

**4/4 B.Tech. EIGHTH SEMESTER**

**CE8T3C GROUND WATER DEVELOPMENT AND MANAGEMENT**

**Credits: 3**

**Lecture: 3 periods/week**

**Internal assessment: 30 marks**

**Tutorial: 1 period /week**

**Semester end examination: 70 marks**

**Pre-requisites:** Water resources engineering, hydraulics and hydraulic machinery, geology

**Learning objectives:**

- To know the general framework of aquifer characterization
- To get introduction to concept of a trans boundary aquifer
- To know the use of geographical information systems for ground water information sharing

**Course outcomes:**

At the end of course the student will be able to:

1. Determine the ground water potential of an area
2. Analyse ground water movement and design ground water extraction structures.
3. Conduct pumping tests to determine aquifer parameters
4. Plan for ground water management including recharge of ground water and prevention of sea water intrusion.

**UNIT – I**

**GROUND WATER MOVEMENT**

Ground water hydrologic cycle, origin of ground water, rock properties effecting 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. 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 – II**

**ANALYSIS OF PUMPING TEST DATA**

Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications, Leak aquifers.

**UNIT – III**

**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 – IV**

**GROUNDWATER BASIN MANAGEMENT**

Concepts of conjunction use, Case studies.

**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.

**UNIT – V**

**SALINE WATER INTRUSION IN AQUIFER**

Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.

**Learning resources:**

**Text books:**

1. Ground water Hydrology, (2<sup>nd</sup> edition) by David Keith Todd, John Wiley & Sons, New York, 1977.
2. Ground water by Raghunath H.M., Wiley Eastern Ltd, Delhi, 1989.

**Reference books:**

1. Ground water, (2<sup>nd</sup> edition) by Bower J.A., John Wiley & Sons, 1980.
2. Groundwater System Planning & Management by Willes R. and Yeh W.W.G., Prentice Hall, 1987.
3. Applied Hydrogeology by Fetta C.W., CBS Publishers & Distributors.

**e-learning resources:**

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in>