

<b>5<sup>th</sup> Semester</b>	<b>REV5D005</b>	<b>Ground Water Contamination</b>	<b>L-T-P 3-0-0</b>	<b>3 Credits</b>
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**Module I:**

**Introduction** Ground water and the hydrologic cycles-Ground water as a resource-Ground water contamination-Ground water as a geotechnical problem-Ground water and geologic processes-Physical properties and principles-Darcy's law-Hydraulic head and fluid potential-Piezometers and nests.

**Module II:**

**Occurrence and movement of ground water** Hydraulic conductivity and permeability-Homogeneity and anisotropy-Porosity and voids ratio-Unsaturated flow and the water table-Steady state flow and transient flow-Compressibility and effective stress-Transmissivity and storability-Equations of ground water flow -Limitations of Darcian Approach-Hydro dynamic dispersion.

**Module III:**

**Resource evaluation** Development of ground water resources-Exploration of Aquifers-The response of ideal aquifers to pumping-Measurement of parameters-Laboratory tests-Numerical simulation for aquifer yield prediction-Artificial recharge and induced infiltration-Land subsidence-Sea water intrusion.

**Module IV:**

**Chemical properties and principles** Constituents-Chemical equilibrium-Association and dissociation of dissolved species-Effects of concentration gradients-Mineral dissolution and solubility-Oxidation and reduction process-Ion exchange and adsorption-Environmental isotopes-Field measurement of index parameters-Chemical evolution-Ground water in carbonate terrain-Ground water in crystalline rocks-Ground water in complex sedimentary systems-Geotechnical interpretation of <sup>14</sup>C dates-Process rates and molecular diffusion.

**Module V:**

**Solute transport** Water quality standards-Transport process-Non reactive constituents in homogeneous media-Transport in fracture media-Hydro chemical behaviour of contaminants-Trace metals-Nitrogen-Trace non metals-Organic substances-Measurement of parameters-Velocity-Dispersivity-Chemical partitioning-Sources of contamination-Land disposal of solid waste-Sewage disposal on land. USGS-Moc model: Modelling principles-MOC modelling.

**Books:**

1. Randall J. Charbeneau-Ground water Hydraulics and Pollutant Transport, Prentice Hall. Inc, 1999
2. Remson I., Hornberger G.M. and Moltz F.J., "Numerical Methods in Subsurface Hydrology", Wiley, New York, 1971
3. Allen Freeze R. and John A. Cherry "Ground water. Prentice Hall. Inc, 1979
4. Raghunath, H.M., Ground Water, 2nd edition, Wiley Eastern Ltd., New Delhi, 1987.
5. Rushton K.R., "Groundwater Hydrology" Conceptual and Computational Models, Wiley, 2003
6. Elango L. and Jayakumar, R. "Modelling in Hydrology", Allied Publishers Ltd., 2001