B.Tech IV Year	L	T	P	To	C
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CE433 GROUND WATER DEVELOPMENT & MANAGEMENT

(Dept. Elective - III)

Course Description and Objective:

The student is expected to have thorough knowledge on occurrence and movement of ground water, analyzing the data of pumping test and artificial recharge of ground water at the end of the course.

Course Outcomes:

- *Evaluate groundwater resources using geophysical methods*
- *Estimate aquifer parameters*
- *Model regional groundwater flow and design water wells*
- *Design water wells*

UNIT – I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT – II

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions, derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT – III

Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well.

UNIT – IV

Analysis of Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jocob and Chow's simplifications, Leak aquifers. Surface and Subsurface Investigation: Surface methods of

exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT – V

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies. Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.,Groundwater Basin Management: Concepts of conjunction use, Case studies.

TEXT BOOKS:

1. David Keith Todd, “Ground water Hydrology”, 6th ed., John Wiley & Son, New York, 2001.
2. H.M.Raghunath, “Groundwater”, 5th ed., Wiley Eastern Ltd., 2002.

REFERENCES BOOKS:

1. R.Willes & W.W.G.Yeh, “Groundwater System Planning & Management”, 4th ed., Printice Hall, 1998.
2. C.W.Fetter, “Applied Hydrogeology”, 7th ed., CBS Publishers & Distributers, 2002.