

**DEPARTMENT OF BOTANY, UNIVERSITY OF LUCKNOW**  
**POST GRADUATE ELECTIVE COURSE**  
**ENVIRONMENTAL SCIENCE**  
**Semester – I**  
**(w.e.f. July, 2018)**

**Paper-I The earth and its Environment**

<b>3.00 Credits</b>		<b>Total: 30 Hours</b>
<b>Unit – I</b>	<b>Natural Resources - I (7.5 Hours) : 0.75 Credits</b>	<b>Hours</b>
	▪ Definition and classification of Natural Resources	1
	▪ Atmosphere: Characteristics of troposphere, stratosphere, mesosphere, thermosphere and exosphere.	2
	▪ Lithosphere: Basic concepts	1.5
	▪ Hydrosphere: Structure and physic-chemical properties	
	▪ Mineral source management: formation, occurrence, exploitation & conservation.	1.5
	▪ Sources of Renewable and Non-Renewable Energy	1.5
<b>Unit – II</b>	<b>Natural Resources –II (7.5 Hours) : 0.75 Credits</b>	
	▪ Agricultural products, their production and management	1.5
	▪ Biogeographical distribution of plants and animals	1.5
	▪ Natural and anthropogenic depletion of biodiversity	1
	▪ Rare, endangered, vulnerable, threatened species of plants and animals, hot spots	1.5
	▪ Conservation of rare and endangered animal species, national parks and wildlife sanctuaries of India.	2
<b>Unit – III</b>	<b>Soils (7.5 Hours) : 0.75 Credits</b>	
	▪ Soils: Origin and development of soil	2
	▪ Soil profile.	1
	▪ Physical, chemical and biological properties of soils	1.5
	▪ Soils of India, extent and distribution	1.5
	▪ Characteristics of problem soils	1.5
<b>Unit – IV</b>	<b>Energy (7.5 Hours) : 0.75 Credits</b>	
	▪ Energy: Non-renewable (conventional) sources of energy	1
	▪ Thermal power, hydro-energy, atomic, nuclear energy and fossil fuel	2
	▪ Energy : Renewable (non- conventional) source of energy, with the development of non-polluting energy systems, energy conservation and storage.	1.5
	▪ Solar, Wind, Geothermal, tidal, Ocean and magneto hydrodynamic power	1.5
	▪ Biogas and power generation from solid waste conservation, energy storage	1.5

**Note: Common name & Vernacular names will be required.**

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**Semester – II**  
**(w.e.f. July, 2018)**

**Paper – II Natural Resources and their Management**

<b>3.00 Credits</b>		<b>Total: 30 Hours</b>
<b>Unit – I</b>	<b>Water and Land Resource Management (7.5 Hours) : 0.75 Credits</b>	<b>Hours</b>
	<ul style="list-style-type: none"> <li>▪ Definition and classification natural resources 0.5</li> <li>▪ Water resources and their integrated management 1</li> <li>▪ Watershed development, rainwater harvesting 1</li> <li>▪ Water conservation strategies in India 1</li> <li>▪ Agricultural practices in India. Exploitation of agricultural land 1.5</li> <li>▪ Wasteland development- concept, scope and strategies 1</li> <li>▪ Desertification &amp; Degraded land and their management, Integrated land use planning. 1.5</li> </ul>	
<b>Unit – II</b>	<b>Biodiversity-I (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Definition, components and interrelationships 1</li> <li>▪ Forests: Their importance, causes of their depletion and degradation, their management and conservation 1.5</li> <li>▪ Strategies for biodiversity conservation, CBD and Agenda 21 1</li> <li>▪ Microbes in drug production 1</li> <li>▪ Bioremediation in environmental management 1.5</li> <li>▪ Biodiversity and Environmental monitoring 1.5</li> </ul>	
<b>Unit – III</b>	<b>Biodiversity-II (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Community ecology: Basic concept, structure, organization and characteristics, ecotone and concept of edge effect 1.5</li> <li>▪ Community dynamics: Concept of ecology, succession, trends of succession, and community retrogression 1.5</li> <li>▪ General processes of succession, climax 1.5</li> <li>▪ Ecosystem: concept and composition, production and decomposition, homeostasis, concept of energy in ecosystem - productivity, food chain, food web, trophic structure, ecological pyramids, energy budgets of plants and animals. 3</li> </ul>	
<b>Unit – IV</b>	<b>Biotic Response to Environment (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Survey and classification of common hazardous chemicals in the environment 1</li> <li>▪ Factors affecting toxicity of harmful chemicals Types and problems of fishery 1</li> <li>▪ Study of toxic agents producing Neuro, behavioral, reproductive, mutagenic and carcinogenic toxicities 2</li> <li>▪ Chemical pesticides and their harmful effects. 1</li> <li>▪ Study of Biopesticides as an alternative to chemical pesticides 1</li> <li>▪ Heavy metal toxicity and its harmful effects on plants, animals and humans and its management 1.5</li> </ul>	

