CUET Environmental Science Syllabus 2022

Unit	Topics
1. Human Beings and Nature	(i) Modern schools of ecological thought. (ii) 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. Modern schools of ecological thought; definition and basic understanding of Deep Ecology as opposed to Shallow Ecology; Stewardship, Social Ecology - Marxist environmentalism and Socialist Ecology, Ecofeminism, Green political movements of Germany and England and Sustainable Development (basic concepts). World Wide Fund for Nature – organization, mission, strategy for conservation. Greenpeace – organization, mission statement, core values, objectives, and strategy.
2. Population and Conservation Ecology	(i) Population dynamics: factors causing population change (birth, death, immigration, and emigration); the relation between the factors; age structure and its significance; population pyramids; survivorship curves; three general shapes r and K strategies. Factors causing population change (birth, death, immigration, and emigration); the 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: the concept of 'overpopulation' 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. 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). Human population control: family planning; education; economic growth; status of women. Strategies for human population control with emphasis on women's empowerment. (Details of methods of family planning is not required.)
	(iii) Threats to the ecosystem: habitat destruction; genetic erosion; loss of diversity; 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.
	(iv) 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; wildlife - 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 reference to tribal rights; threats to forests: poaching, developmental projects like roads and dams, overexploitation of forest resources (direct and indirect). The role of the forest department and NGOs in managing forests. Some management measures are scientific forestry, social forestry (various types of social forestry), Joint Forestry Management (JFM), and ecotourism. Definition, scope, advantages, and disadvantages of each of the above. Project Tiger as a case study in conservation: Origin, aims, and objectives, successes, failures.
3. Monitoring Pollution	(i) Pollution monitoring. Primary and secondary pollutants. Importance of monitoring air pollution including Ambient Air Quality Monitoring (gaseous and particulate). Concept of carbon credits and carbon trading in regulating emissions. Causes for excessive vehicular pollution and various steps taken to regulate pollution-emission standards for new vehicles, implementation of CNG programme, inspection & maintenance programme for in-use vehicles, phasing out of old commercial vehicles and promotion of public transport.
	(ii) Monitoring the atmosphere: techniques. 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, and 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.
	(iii) International and national air quality standards. National Ambient Air Quality Monitoring (NAAQM); the main functions of the Central

	Pollution Board and the State Pollution Control Board, objectives of air quality standards, new name of NAAQM, National Air Monitoring Programme (NAMP)objectives of the NAMP. Definition of air quality standards and importance; National air quality standards for gases/particulate matter are covered under WHO guidelines.
	(iv) Water testing: indicators of water quality. Indicators (electrical conductivity, turbidity, pH, dissolved oxygen, fecal waste, temperature, hardness, nitrates and sulfates) the significance of each and their interpretations. B.O.D. and C.O.D., the theoretical concept only (lab work for better understanding and not for testing)
	(v) Soil testing: indicators of soil type and quality and laboratory work. Soil indicators- the characteristics of a good soil indicator, the three basic types of soil indicators- biological, physical, and chemical, are two examples of each. The information is provided by each of these types of indicators. Definitions, effects, and experiments to find out soil respiration, soil pH, soil aggregate, infiltration rate, and simple methods of controlling each of these.
4. Third World Development	(i) Urban-rural divide: urbanization - push and pull factors; consequences on rural and urban sectors; future trends and projections. Causes of migration - push and pull factors, consequences on rural and urban areas, and ways to reduce migration. Future trends and projections.
	(ii) A critical appraisal of the conventional paradigm of development from the viewpoints of sustainability, environmental impact and equity. Definition of Development. An understanding that development has become synonymous with growth. This approach has the following impacts on the environment: (a) Ignoring negative environmental impacts; (b) Changing patterns of resource use due to market pressures; (c) Overuse and exploitation of resources; (d) Diversion of scarce resources to luxury goods; (e) Disparate access to resources; (f) Increasing wastes and pollution. The above to be explained with suitable examples
	(iii) A case study of the Gandhian approach in terms of its aims and processes. Local self-governance – basic principles behind village policy, Antoday, Sarvoday, Panchayati Raj; local self-sufficiency, local markets, and environmental sustainability. The village as the basis of development; promotion of cottage industries and intermediate technologies; focuses on employment. The above to be contrasted with today's paradigm of growth
	(iv) Urban environmental planning and management: problems of sanitation; water management; transport; energy; air quality; housing; constraints (economic, political) in tackling the problems; inapplicability

	of solutions that have worked in the First World and the need for an indigenous approach to the urban environment. A basic understanding of the following urban environmental problems: problems of sanitation, water management, transport, energy; air quality, and housing. Awareness of some indigenous solutions: 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. The following examples of urban planning and management from the third world to be studied: § 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 the privatization of water supply).
5. Sustainable Agriculture	(i) Traditional Agriculture in India: irrigation systems; crop varieties; techniques for maintaining soil fertility; the impact of colonialism; Indian agriculture at independence - food scarcity - food import - the need for increasing production - the need for land reform; green revolution - HYVs - fertilizers - pesticides - large irrigation projects (dams); critical appraisal of the green revolution from the viewpoints of agro-biodiversity; soil health; ecological impact of pesticides; energy (petroleum and petrochemicals); ability to reach the poorer sections of the rural communities; sustainability - need for sustainable agriculture - characteristics for sustainable agriculture; techniques of water soil and pest management. Definition of the following terms: 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. Irrigation systems: Macro vs micro irrigation systems - canal irrigation/dam as compared to sprinkler/ drip/ trickle drip/dug wells. Basic features, advantages, and disadvantages of each kind. Traditional rainwater harvesting- tankas, khadins, ahar, pynes, zings, johads and eris (suitability of each type in the particular region). Features of pre-colonial agriculture in India: growing for sustenance rather than the market; multi-cropping,
	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. Green Revolution: Origin (food scarcity - food import - the need for increasing production). 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 agrobiodiversity; soil health; the ecological impact of

