For The Year 2026

Environmental Science- 307 Syllabus for CUET(UG)

Environmental

1. Human Beings and Nature

(i) Modern schools of ecological thought.

(ii) Definitions and basic understanding of Deep ecology (Gary Snyder, Earth First) vs. shallow ecology.

(iii) Stewardship of land (e.g. Wendell Berry).

(iv) Social ecology [Marxist environmentalism and socialist ecology (Barry Commoner)].

(v) Feminism.

(vi) Green Politics (e.g. Germany and England).

(vii) Sustainable Development: basic concepts, Brundtland commission report, Sustainable development Goals, Mission LiFE.

2. Population and Conservation Ecology

I. **Population dynamics:** Factors causing population change (birth, death, immigration and emigration); relation between the factors; Age structure and its significance; Population Pyramids –interpretation and implications. Rate of change of population – the three general shapes of Survivorship Curves, r and K strategies and differences between the two.

II. **Human populations (Malthusian model and demographic transition):** Definition of Carrying Capacity; Malthusian view: concept of 'over-population' and shortage of resources; Questioning Malthus. Population Growth vs. Disparate Consumption of resources within and amongst nations. Definition and understanding of Demographic Transition; Factors influencing demographic transition.

III. **Population Regulation:** Growth without regulation (exponential); simple population regulation (logistic growth curve); factors regulating population size (space, food and water, territories, predators, weather and climate, parasite and diseases, disasters and self-regulation). Basic understanding of the Exponential growth curve (J – shaped) and Logistic growth curve (S - shaped); Factors regulating population size (space, food and water, territories, predators, weather and climate, parasite and diseases, disasters and self-regulation).

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IV. Threats to the ecosystem: habitat destruction; genetic erosion; Biodiversity loss; expanding agriculture; impound water; waste from human societies; increasing human consumption. Only a brief understanding of the causes and consequences of threats to provisioning and regulatory functions of the ecosystem with suitable examples.

V. Conservation: importance, the critical state of Indian forests; conflicts surrounding forested areas - populations and tribals and their rights - tourism - poaching - roads - development projects - dams; scientific forestry and its limitations; social forestry; the role of the forest department; NGOs; joint forestry management; wild life - sanctuaries, conservation and management in India; Project Tiger as a case study in conservation.

Definition of Conservation in situ and ex situ conservation, Importance of Conservation.

In-situ conservation: Wildlife sanctuaries, National parks, Biosphere reserves (definition, objectives, features, advantages and disadvantages). Ex-situ conservation: zoos, aquaria, plant collection (objectives, features, advantages and disadvantages).

Conflicts in managing and conserving Forests: India's forest cover, issues concerning people living in and around forests with particular reference to tribal rights; threats to forests: poaching, developmental projects like roads and dams, over exploitation of forest resources (direct and indirect).

The role of the forest department and NGOs in managing forests.

Some management measures: scientific forestry, social forestry (various types of social forestry), Joint Forestry Management (JFM), ecotourism.

Case study in conservation for example Project Tiger: Origin, aims, and objectives, successes, failures.

Acts and rules related to ecology, forest and biodiversity conservation etc.

3. Environmental Pollution

Definition and concepts of pollutants, contaminant sources, sink, receptor, Impacts of air/water/soil pollution on human health and ecosystem, Different acts/rules related to prevention and control of air/water/soil/noise pollution in India.

I. Air pollution and its monitoring

Structure, temperature profile and composition of atmosphere, Primary and secondary pollutants. National Ambient Air Quality Standards (NAAQS), Importance of

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monitoring of Ambient Air Quality Monitoring (gaseous and particulate). Industrial and vehicular pollution and various steps taken to regulate pollution-emission standards, implementation of CNG programme,

Acid rain formation and its impact, Smog, photochemical smog, Ozone in troposphere

Monitoring at emission source and of ambient air quality, criteria for monitoring stations, types of stations, number of stations, frequency of data collection, characteristics of ambient air sampling, basic consideration for sampling (to be dealt with in brief). Classification of techniques- manual and instrumental. Manual-Passive samplers, High Volume Samplers and Bubbler Systems. Instrumental-photometric techniques-NDIR, Chemiluminescence - principle and use.

