



ENGINEERING HYDROLOGY (SYLLABUS)

Course Code	23CE3502	Year	III	Semester	I
Course Category	Professional Core	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	20CE3301 - Mechanics of Fluids
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

1. Understand hydrologic cycle and its relevance to Civil engineering.
2. Learn physical processes and their interactions in hydrology.
3. Learn measurement and estimation of the components of hydrologic cycle.
4. Have an overview and understanding of Hydrographs.
5. Learn flood frequency analysis, design flood and flood routing methods.
6. Study the concepts of groundwater movement and well hydraulics.

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Understand the fundamentals of engineering hydrology and precipitation, and analyze rainfall data for hydrologic applications.	L3
CO 2	Analyze abstractions in the hydrologic cycle such as evaporation, infiltration, and evapotranspiration, and their impact on surface and groundwater systems.	L3
CO 3	Apply runoff estimation methods and hydrograph analysis to model surface flow and support flood prediction.	L3
CO 4	Perform statistical flood frequency analysis and suggest appropriate flood management strategies.	L4
CO 5	Apply the principles of aquifer properties and use Darcy's law and Dupuit's equation to analyze groundwater flow in confined and unconfined aquifers.	L3

Course Articulation Matrix:

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



Syllabus

Unit No	Content	Mapped COs
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)	CO1
II	Abstractions: Initial abstractions, Evaporation: factors affecting, measurement, estimation, reduction, Evapotranspiration: factors affecting, measurement, estimation, control. Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.	CO1, CO2
III	Runoff: Factors affecting runoff, components, empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. 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 and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph, introduction to IUH.	CO1, CO3
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.	CO3, CO4
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 an open well- recuperation test.	CO2, CO5



Learning Resource(s)	
Text Book(s)	
1. ‘Engineering Hydrology’ by Subramanya, K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi. 2. ‘Engineering Hydrology’ by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd., (2013), New Delhi 3. ‘Applied hydrology’ by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi. 4. ‘Engineering Hydrology’ by Ojha C.S.P, R. Berndtsson and P. Bhunya, Oxford University Press, (2010).	
Reference Book(s)	
1. ‘Water Resources Engineering’, Mays L.W, Wiley India Pvt. Ltd, (2013). 2. ‘Hydrology’ by Raghunath. H.M., New Age International Publishers, (2010) 3. ‘Engineering Hydrology – Principles and Practice’ by Ponce V.M., Prentice Hall International, (1994) 4. ‘Hydrology and Water Resources Engineering’ by Patra K.C., Narosa Publications, (2011).	
Web Materials:	
1. https://onlinecourses.nptel.ac.in/noc24_ce10/preview 2. https://archive.nptel.ac.in/courses/105/101/105101002/	