	pesticides; energy use; input costs; benefits to small and medium farmers, community level and household level food security). Land reform – needs advantages, failures and successes. 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, biofertilizers, green manure, with two examples) and pest control (biopesticides). Integrated Pest Management (IPM); eating local foods Management of agricultural produce: Storage; Food preservation-different methods like use of low temperatures, high temperatures, drying, canning, preservation by salt and sugar. Transportation of Food. Food processing - Definition, food preservation, packaging, grading. Food adulteration and Food additives-definitions; types of adulteration, harmful effects of adulteration. Quality Marks - ISI (Indian Standard Institute); AGMARK (Agricultural Marketing); FPO(Fruit Product Order) - a brief explanation only.
	(ii) Food: the twin problems of production and access; food situation in the world; integrated and sustainable approach to food security for the Third World. Food Security. Meaning of Food Security, need for food security. The problems in attaining food security - are those of production, storage, and access. An integrated and sustainable approach to food security for the Third World includes 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, and ways to improve the marketing system, improving access to food, ownership of seeds. An understanding that national-level food security may not translate into household and community level food security or long-term environmental sustainability unless the above factors are addressed. Main features of the Food Security Law 2013.
6. Environmental and Natural Resource Economics	
	(i) Definition: resources; scarcity and growth; natural resource accounting. Classification of natural resources - based on origin (abiotic and biotic), on the basis of renewability (renewable and non-renewable), on the basis of development (potential and actual), on the basis of distribution (ubiquitous and localized); scarcity and growth, natural resource accounting. Classification of resources as renewable and non-renewable. 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) Economic status and welfare (net economic welfare, natural capital, ecological capital, etc.) A broad overview of the purpose of environmental economics. Definition and classification: Defensive expenditure (its classification); natural/ ecological capital. (iv) Externalities: cost-benefit analysis (social, ecological). Externalities – definition, kinds (positive and negative), impacts. Cost-Benefit analysis - Definition, the process in brief, advantages, and disadvantages. EPR (Extended Producer Responsibility) -definition, examples, advantages. (v) Natural capital regeneration. What is natural capital? Kinds of natural capital; classification of ecosystem services, causes of degradation (acid deposition, air pollution, deforestation, loss of biodiversity and emission of carbon dioxide), ecological footprint and man's disproportionate use of natural resources, the importance of preserving and regenerating natural capital.
7. International Relations and the Environment	(i) Trans-national characteristics of environmental issues using a case study of Amazonia, Trade in Wild Life, and Ozone Depletion. Case study of Amazonia - causes for exploitation of forests, reasons for the acceleration of deforestation, effects of government policies, the 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 are taken to curb the trade, and the consequences of the ban in trade. Case study of ozone depletion - what is meant by the ozone layer and how does it get depleted, (Chapman's cycle), potential effects of ozone depletion, common ozone-depleting substances (halons, carbon tetrachloride, CFCs, methyl chloroform, methyl bromide, and HCFCs) and their life span in the atmosphere; Ozone hole; steps taken to control ozone depletion.
	(ii) Impact of international politics, national sovereignty, and interest
	(iii) International trade: a theoretical perspective; free trade vs. protectionism; import barriers; domestic industry vs. free trade; transnational companies - a historical perspective (colonialism and its lasting impact today); trade between the first and the third world - characteristics - terms of trade; India's international trade - characteristics - 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 the production of subsistence needs to commercial products; toxic waste trade - extent and impact;

	Globalisation - trade regimes (WTO, GATT, IPR) and their impact on the third world. Definition, advantages, and disadvantages of globalization, free trade, and protectionism. Transnational Companies (TNCs) – definition; TNCs and environment – conflict of interest. History of third world countries' trade with the developed countries (with special reference to India) with regards to composition and terms of trade (export of primary goods and import of finished goods at higher cost tapping of primary goods leading to environment degradation- open cast mining, agriculture, aquaculture, etc.). Case study of aquaculture in India to understand the impact of free trade. Economic allocation of scarce resources and its impact on the environment. Toxic waste trade – definition, origin, factors sustaining, impact on third world countries(example – health and environmental impacts)and steps to mitigate it (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 MFN (Most Favored Nation), NT(National Treatment), and reduction of import barriers - tariff and nontariff barriers and trading to comparative advantages. Full forms of and areas addressed in the WTO, GATT, TRIPS, TRIMS, and Agreement on Agriculture (AOA). A brief understanding of how these agreements impacted India's trade, food security, economic well-being, and environmental sustainability. Definition of IPR and its categories: copyrights, patents, trademarks, industrial design rights, geographical indicators and trade secrets. A brief understanding of each of the above categories.
	(iv) International aid: agencies; advantages; limitations; the need for re-orienting aid; aid vs. self-reliance. International aid – advantages and disadvantages; Types of Aid: Tied and Untied Aid - advantages and limitations of each.

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