Course-VII-: Ground Water: Geology & Exploration

CO1- To have fundamental knowledge on the occurrences of the ground water, and its application in the irrigation and domestic purposes
CO2- To be able to use suitable data to calculate the exploitable storage, specific yield and specific retention of an aquifer.
CO3- To have thorough knowledge of the the types of rock that usually make good aquifers, and assess how good an aquifer a rock could be, given its porosity and hydraulic conductivity.
CO4- To be able to distinguish between unconfined and confined aquifers, and recognize conditions in confined aquifers that will produce a flowing artesian well.

Unit-I

Introduction: Definition of Hydrology, Hydrogeology, Scope and application of Hydrogeology. Hydrological Evaporation, Condensation, Precipitation, Infiltration, Transpiration. Evapotranspiration. runoff, connate water.

Ground Water: Origin, Occurrence, and age of groundwater, Vertical distribution of sub-surface water, zone of aeration-soil water, vadose water, capillary fringe. Zone of saturation - water table. Perched water table. Recharge and discharge areas.

UNIT-II

Aquifers: Definition of aquifer, Aquitard, Aquclude, Aquifuge. Properties of Aquifer - porosity, retension of water in rocks, yield of water from rocks (specific yield and specific retension), Darcy's law, permeability, hydraulic conductivity, velocity of groundwater flow, storage co-efficient. Types of aquifers: confined, semi-confined, unconfined. Homogeneous, Heterogeneous. Isotropic and Anisotropic aquifers. Igneous, sedimentary and metamorphic rocks as aquifers.

UNIT-III

Quality of Ground Water: Physical, chemical and Biological characteristics of groundwater. Suitability of groundwater for drinking, Irrigation and industrial purposes. Pollution of Ground Water; Pollution in relation to urban, industrial and Agricultural sources. Brief account of saline water intrusion.

UNIT – IV

Ground Water Investigations: Scope of investigations, Methods of groundwater explorations, Brief account of Geologic, hydrogeologic, Geobotanical investigations, Introduction to Remote Sensing techniques. Geophysical Exploration: Basic principles of Geophysical exploration methods; Electrical methods -

Schluntberger and Wenner configuration, Resistivity profiling and Vertical Electrical Sounding.

Unit-V

Management Of Groundwater: Groundwater balance, recharge, (natural and artificial) and discharge. Safe, yields and over draft. Cojunctive use of surface and groundwater. Utilization of groundwater. Groundwater resource evaluation-water table fluctuation method and rainfall infiltration method. Ground water provinces of India. Concept of water shed management.

Text Books:

1. Groundwater hydrology - Todd
2. Hydrogeology - Davis and Dewiest
3. Hydrogeology - Karanth
4. Groundwater Assessment - Development and Management - Karancth
5. Apphed Hydrogeology - Fetter.
6. Applied principles of Hydrogeology - Mannings.

Lab VII- Ground Water: Geology & Exploration (50 Marks)

- Study of hydro-geological models,
- Estimation of porosity and permeability from the given data;
- Preparation and interpretation of water table maps.