



Unit I

This unit introduces the fundamentals of groundwater hydrology, emphasizing the hydrologic cycle and the role of groundwater as a vital natural resource. Students learn about the occurrence of groundwater in various geological formations, types of aquifers, and related hydrogeological terms such as porosity, permeability, specific yield, and storativity. The unit also covers Darcy's law and its applications in understanding groundwater flow and movement through porous media.

Unit II

This section focuses on the principles governing groundwater flow within aquifers. It explains steady and unsteady flow to wells, confined and unconfined aquifers, and the analysis of flow nets. Students study well hydraulics, including drawdown, yield, and recovery tests, which are essential for determining aquifer characteristics. The concepts of homogeneity, anisotropy, and transmissivity are also discussed to provide a scientific basis for aquifer evaluation.

Unit III

Students learn various exploration methods such as geological mapping, geophysical surveys, and remote sensing techniques for identifying potential groundwater zones. The unit further details the design, construction, and development of open wells and tube wells, including casing, screening, gravel packing, and efficiency testing. Emphasis is placed on well performance, maintenance, and multi-well systems for sustainable extraction.

Unit IV

This unit highlights the growing need for artificial recharge due to groundwater depletion. It explores techniques like recharge wells, percolation tanks, recharge trenches, and rainwater harvesting systems. The concept of conjunctive use of surface and groundwater resources is introduced, emphasizing the balance between availability and sustainable utilization.

Unit V

The final unit focuses on groundwater quality assessment and pollution control. Students examine chemical and physical characteristics, contamination sources, and problems such as salt-water intrusion in coastal aquifers. The unit concludes with an introduction to groundwater flow modelling, using analytical and numerical methods to simulate aquifer behaviour, along with case studies on groundwater management and sustainability.