

# CE506PC: Hydrology and Water Resources Engineering

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B.Tech. III Year I Sem. L T P C  
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## Course Objectives:

This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle. and its components. Further it will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.

## Course Outcomes:

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

- Understand the different concepts and terms used in engineering hydrology.
- To identify and explain various formulae used in estimation of surface and Ground water hydrology components
- Demonstrate their knowledge to connect hydrology to the field requirement.

## UNIT - I

Introduction: Concepts of Hydrologic cycle, Precipitation: Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area- duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

## UNIT - II

Abstractions from precipitation:

Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Run off: Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of

estimating runoff, Flow duration curves, Mass curve of runoff – Analysis, concepts of watershed management.

### **UNIT - III**

Hydrographs: Hydrograph –Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Unit Hydrograph, definition, limitations and applications and Unit hydrograph, S-hydrograph, Synthetic Unit Hydrograph.

### **UNIT - IV**

Groundwater Hydrology: Occurrence, movement and application of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

Crop water requirements – Water requirements of crops – crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zones oil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, Micro irrigation.

### **UNIT - V**

Canal systems: alignment of canals, canal losses, estimation of design discharge. Design of channelsrigid boundary channels, alluvial channels. canal outlets: non-modular, semi modular and modular outlets. Canal outlets non-modular, semi-modular and modular outlets. Waterlogging: causes, effects and remedial measures. Lining of canals-Types of lining-Advantages and disadvantages. Drainage of irrigated lands- necessity, methods.

### **TEXT BOOKS:**

- Hydrology by K. Subramanya (Tata McGraw-Hill).
- Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers.
- G L Asawa, Irrigation Engineering, Wiley Eastern.

### **REFERENCE BOOKS:**

- Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill).
- Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications).
- Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
- Elements of Water Resources Engineering by K.N. Duggal and J.P. Soni (New Age International).

- Manual on Storm Water Drainage System- 2019, CPHEEO New Delhi.