Ambient air quality index, National Ambient Air Quality Monitoring (NAAQM) programme; the main functions of the Central Pollution Board and the State Pollution Control Board, National Air Monitoring Programme (NAMP) and its objectives.

II. **Water pollution and its monitoring**

Distribution of water on the earth, Sources (quantitative/qualitative, Bio vs non-biodegradable, point vs non-point sources) of pollution in surface and ground water, ponds/lakes/rivers

Water quality Indicators: pH, electrical conductivity, turbidity, salinity, alkalinity, hardness dissolved oxygen, temperature, hardness, nitrates and sulphates, metals and pesticides, B.O.D. and C.O.D.

Lake stratification, Eutrophication,

III. **Soil pollution and its monitoring**

Sources to soil pollution such as industries, mining, agriculture run off, sewage water etc

Soil Characteristics: physical, chemical and biological attributes of soil, soil types, soil moisture, soil pH, soil acidity, Experimental details for assessing soil respiration, soil pH, soil aggregate, infiltration rate

4. Development and Environment

I. **Urbanisation -** push and pull factors; consequences on rural and urban sectors; future trends and projections.

II. **A critical appraisal of conventional paradigm of development from the**

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viewpoints of sustainability, environmental impact and equity.

Definition of economic Development, natural resources

Relationship between development and environment

Overuse and exploitation of resources, Diversion of scarce resources; Disparate access to resources; Increasing wastes and pollution.

III. **Gandhian approach to development and environment**

Local self-governance – basic principles behind village policy, Antoday, Sarvoday, Panchayati Raj; local self-sufficiency, local markets and environmental sustainability. Village as the basis of development; promotion of cottage industries and intermediate technologies; focus on employment. India way of life and concerns for environment

IV. **Urban environmental planning and management:** Problems of sanitation; water management; transport; energy; air quality; housing; constraints (economic, political); Indigenous approach to urban environment: Rainwater harvesting, garbage segregation, composting, energy from solid and liquid wastes, sewage management (dry toilets, Decentralized Water Management System (DEWATS)

Features of new urbanism, goals of smart growth with examples of urban planning and management from the third world:

- Bogota – Bolivia (Traffic Management);
- Cuba (Urban agriculture using organic methods);
- Curitiba – Brazil (Traffic planning and urban renewal using innovative measures);
- Cochabamba – (Water management and protests against privatization of water supply).

5. Sustainable Agriculture in India

Crop varieties; techniques for maintaining soil fertility

I. **Features of pre-colonial agriculture:** Growing for sustenance rather than market; multi-cropping, management of soil health, diversity in seed.

Colonial influence: Punitive taxation, commercial crops for export and British industry, devaluation of sustainable traditional practices. Bengal famine. Comparative study of pre-colonial, colonial and post- colonial agriculture and their impact.

II. **Irrigation systems,** Macro vs micro irrigation systems - Canal irrigation/dam as compared to sprinkler/ drip/ trickle drip/dug wells. Basic features, advantages and

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disadvantages of each kind. Traditional rainwater harvesting- tankas, khadins, ahar, pynes, zings, johads and eris etc in different parts of India.

III. **Green Revolution:** Origin and Basic principles of Green Revolution- Development of High Yielding Varieties (HYV); introduction of fertilizers and pesticides; mono cropping, Environmental, social and economic impacts - advantages and disadvantages (from the viewpoints of agro-bio diversity; soil health; ecological impact of pesticides; energy use; input costs; benefits to small and medium farmers, community level and household level food security).

IV. Elements of sustainable agriculture: Mixed farming, mixed cropping, inter-cropping, crop rotation, use of sustainable practices of water soil and pest management for improving soil fertility (organic fertilizers, bio-fertilizers, green manure, with two examples) and pest control (bio pesticides). Integrated Pest Management (IPM); eating local foods. Traditional agriculture, natural farming, organic agriculture, modern agriculture (use of hybrid seeds, high yielding varieties, chemical fertilizers and pesticides), gene revolution (genetically modified seeds) and sustainable agriculture.

