

Objective

To acquaint and equip with the occurrence, development, hydraulics of groundwater flow and groundwater pumping

Theory

UNIT I

Properties affecting groundwater storage and movement, Groundwater balance studies.

UNIT II

Well hydraulics, Two dimensional flow, Steady and unsteady state flow in confined, unconfined and semi-confined aquifers, Steady flow in sloping aquifers, Partial penetrating wells, Analysis of multi-aquifers.

UNIT III

Flow analysis in interfering wells. Pumping tests and determination of aquifer parameters.

UNIT IV

Groundwater modeling for water resources planning, Techniques for groundwater recharge.

UNIT V

Principle and performance characteristics of centrifugal pump, Vertical turbine pump, Submersible pump and axial flow pump. Non-conventional energy sources for pumping, Solar pumps, Hydraulic ram, Design criteria of pumping station, Techno-economic evaluation, energy conservation measures for pumping systems

Practical

Water table contour maps and determination of groundwater flow, estimation of aquifer characteristics, problems on non leaky and leaky aquifers, analysis of pumping test data; Computation of interference of wells; groundwater computer simulation models.

Suggested Readings

Boonstra J & de Ridder NA. 1981. Numerical Modeling of Groundwater Basins. ILRI.

Domenico PA. 1972. Concept and Models in Groundwater Hydrology. McGraw Hill.

Hantush MS. (Ed.). 1964. Advances in Hydro Sciences. Vol. I. Academic Press.

Harr ME 1990. Ground Water and Seepage. Wiley Eastern. Huisman L. 1972. Groundwater Recovery. MacMillan.

Polubarinova Kochina P Ya 1962. Theory of Ground Water Movement. Princeton Univ. Press.

Raghunath HM. 1992. Ground Water. Wiley Eastern. Todd DK. 1997. Ground Water Hydrology. Wiley Eastern.