

## Environmental Management (EM)

**Ecology & Environment:** Nature of ecosystems, Energy flow in ecosystems-energy fixation by Autotrophs - Energy beyond the producers, Biogeochemical cycles and ecosystems, Ecology of populations - population growth - age structure - equilibrium level, Dynamics of ecological communities.

**Microbiology:** Major characteristics of microorganisms - bacteria - Fungi, molds and yeasts - algae - protozoa - Viruses. Cultivation of microorganisms- aerobic and anaerobic cultivation, isolation, enumeration and preservation of microorganisms. Control of microorganisms - physical and chemical agents. Microorganisms in aerobic & anaerobic biological waste treatment- major groups of microbes and their role. Microorganisms, growth kinetics- bacterial growth curve, various phases of growth, growth rate and doubling time.

**Environmental Chemistry:** Basic concepts and scope of environmental chemistry - Environmental Segments.

Atmosphere - Structure - Chemical and photo chemical reactions - and ozone chemistry - green house effect.

Hydrosphere - hydrologic cycle-chemistry of water and waste water. Lithosphere - micro and macro nutrients - Wastes and pollution of soil, air and water. Environmental effects of pollution - Health effects of pollution.

**Pollution Control Engineering:** Solid, Liquid and Gaseous Wastes, Various Pollutants and their Harmful effects. Water quality, water purification systems. Waste water characteristics, Primary / Secondary treatment methods. Air Pollution control methods.

**Geospatial technology:** Origin and age of the earth, internal Constitution of the earth, Geological processes - Exegetic and endogenic, ligneous, metamorphic and sedimentary rocks, distinguishing features of these three types of rocks, basic principle of structural geology, geology of dams and reservoirs. Geomorphic cycle, geomorphic agents, definition of weathering, types of weathering physical and chemical, definition of erosion and denudation, cycle of erosion, landforms created by geomorphic agents. Map terminology: map reading, topographic map, conventional symbols, locating points, and map projections and classification of maps. Aerial photogrametry: Definition, photo scale, classification of Ariel photographs, Air photo interpretation key elements, photo grammetric terminology. Remote Sensing: Electromagnetic energy, Electromagnetic spectrum, various satellites and sensors, latest advancements in satellite remote sensing, General knowledge on Indian remote sensing Programmes.

**Elementary Mathematics, Statistics and Computer Science:** Solutions of simultaneous linear equations, quadratic equations, progressions, Perambulations and combinations, concepts of matrices and determinants. Sample mean and variance, random variable, distributed and continuous distributions, mean and variance of distribution, correlation, coefficient, confidence intervals, goodness of fit, test, pairs of measurements, fitting straight lines. Introduction to computers and programming: components of computers, characteristics of computer, modes of operation, type of computer algorithms, flowcharts, programming languages, operating systems, fundamentals of C, structure of C, variables and constants, arithmetic and logical expression

**Fundamentals of Surface hydrology:** Hydrologic Cycle - Precipitation: Different types and forms of precipitation and their mechanism. Rain gauges. Evaporation and Transpiration: Concepts, measurements and factors affecting evaporation and transpiration. Infiltration - Concept, measurement and factors affecting infiltration, runoff, Definition and factors affecting runoff, stream gauging - computation of run-off.

**Fundamentals of Ground water hydrology:** Occurrence of ground water in consolidated and unconsolidated formations - Types of aquifers. Properties: Porosity, Specific Yield, Storativity, Hydraulic conductivity and transmissivity - Darcy's Law, Ground Water management - artificial recharging methods. Types of wells, Open wells, Tube wells, Construction of wells. National water Resources Problems with reference to the environment of major river valley projects.

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