

Credit distribution, Eligibility and Pre-requisites of the Course GE-8

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
GE-8 Groundwater management and water quality (L3, P1)	4	3	0	1	12th Pass	Nil

Learning Objectives

To understand about the fundamentals of: groundwater management and water quality issues.

Learning outcomes

The course will impart basic understanding about: groundwater science; aquifers; groundwater flow and groundwater management principles and practices. The concepts of water quality; water quality parameters and criteria for portable and irrigation use; contamination and pollution and graphical representation of the water quality data.

SYLLABUS OF GE-8

Theory (45 hours)

UNIT – I (10 Hours)

Geodiversity, Geoheritage, Geoconservation and their relationship to geotourism. Concept of Water science and its societal relevance, Hydrologic cycle and interaction of the surface and subsurface water, Vertical distribution of subsurface water.

UNIT – II (10 hours)

Detailed contents

Introduction to the concept of porosity and permeability, classification of rocks and sediments as aquifer, aquitard, aquiclude and aquifuge. Types of Aquifer, concept of the piezometric surface and water table and aquifer parameters.

Introduction to Darcy's law and the concept of : static water level, pumping water level, drawdown, radius of influence, cone of depression, specific capacity etc.

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UNIT – III (13 Hours)

Detailed contents

Introduction to: the basic concept of water balance and the groundwater resources estimation; principles of the groundwater management; rainwater harvesting and artificial recharge to groundwater; aspects of watershed management as an integral part of groundwater management .

UNIT – IV (12 Hours)

Detailed contents

Introduction to the concept of water quality, contamination, pollution and water quality parameters: Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), organoleptic; physical; chemical; radioactive and bacteriological parameters.

The criteria for portable and irrigation use and graphical representation of the water quality data.

Practical (30 hours)

Preparation and interpretation of water level contour maps and depth to water level maps. Graphical representation of chemical quality data and water classification (Trilinear diagrams). Fundamental exercise on groundwater resources estimation. Basic fundamental exercises on aspects related to designing rainwater harvesting and artificial recharge structures.

Essential/recommended readings

Todd, D. K. (1980). *Groundwater hydrology*, 2ed. John Wiley. (p. 535).

Karanth K.R., 1987, *Groundwater: Assessment, Development and management*, Tata McGraw- Hill Pub. Co. Ltd.

Suggestive readings

Freeze, R. A., & Cherry, J. A. (1979). *Groundwater* (p. 604). *New Jersey: Prentice Hall Inc Englewood cliffs.*

Syed Tajdarul Hassan. 2017. *Introduction to Hydrology*. E-PG Pathshala, UGC, MHRD, Govt. of India.