

HYDROGEOLOGY AND GROUND WATER MANAGEMENT

UNIT I

Hydrogeology : - Introduction - **Origin**: Meteoric, Juvenile and Connate waters – Hydrogeological Cycle: **Occurrence**: Groundwater occurrence in igneous, sedimentary and metamorphic rocks – Vertical distribution of groundwater in hard rock regions – Water bearing properties of rocks: Porosity, Permeability, Specific yield, specific retention, Transmissibility and storage coefficient. Geologic formations as aquifers; Types of aquifers; Movement of Groundwater – Laminar and turbulent flow – Darcy's law and its applications; Determination of Permeability in the laboratory and in the field.

UNIT 2

Groundwater Detection: **Surface Methods**: Geomorphological, Structural and Biological evidences – **Subsurface Methods**: Applications and limitations of Geophysical methods in groundwater targeting - Detailed account of principles, field procedure, electrode arrangements, instruments and interpretation of resistivity data. Brief study of Electrical Well-logging method of groundwater detection - Application of remote sensing methods in groundwater exploration

UNIT 3

Well Design and Well development: Brief introduction about Dug wells, Tube wells, Jetted wells, Infiltration Galleries and Collector wells. Design of Tube well, Well Screening and Artificial Packing – Well development through pumping, Bridging, Surging with air, Back washing, Acidizing – Method of sealing of poor quality wells, Sealing of top, intermediate and bottom zones in tube wells.

Fluctuations of groundwater levels; causes and control, Features of Re-charge and discharge areas; Re-charge methods and practices.

UNIT 4

Pump Tests: Methodology and need for pump test – Testing of flowing wells: Theim's Method, Theis's method, Jacob's method, Chow's method - Evaluation of aquifer parameters through Pump Tests - Estimation of water flow from vertical and horizontal Well-pipes – Hydraulic conductivity and field methods for determining the Hydraulic conductivity below the water table.

Groundwater basins; data collection for basin investigations – Water balance studies – Safe yield and overdraft. Conjunctive use of surface and groundwater reservoirs, Sea water intrusion in Coastal areas and its prevention Groundwater province of India –

UNIT 5

Water Quality: Geochemical method of groundwater exploration - Quality of water in various rock types – Water quality parameters and their standards for domestic, industrial and irrigation purposes. Physical tests for determining water quality – Chemical tests for estimation of water quality – graphical representation of water quality – Diseases and Virological aspects of underground water and remedial measures.

Groundwater problem in mining, a case study from Neyveli. Rain water harvesting and management.

Text Books:

1. Todd, D.K. 1959 Ground water Hydrology. John Wiley & Sons.
2. Davis, S.N. & Dewiest 1966 Hydrogeology, John Wiley & Sons. Dewiest R.J.M.
3. Regunath, H.M. 1983 Ground water, Wiley Eastern.
4. Gautam Mahajan- 1989: Evaluation and Development of Groundwater, Ashish Publishing House.
5. Ramakrishnan. S: 1998 – Ground water –By Author.

Reference Books:

1. Tolman., G.F. 1937 Ground water McGraw Hill. New York.
2. Walton, W.C. 1970 ground water Resources evaluation McGraw Hill.
3. Karanath, K.R. 1987 ground water Assessment Development & management Tata McGraw Hill