Syllabus For
Ph.D. Entrance Test

of

Department of Environment, Sustainability and Climate Change (DESCC), 2024-25

Islamic University of Science & Technology
Awantipora-192122, Kashmir

Ph.D. Entrance test syllabus offered by the Department of Environment, Sustainability and Climate Change

Part A. This section will be compulsory for all candidates.

Part B. This section will include questions from five units. Unit-1 will be compulsory, and candidates will have the option to answer questions from any two of the following units: Unit-2, 3, 4, 5.

Part A. Research Methodology (35 marks)

Research Fundamentals, Aims and Objectives of Research, Types of Research: Basic, Novel and Applied Research. Tools for Searching a Research Topic: Books, Journals, Internet, Discussions, Research Hypothesis; Steps in Research Design. Publication of Research, Plagiarism, Intellectual Property Rights. Quality of Research Work and Papers Indexing, Impact Factor, Citation Index, H Index. Web Resources.

Basic Knowledge of Computers and Software. General Awareness of Computer Hardware, CPU and other Peripheral Devices (Input/Output and Auxiliary Storage Devices), Primary and Secondary Memory. Basic Knowledge of Software and Programming Languages. Introduction to Artificial Intelligence.

Concept of Data: Types of Data. Mean, Median, Mode, Standard Deviation, Standard Error and Variance of Data, Correlation Coefficient and Regression Analysis, Knowledge-about Statistical Software's.

Part B. Core Paper (35 Marks)

Unit 1. Global, regional and local environmental scenario (15 Marks)

The Paris Agreement, The United Nations Framework Convention on Climate Change (UNFCCC), The Kyoto Protocol, The Montreal Protocol, Ramsar Convention on Wetlands, Stockholm Convention on Persistent Organic Pollutants (POPs), CITES-Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention on Biological Diversity (CBD), Bonn Convention on the Conservation of Migratory Species of Wild Animals, Vienna Convention for the Protection of Ozone Layer.

A glimpse of Environmental regulation and Clearance frame work regime in India, Dates of enactment of National Biodiversity Authority (NBA) of India, Environment Protection Act, Wildlife Protection Act, Forest Conservation Act, Biodiversity Act of India.

Protected Areas of J&K, Important environmental issues of J&K, Forest & Wildlife conservation regime in J&K, Eco-tourism, Ecological degradation and conservation mechanism of water bodies of J&K, Dates of enactment of various acts and Rules having bearing on human environment including J&K Development Act, Srinagar Metropolitan Region Development Act, J&K Minor Mineral Concession Rules, J&K State Water Resources (Regulatory) Act, J&K Fisheries Act.

Unit 2. Environmental Monitoring and Assessment (10 Marks)

Air Pollution: Sources and Classification: Primary vs. Secondary Pollutants, Pollutant's behavior in Atmosphere. Key Issues: Smog, Acid Rain. Pollutant Standards and Control Monitoring of SO_X, NO_X, CO, SPM and Hydrocarbons using Bio-filters and other Methods. Noise Pollution: Sources, Measurement standards, Impacts on Health and Control. Thermal Pollution: Causes, Environmental Effects and Abatement Strategies. Soil Pollution: Industrial Effluents, Pesticides and Heavy Metals; Impacts like Erosion, Desertification and Reduced Soil Fertility; Conservation Practices. Water Pollution: Lake Eutrophication, Marine and Groundwater Contamination from Biocides, Heavy Metals and Petroleum Hydrocarbons; Restoration and Pollution Abatement with Microbes and Aquatic Plants.

Unit 3. Biodiversity and its Conservation (10 Marks)

Biodiversity: Concept, Levels and Threats. Importance of Biodiversity for Ecosystem Functioning and Services. Biodiversity Hotspots, Endemism. Endangered Medicinal Plants of J&K. Overexploitation, Climate Extremes, Invasive Species. Energy Flow, Food Web, Nutrient Cycles. Ecological Succession, Population Dynamics, Carrying Capacity, Ecological Niche. Ecosystem Resilience and Adoption to Climate Change, Symbiosis, Predation, Competition, Biodiversity Assessment Conservation Strategies: *In-Situ* and *Ex-Situ* Conservation, Indigenous Knowledge of Biodiversity Conservation, Community Participation, Role of Local Institutions in Biodiversity Conservation. Concept of Biodiversity Credits.

Unit 4. Water Resource Management (10 Marks)

Hydrology, Water Cycle, Measurement of surface flow, Precipitation, Evaporation, Infiltration, and Runoff, Groundwater Recharge and Discharge, Conservation of Mass, Momentum and Energy, Hydrograph analyses, Floods, Types of floods and droughts. Watershed hydrology, water balance, aquifers, Water resources planning and management, Irrigation Engineering, Design of water resources and irrigation structures, River training works, Dams, reservoirs, Contaminant transport. Use of Remote sensing and GIS models in hydrological disasters.

Unit 5. Climate Change (10 Marks)

Origin, Structure and Composition of Atmosphere, Virtual/Potential Temperature, Lapse Rate, Factors controlling insolation; heat budget of the atmosphere. Horizontal and vertical distribution of temperature; Inversion of temperature. Greenhouse effect and importance of ozone layer Reducing Greenhouse Gas Emissions, Renewable Energy Technologies, Energy Efficiency and Conservation and Carbon Sequestration.

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