Sikkim Manipal University Ph D Entrance_ May 2026

Subject: Environmental Science

Module I: Introduction to Environment

- Definition, principles and scope of Environmental Science.
- Structure and composition of atmosphere, hydrosphere and lithosphere
- Structure and functions of ecosystem: Abiotic and Biotic components, energy flows, food chains, biogeochemical cycles

Module II: Environmental Chemistry

Chemical Composition of air: Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matter. Chemical processes for formation of organic particulate matter. Chemical and photochemical reactions in the atmosphere. Oxygen and ozone chemistry, Chemistry of air pollutants, Photochemical smog.

Water Chemistry: Chemistry of water, concept of DO, BOD and COD. Drinking water treatment and wastewater treatment

Module III: Biodiversity Conservation

Biodiversity and its conservation: Definition of biodiversity, Genetic Species and Ecosystem biodiversity, species richness & species evenness, Hotspots of Biodiversity, why to conserve biodiversity? – ethical, aesthetic, utilitarian & scientific reasons. Rare, vulnerable, endangered and extinct species. How can we prevent species extinction? In-situ biodiversity conservation through Protected Areas, Ex-situ biodiversity conservation – seed banks, cryopreservation, field gene banks, zoos and botanical gardens.

Module IV: Global Environmental Issues

Global warming – what is green-house effect? Name and characteristics of important green-house gases, sources and impact of green-house gases, effects of global warming, adaptation strategies towards global warming, prevention from global warming, Kyoto Protocol.

Ozone depletion – Chemical mechanisms of ozone depletion, ozone depleting substances, mechanisms of ozone depletion in Antarctica, effects of ozone depletion, prevention of ozone depletion, Montreal Protocol

Acid rain: What is Acid Rain? Mechanisms and condition of formations of acid droplets in Atmosphere. Effects of acid rain on humans, assets and aquatic ecosystems. Prevention of acid rain.

Module V: Environmental Hazards

Explain earthquake. Causes behind earthquake. Seismic focus and epicenter. Different types of seismic waves. Locating the Epicenter. Seismograph. Richter scale. Types of earthquakes. Seismic zones of the world. Earthquake areas of India.

Flood Hazards: Streams and sediment transport. Stream velocity, gradient and base level. Stream discharge. Channel and floodplain evolution. Flooding. Factors governing flood severity. Flood characteristics. Consequences of development in floodplain. Strategies for reducing flood hazards.

References:

1. Environmental Science *Working with the Earth* by G. Tyler Miller, Jr.
2. Environmental Chemistry by Anil Kumar De
3. Introduction to Environmental Engineering and science by Gilbert M. Masters
4. Fundamentals of Ecology by Eugene P. Odum and Garry W. Barrett
5. Environmental Geology by Carla Montgomery
6. Biological Science by Taylor & Green
7. Environmental Geology by Murck, Skinner and Porter