

Branch Name:	Civil Engineering
Semester/Year:	Semester V / Third Year
Subject Title:	Hydrology and Water Resources Engineering
Subject Code:	1ET1060501
Pre-requisite:	Knowledge of hydrological cycle and its component, ground water hydrology, Basic ideas about floods, drought, hydropower plants and reservoir.

Course Objective:

- To develop basic understanding about precipitation, infiltration, evapotranspiration, hydrograph, capacity of reservoir.
- To enable the students for estimation of runoff, infiltration, evaporation, floods and reservoir capacity.
- To create understanding about features of various types of dam.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	01	00	04	70	30	-	-	100

Subject Contents				
Sr. No	Topic	Total Hours	Weightage (%)	
1	<u>Introduction:</u> Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	8	20	
2	<u>Hyetograph and Hydrograph Analysis:</u> Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve,	5	10	
3	<u>Ground Water:</u> Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test	5	10	
4	<u>Reservoir:</u> Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control.	4	10	
5	<u>Introduction to Dams:</u> Introduction and types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India	4	10	

6	<u>Hydroelectric Power:</u> Low, Medium and High head plants, Power house components, Hydel schemes.	4	10
7	<u>Flood Management:</u> Indian rivers and floods, Causes of floods, Alleviation, Levees and floodwalls, Floodways, Channel improvement, Flood damage analysis.	4	10
8	<u>Hydrologic Analysis:</u> Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels.	4	10
9	<u>Drought Management and Water Harvesting:</u> 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.	4	10

Course Outcome:

On completion of the course, the students will be able to:

- Compute mean precipitation from a catchment.
- Compute infiltration rate and capacity.
- Calculate runoff from a catchment.
- Compute peak flood flow.
- Compute reservoir capacity using mass curve.
- Compute dependable flow using flow duration curve for the requirement of irrigation, power generation etc.
- Basic idea about reservoir sedimentation and its control.
- Compute the capacity of well.
- Estimation of design flood for the design of hydraulic structure.
- Measures of water conservation to battle drought.

List of Tutorials:

- To determine rate of infiltration and infiltration capacity using double ring infiltrometer.
- Measurement of rainfall.
- Estimation of flood using unit hydrograph.
- Computation of rate of infiltration using infiltrometer.
- Computation of live and dead storage capacity of reservoir.
- Flood routing of reservoir and channel.
- Calculation of dependable flow.
- Determination of capacity of well.
- Calculation of power of a hydro-power plant.

List of Reference Books:

1. K. Subramanya, Engineering Hydrology, Tata McGraw Hill Pub. Co. New Delhi.
2. R.K. Sharma and T.K. Sharma, Hydrology and Water Resources Engineering, Dhanpat Rai Publications, New Delhi.
3. Ven Te Chow, D.R. Maidment and L.W Mays, Applied Hydrology, McGraw Hill International Edition, New York
4. R.K. Linsley, J.B. Franzini, D.L. Freyberg and G. Tchobanoglous, Water Resources Engineering, McGraw Hill Singapore.
5. R.A. Wurbs and W.P. James, Water Resources Engineering, Prentice Hall of India, New Delhi.

E-Resources :

1. <http://nptel.ac.in/>