

Branch Name:	CIVIL ENGINEERING
Program Code:	ET106
Course Title:	Hydrology and Water Resources Engineering
Course Code:	2ET1060404T
Pre-requisite Course:	Basic knowledge of Hydrology and Surface water.

Course Objectives:

CO- 1 : To demonstrate the process for measurement of precipitation, infiltration, Evaporation

CO-2 : To understand of construction of hydrograph, unit hydrograph and S-Hydrograph

CO-3 : To impart the methodology for estimation of design flood.

CO-4 : To introduce drought management techniques

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
01	Introduction: The hydrologic cycle, history of hydrology, scope and application of hydrology, importance of water resources, need of water resources projects	02	04
02	Precipitation: Types of precipitation, geographical distribution, time distribution, variability, measurement, average depth over area, depth area duration.	04	10
03	Evaporation, Transpiration and Infiltration: - Factor affecting evaporation, measurement of evaporation, evaporation in reservoirs, methods of prevention of evaporation. - Transpiration and its measurement - Basics of Infiltration, factors affecting transpiration, measurement of transpiration	06	14
04	Runoff : Runoff process; relation of storm period and rainfall, factors affecting runoff methods of computation; gauging runoff of stream; stage discharge relationships interpretation of stream flow records.	05	12
05	Hydrograph Analysis: Components of the hydrograph; Separation of base flow, components unit hydrographs, S- hydrographs.	04	10
06	Floods: Causes of floods, methods of estimation of floods. Design floods, damages, flood routing through reservoirs, methods of flood control, flood forecasting and warning.	04	10
07	Groundwater Hydrology: Occurrence and movement of groundwater, surface and subsurface investigation of groundwater, flow through saturated porous medium	03	06
08	Reservoir: Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control.	04	10

09	Drought Management and Water Harvesting: Definition of drought, Causes of drought, measures for water conservation and augmentation, drought contingency planning. Water harvesting: rainwater collection, small dams, runoff enhancement, runoff collection, ponds, tanks	05	12
10	Technological Advancement : Recent development in Water Resources Engineering and Management, Software Applications including remote sensing and GIS, Water Quality Modeling, Innovations in integrated water resources management,	05	12

Reference Books:

1. Hydrology, Ground water and Water Resources Engineering- Santoshkumar Garg, Khanna Publisher.
2. Engineering Hydrology - K. Subramanya, Mc Graw Hill Publication.
3. Applied Hydrology - K N Mutreja, Tata Mc- Graw Hill Company Ltd.
4. Groundwater - Raghunath, H.M., New Age International Publishers.
5. Irrigation Water Resources and Water Power Engineering - Dr. P N Modi, Standard Book House.
6. Application of RS and GIS in Water Resources Management - Dr. Dhruvesh Patel, Lambert Academic Publishing,

Course Learning Outcomes (CLO):

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

1. Provide a background in the theory of hydrological processes and their measurement.
2. Calculate precipitation and its measurement on ground.
3. Find out the quantity of precipitation, transpiration and infiltration based on available data.
4. Calculate potential runoff based on the precipitation occurred.
5. Derive hydrographs based on runoff of a catchment area
6. Estimate the flood forecasting and design flood.
7. Brief concept the groundwater hydrology and its movement in aquifer.
8. Understand the basic ideas of Drought Management and Water Harvesting.

Web Material Links:

<https://archive.nptel.ac.in/courses/105/105/105105110/>

<https://archive.nptel.ac.in/courses/105/103/105103026/>

<https://archive.nptel.ac.in/courses/105/103/105103213/>

Course Learning Outcomes (CLO):

After successful completion of the course the student shall be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Provide a background in the theory of hydrological processes and their measurement	L1 and L2
CLO2	Calculate precipitation and its measurement on ground.	L3 and L4
CLO3	Find out the quantity of precipitation, transpiration and infiltration based on available data.	L5 and L6
CLO4	Calculate potential runoff based on the precipitation occurred.	L3 and L4
CLO5	Derive hydrographs based on runoff of a catchment area	L5 and L6
CLO6	Estimate the flood forecasting and design flood.	L5
CLO7	Brief concept the groundwater hydrology and its movement in aquifer.	L1 and L2
CLO8	Understand the basic ideas of Drought Management and Water Harvesting.	L2

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H	L	H				L				M	M	H	M	
CLO2	H	H	L	M			M					L	M	M	
CLO3	H	M	M	LM	M			L			M	L	H	M	
CLO4	H	L	M	M		M			L		M	M	M	H	M
CLO5	H	H	M			L		M			M	L	M	H	M
CLO6	M	M	M	L							L	M	H		
CLO7	M	M	L			M	L					M	M		
CLO8	M			L	M	M	L				M		M		

H: High, M: Medium, L: Low