SYLLABUS

Subject: ENVIRONMENTAL SCIENCES

Note:

There are two Papers for each of the subjects. Paper – I on Teaching and Research aptitude, Paper – II based on the syllabus of concerned subjects. Details are furnished below:

PAPER – I

Subject : General Paper on Teaching & Research Aptitude

The Test is intended to assess the teaching/research aptitude of the candidate. They are supposed to possess and exhibit cognitive abilities like comprehension, analysis, evaluation, understanding the structure of arguments, evaluating and distinguishing deductive and inductive reasoning, weighing the evidence with special reference to analogical arguments and inductive generalization, evaluating, classification and definition, avoiding logical inconsistency rising out of failure to see logical relevance due to ambiguity and vagueness in language. The candidates are also supposed to have a general acquaintance with the nature of a concept, meaning and criteria of truth, and the source of knowledge. There will be 50 questions for Paper – I.

1. The Test will be conducted in objective mode. The Test will consist of two Papers. All the two Papers will consists of only objective type questions and will be held on the day of Test in two separate sessions as under :

<table>
<thead>
<tr>
<th>Session</th>
<th>Paper</th>
<th>Number of Questions</th>
<th>Marks</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>I</td>
<td>50 question</td>
<td>50 ×2 = 100</td>
<td>1 Hours</td>
</tr>
<tr>
<td>Second</td>
<td>II</td>
<td>100 questions</td>
<td>100×2 =200</td>
<td>2 Hours</td>
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2. Candidates who appear in two Papers and secure at least 40% aggregate marks for candidates belonging to General Category and at least 35% aggregate marks for candidates belonging to reserved categories will be declared qualifies for Eligibility for Assistant Professor by following the reservation policy of the State Government.

3. The Syllabus of Paper – II and Paper – III will be combined for Paper – II of each subject.
ENVIRONMENTAL SCIENCES

PAPER–II and PAPER–III (Part–A & B)

Unit–I
Definition, Principles and scope of Environmental Science.
Earth, Man and Environment. Ecosystems, Pathways in Ecosystems.
Physico-chemical and Biological factors in the Environment.
Geographical classification and zones.
Natural resources, conservation and sustainable development.

Unit–II
Fundamentals of Environmental Chemistry: Stochiometry, Gibbs’s energy, Chemical potential, Chemical equilibria, acid base reactions, solubility product, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radionuclides


Water Chemistry: Chemistry of water, concept of DO, BOD, COD, sedimentation, coagulation, filtration, Redox potential.


Unit–III
Definition, Principles and scope of ecology, Human ecology and Human settlement, Evolution, Origin of life and speciation.

Ecosystem: Structure and functions, Abiotic and Biotic components, energy flows, Food Chains, Food web, Ecological pyramids, types and diversity.

Ecological Succession, Population, Community ecology and Parasitism, Prey predator relationships.

Common flora and fauna in India

Aquatic: Phytoplankton, Zooplankton and Macrophytes

Terrestrial: Forests

Endangered and Threatened Species


Environmental Biotechnology: Fermentation Technology, Vermiculture technology, Biofertilizer technology.

**Earth’s Processes and Geological Hazards**:
Earth’s processes; concept of residence, time and rates of natural cycles. Catastrophic geological hazards. Study of floods, landslides, earthquakes, volcanism and avalanche. Prediction and perception of the hazards and adjustments to hazardous activities.

**Mineral Resources and Environment**:
Resources and Reserves, Minerals and Population. Oceans as new areas for exploration of mineral resources. Ocean ore and recycling of resources. Environmental impact of exploitation, processing and smelting of minerals.

**Water Resources and Environment**:

**Landuse Planning**:
The landuse plan. Soil surveys in relation to landuse planning. Methods of site selection and evaluation.

**Environmental Geochemistry**:
Concept of major, trace and REE. Classification of trace elements, Mobility of trace elements, Geochemical cycles. Biogeochemical factors in environmental health. Human use, trace elements and health. Possible effects of imbalance of some trace elements. Diseases induced by human use of land.


**Unit–V**
Sun as source of energy; solar radiation and its spectral characteristics; Fossil fuels–classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas. Principles of generation of hydroelectric power, tidal, Ocean Thermal Energy Conversion, wind, geothermal energy; solar collectors, photovoltaics, solar ponds; nuclear energy–fission and fusion; magnetohydrodynamic power, bio-energy–energy from biomass and biogas, anaerobic digestion; energy use pattern in different parts of the world.

Environmental implication of energy use; CO₂ emissions, global warming; air and thermal pollution; radioactive waste and radioactivity from nuclear reactors; impacts of large-scale exploitation of Solar, Wind, Hydro and Ocean energy.

**Unit–IV**

**Air**:

**Water**:

**Soil**:
Physico-chemical and bacteriological sampling as analysis of soil quality. Soil Pollution Control. Industrial waste effluents and heavy metals, their interactions with soil components. Soil micro-organisms and their functions, degradation of different insecticides, fungicides and weedicides in soil. Different kinds of synthetic fertilizers (NP & K) and their interactions with different components of soil.

**Noise**:

**Marine**:
Sources of marine pollution and control. Criteria employed for disposal of pollutants in marine system–coastal management.

Radioactive and Thermal Pollution.

**Unit–VII**
Introduction to environmental impact analysis.
Environmental impact Statement and Environmental Management Plan.
Impact Assessment Methodologies.
Generalized approach to impact analysis.
Procedure for reviewing Environmental impact analysis and statement.
Guidelines for Environmental audit.
Introduction of Environmental planning.
Base line information and predictions (land, water, atmosphere, energy, etc.)
Restoration and rehabilitation technologies.
Landuse policy for India.
Urban planning for India.
Rural planning and landuse pattern.
Concept and strategies of sustainable development.
Cost-Benefit analysis.
Environmental priorities in India and sustainable development.

Unit–VIII

Unit–IX
Basic elements and tools of statistical analysis; Probability, sampling, measurement and distribution of attributes; Distribution–Normal, \( t \) and \( x^2 \), Poisson and Binomial; Arithmetic, Geometric and Harmonic means; moments; matrices, simultaneous linear equations; tests of hypothesis and significance.
Introduction to environmental system analysis; Approaches to development of models; linear simple and multiple regression models, validation and forecasting. Models of population growth and interactions–Lotka-Volterra model, Leslie’s matrix model, point source stream pollution model, box model, Gaussian plume model.

Unit–X
Environmental Education and Awareness.
Environmental Ethics and Global imperatives.
Global Environmental problems–ozone depletion, global warming and climate change.
Current Environmental issue in India.
Context : Narmada Dam, Tehri Dam, Alnetti Dam, Soil Erosion, Formation and reclamation of Usar, Alkaline and Saline Soil.
Waste lands and their reclamation.
Desertification and its control.
Vehicular pollution and urban air quality.
Depletion of Nature resources.
Biodiversity conservation and Agenda-21.
Waste disposal, recycling and power generation, Fly ash utiliza-
tion.
Water Crises–Conservation of water.
Environmental Hazards.
Eutrophication and restoration of Indian lakes.
Rain water harvesting.
Wet lands conservation.
Epidemiological issues (e.g., Goitre, Fluorosis, Arsenic)