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**ENVIRONMENTAL SCIENCE**  
**Semester – III**  
**(w.e.f. July, 2018)**

**Paper – III Environmental Pollution**

<b>3.00 Credits</b>		<b>Total: 30 Hours</b>
<b>Unit – I</b>	<b>Air Pollution (7.5 Hours) : 0.75 Credits</b>	<b>Hours</b>
	<ul style="list-style-type: none"> <li>▪ Air pollution: particulate &amp; non particulate resources</li> <li>▪ Green House Effect, Global Warming, Issues &amp; Advance Research to protect the ozone layer &amp; consequences.</li> <li>▪ Water and Soil pollution</li> <li>▪ Radiation, Noise, Industrial and Thermal Pollution</li> <li>▪ Modern environmental problems: acid rain, ozone layer depletion</li> </ul>	<p>2</p> <p>2</p> <p>1.5</p> <p>1</p> <p>1</p>
<b>Unit – II</b>	<b>Pollution: Sources and effects (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Non Degradable water pollutants and their control Measures</li> <li>▪ Sources and effects of Bio-degradable water pollutants and their control measures</li> <li>▪ Soil pollution caused by over usage of agro-chemicals, their effect on plants and their control measures</li> <li>▪ Microbes in environment: in air, water, soil and food, microbial toxins</li> </ul>	<p>2</p> <p>2</p> <p>2</p> <p>1.5</p>
<b>Unit – III</b>	<b>Environmental Pollution and their Management-I (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Major, natural, accidental and man-made disasters and their effects</li> <li>▪ Waste- types and management</li> <li>▪ National forest policy, afforestation-social and agroforestry, silvipastoral, afforestation of degraded/wasteland, Wildlife: Definition, ecological balance.</li> <li>▪ Importance, cause of depletion and extinction, wildlife management</li> </ul>	<p>2</p> <p>2</p> <p>2</p> <p>1.5</p>
<b>Unit – IV</b>	<b>Environmental Pollution and their Management-II (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Environmental education programmes and public awareness</li> <li>▪ Environmental organizations/agencies (Government /Non Government)</li> <li>▪ Environmental Priorities in India</li> <li>▪ Environmental Laws I: International</li> <li>▪ Environmental Laws II: India</li> </ul>	<p>1.5</p> <p>1.5</p> <p>1</p> <p>1.5</p>

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**Semester – IV**  
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**Paper – IV Climate Change & Current Issues**

<b>3.00 Credits</b>		<b>Total: 30 Hours</b>
<b>Unit – I</b>	<b>Basic Concepts (7.5 Hours) : 0.75 Credits</b>	<b>Hours</b>
	<ul style="list-style-type: none"> <li>▪ Introduction to the basics of climate change and its interrelationship with other sciences and environment. 1</li> <li>▪ Overview of key concepts – weather and climate 1.5</li> <li>▪ Effect of various anthropogenic activities on earth's atmosphere 2</li> <li>▪ Climate Change and sustainable development 1.5</li> <li>▪ Implications of climate change, monitoring and assessment 1.5</li> </ul>	
<b>Unit – II</b>	<b>Impact of Rainfall (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Climate change: Measurement of rainfall – Seasonal distribution of rainfall, temperature, wind aspects. 2</li> <li>▪ Monsoons – Indian monsoons, climate variability, recent trends, factors affecting rainfall distribution, cyclones and cyclonic tracks over the Indian region 2.5</li> <li>▪ North western disturbances and monsoon breaks. 2</li> <li>▪ El-Nino, La Nino and their impacts 1</li> </ul>	
<b>Unit – III</b>	<b>Mitigation – Concepts and Initiatives (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Climate change adaptation and mitigation: The concept of climate change adaptation; Linkage between climate change adaptation initiatives and programs 1.5</li> <li>▪ Definitions of mitigation and present an overview of emissions levels and mitigation targets per country 2</li> <li>▪ Integrate mitigation into development planning through low emission development strategies. Identification of main economic sectors where mitigation actions countries can applied. 2</li> <li>▪ International mechanism created to assist countries in planning and implementing mitigation actions. 2</li> </ul>	
<b>Unit - IV</b>	<b>Policy and Current Issues (7.5 Hours) : 0.75 Credits</b>	
	<ul style="list-style-type: none"> <li>▪ Climate change and policy frameworks – History of international climate change policies. United Nation Framework Convention on climate change (UNFCCC) – Key provisions of the UNFCCC, its structure, and different party groups under the convention – Annex I, Annex II and Non-Annex I countries. 2</li> <li>▪ The Kyoto protocol and its associated bodies. Overview of Conference of Parties (CoP). 1.5</li> <li>▪ Main climate change negotiations evolved over the past years and highlights some key issues relevant for a future climate change regime. 2</li> <li>▪ Pollution implications of Climate change, monitoring and assessment; climate change models. 2</li> </ul>	

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