

## GROUND WATER DEVELOPMENT

### Course Learning Objectives:

- Appreciate groundwater as an important natural resource.
- Understand the principles involved in design and construction of wells.
- Create awareness on improving the groundwater potential using various recharge techniques.
- Know the importance of saline water intrusion in coastal aquifers and its control measures.
- Appreciate various geophysical approaches for groundwater exploration.

### Course Outcomes:

Upon successful completion of the course, the student will be able to:

- Estimate aquifer parameters and yield of wells.
- Design wells and understand the construction practices.
- Determine the process of artificial recharge for increasing ground water potential.
- Take effective measures for controlling saline water intrusion.
- Interpret geophysical exploration data for scientific source finding of aquifers.

### Syllabus

#### UNIT – I

##### Introduction

Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

##### Well Hydraulics

Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow's methods, Leaky aquifers.

#### UNIT – II

##### Well Design

Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

#### UNIT III

##### Well Construction and Development

Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open-hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

#### UNIT - IV

##### Artificial Recharge

Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.

### **Saline Water Intrusion**

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

### **UNIT – V**

#### **Geophysics**

Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

#### **Text Books:**

1. Groundwater, Raghunath H M, New Age International Publishers, 2005.
2. Groundwater Hydrology, Todd D.K., Wiley India Pvt Ltd., 2014.
3. Groundwater Hydrology, Todd D K and L W Mays, CBS Publications, 2005.

#### **References:**

1. Groundwater Assessment and Management, Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. Groundwater Hydrology, Bouwer H, McGraw Hill Book Company, 1978.
3. Groundwater Systems Planning and Management, Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. Groundwater Resources Evaluation, Walton W C, McGraw Hill Book Company, 1978.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	2	3	2	3	3	1	1	1	2	2	3	1	1
<b>CO2</b>	3	3	2	3	2	3	3	1	1	1	1	3	3	2	2
<b>CO3</b>	3	3	2	3	3	2	3	1	3	3	2	3	3	2	2
<b>CO4</b>	3	3	3	3	3	3	3	1	3	3	3	2	3	3	1
<b>CO5</b>	3	3	3	3	3	3	3	2	2	3	3	2	3	3	3