V. Management of agricultural produce: Storage; Food preservation-different methods like use of low temperatures, high temperatures, drying, canning, preservation by salt and sugar. packaging, grading, Transportation of Food.

Food adulteration and Food additives- definitions; types and harmful effects of adulteration.

Quality Marks - ISI (Indian Standard Institute); AGMARK (Agricultural Marketing); FPO (Fruit Product Order).

VI. Food Security. Meaning and need, Issues related to food production, storage and access. Integrated and sustainable approach to food security for the Third World including working for environmental sustainability and social and economic sustainability through land reform, credit support to farmers, market support to farmers, inadequacies in the present marketing system, ways to improve marketing system, improving access to food, ownership of seeds. National level food security Act 2013

6. Environmental and Natural Resource Economics

(i) Classification of natural resources - abiotic and biotic, renewable and non-renewable, stock, potential and actual, ubiquitous and localized; scarcity and growth, natural resource accounting.

Definition, basic principles, advantages and disadvantages of Physical accounting.

(ii) GNP vs. other forms of measuring income. GDP, GNP – definitions, advantages and disadvantages of using them as tools for measuring growth.

(iii) A broad overview of the purpose of environmental economics.

Definition and classification: Defensive expenditure (its classification); natural/ ecological capital, carbon footprint and carbon credit

(iv) **Externalities:** Definition and types (positive and negative) with examples, impacts.

(v) **cost benefit analysis.** - Definition, process, advantages and disadvantages.

EPR (Extended Producer Responsibility) -definition, examples, advantages.

(vi) **Natural capital regeneration.**

Concept of natural capital, Ecosystem services and types with examples, causes of environmental degradation (forest/biodiversity loss), ecological footprint and man's disproportionate use of natural resources, importance of preserving and regenerating natural capital.

7. International Relations and the Environment

I. Global Impacts of pollution

Ozone depletion: Chapman's cycle, potential effects of ozone depletion, ozone depleting substances (halons, carbon tetrachloride, CFCs, methyl chloroform, methyl bromide and HCFCs); Ozone thinning over Antarctica and arctic,

Steps taken to control ozone depletion. waste dumping, persistent organic pollutants, Global warming, Greenhouse gases, Carbon footprint, Climate change: indicators and causes;

Montreal protocol, Kyoto protocol, Bamako convention, Paris agreement, Conference of parties, carbon credits system

Case study of Amazonia - causes for forest exploitation, reasons for acceleration of deforestation, effects of government policies, ecological value of rainforests and

possible solutions to the problem.

Case study of ivory trade in Africa - reasons for flourishing trade of ivory in the past, steps taken to curb the trade and the consequences of ban in trade.

II. **International trade:** A theoretical perspective; free trade vs. protectionism; import barriers; domestic industry vs. free trade; transnational companies - a historical perspective; India's international trade – characteristics and terms of trade, major imports and exports - foreign exchange crises

The export imperative and its impact on the environment; the case study of aquaculture in India; diversion of scarce resource from production of subsistence needs to commercial products; toxic waste trade - extent and impact; Globalization - trade regimes (WTO, GATT, IPR, TRIPS, TRIMS) and their impact on third world.

Definition, advantages and disadvantages of globalization, free trade, protectionism.

Transnational Companies (TNCs) – definition; TNCs and environment – conflict of interest.

Toxic waste trade – definition, origin, factors sustaining, impact on third world countries (example – health and environmental impacts) and Bamako and Basel Conventions.

GATT – the organization and its metamorphosis into WTO.

Principles and functions of WTO: creating a level playing field for international trade through Most Favored Nation, tariff and non-tariff barriers and trading to comparative advantages.

Definition of IPR and its categories: copyrights, patents, trademarks, industrial design rights, geographical indicators and trade secrets.

A brief understanding of how these agreements impacted India’s trade, food security, economic well-being, environmental sustainability.

III. **International aid:** agencies; Types of Aid: Tied and Untied Aid, advantages and disadvantages of each

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