Human-modified ecosystems | 5 |
| 10 - 12 | Biodiversity and its Conservation | Importance, Value, Types, Biogeographical classification, Hotspots, Threats, Conservation strategies | 8 |
| 13 - 16 | Environmental Pollution | Definition, Causes, Effects, Control measures: Air, Water, Soil, Marine, Noise, Thermal and Light pollution | 12 |
| 17 - 18 | Solid Waste Management | Classification of solid wastes; Management methods like, Composting, Incineration, Pyrolysis, Biogas production | 6 |
| 19 | Urban and Industrial waste | Causes, Effects and Control measures of Urban and Industrial waste | 4 |
| 20 | Social Issues Related to the Environment | Urban energy problems, Water conservation, Rainwater harvesting, Watershed management | 4 |
| 21 - 22 | Environmental Ethics | Issues, Possible solutions, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust. | 6 |

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| 23 | Environment Protection Laws | Environment Protection Act, Air and Water (Pollution) Acts, Wildlife Protection Act, Forest Conservation Act | 4 |
| 24 - 25 | Human Population and Environment | Environment and human health, Human rights, Value education, Women and child welfare, Role of IT in environment and health | 5 |
| 26 - 28 | Introduction to Disaster Management | Definition, Types of natural and man-made disasters; Floods, Droughts, Cyclones, Earthquakes, Landslides, Fires | 10 |
| 29 - 30 | Disaster Management Framework | National and International strategies, disaster response framework, Financial arrangements, Role of NGOs and media | 5 |
| 31 | Central and Local Administration in Disasters | Role of Central, State, District and Local Administrations; Coordination in disaster response | 4 |
| 32 | Disaster Response Organizations | Central, State, District and Local Administrations in Disaster Control; Role of Armed Forces, Police and Other organizations in disaster response and control | 4 |
| Total = | | | 100 |

TEACHING SCHEDULE**PRACTICAL [VAC-121]**

| Exercise No. | Exercise Title |
|---------------------|--|
| 1 | Visit to a local area to document environmental assets: River/Forest/Grassland/Hill/Mountain. |
| 2 | Visit to Biogas production, Windmill, Hydro/Solar power generation units |
| 3 | To assess floral and faunal diversity in farming systems. |
| 4 | Assessment of biodiversity in farming system. |
| 5 | Floral and faunal diversity assessment in polluted and unpolluted system. |
| 6 | Visit to Local Polluted Site - Urban/Rural/Industrial/Agricultural to study the common plants, insects and birds. Environmental sampling and preservation. |
| 7 | Water quality analysis: pH and electrical conductivity (EC) in water samples. |
| 8 | Estimation of total dissolved solids (TDS) in water samples |
| 9 | Estimation of acidity and alkalinity in water samples. |
| 10 | Estimation of water hardness in water samples. |
| 11 | Determination of dissolved oxygen (DO) and biological oxygen demand (BOD) in water samples. |
| 12 | Performing COD estimation on water samples. |
| 13 | Enumeration of <i>E. coli</i> in water samples to check for contamination. |
| 14 | Assessment of Suspended Particulate Matter (SPM) in an environmental sample. |
| 15 | Study of simple ecosystem -Visit to Pond/River/Hills. |
| 16 | Visit to areas affected by natural disaster. |

Suggested Readings (VAC-121):

1. **De, A.K. 2010.** Environmental Chemistry. Published by New Age International Publishers, New Delhi. ISBN:139788122426175. 384 pp.
 2. **Dhar Chakrabarti, P.G. 2011.** Disaster Management - India's Risk Management Policy Frameworks and Key Challenges. Published by Centre for Social Markets (India), Bangaluru. 36 pp.
 3. **Erach Bharucha,** Text Book for Environmental Studies. University Grants Commission, New Delhi.
 4. **Parthiban, K.T., Vennila, S., Prasanthrajan, M. and Umesh Kanna, S. 2023.** Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India.
 5. **Prasanthrajan, M. and Mahendran, P.P. 2008.** A Text Book on Ecology and Environmental Science.1st Edn. ISBN 8183211046. Agrotech Publishing Academy, Udaipur - 313 002.
 6. **Prasanthrajan, M. 2018.** Objective Environmental Studies and Disaster Management, ISBN 9789387893825. Scientific Publishers, Jodhpur, India. 146 pp.
 7. **Sharma, P.D. 2009.** Ecology and Environment, Rastogi Publications, Meerut, India.
 8. **Tyler Miller and Scot Spoolman. 2009.** Living in the Environment (Concepts, Connections, and Solutions). Brooks/Cole, Cengage Learning Publication, Belmont, USA.
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