III Year - I Semester | **L T P C**
20CE5314 | **3 0 0 3**

ENGINEERING HYDROLOGY
(For CE)

Course Learning Objectives:

- Introduce hydrologic cycle and its relevance to Civil engineering.
- Make the students understand physical processes in hydrology and components of the hydrologic cycle.
- Provide an overview and understanding of Unit Hydrograph theory and its development.
- Understand flood frequency analysis, design flood, flood routing.
- Appreciate the concepts of groundwater movement and well hydraulics.

Course Outcomes:

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

- Understand the theories and principles governing the hydrologic processes.
- Quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
- Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
- Recommend proper flood control method and carry out frequency analysis.
- Determine aquifer parameters and yield of wells.

Syllabus

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

UNIT-II

Abstractions from Precipitation: Initial abstractions.

Evaporation: factors affecting, measurement, reduction

Evapo transpiration: factors affecting, measurement, control

Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

Runoff: Catchment characteristics**,** Factors affecting runoff, components, computation-empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

UNIT-III

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall Hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, Principle of Superposition & S-Hydrograph methods, limitations and applications of unit hydrograph, Synthetic unit hydrograph.

Rainfall-runoff Modelling, instantaneous unit hydrograph (IUH) - conceptual models - Clark and Nash models, general hydrological models.

UNIT-IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT-V

Groundwater: Occurrence, Types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

Text Books:

1. Engineering Hydrology, Jayarami Reddy, P., Laxmi Publications Pvt. Ltd., (2013), New Delhi
2. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P) Ltd.
3. Engineering Hydrology Subramanya K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi

References:

1. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.
2. Applied hydrology, Chow V. T., D. R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
3. Water Resources Engineering, Mays L.W, Wiley India Pvt. Ltd, (2013).

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