NIRMA UNIVERSITY

Institute:	**Institute of Technology**
Name of Programme:	**B Tech Civil Engineering**
Course Code:	
Course Title:	**Water Resources Engineering**
Course Type:	**Core**
Year of Introduction:	**2025-2026**

L	T	Practical Component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

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

1. analyse the hydrological cycle and various hydraulic structures (BL4)
2. estimate the rainfall, runoff, and groundwater characteristics (BL6)
3. evaluate water requirements of various types of crops and irrigation methods (BL5)
4. design the gravity and earthen dam. (BL6)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Hydrology Hydrological cycle, rainfall, Infiltration, Evapotranspiration, runoff, hydrograph analysis, Unit hydrograph, and S-curve hydrograph.	10
Unit-II	Ground Water Sources, ground water availability and yield, groundwater withdrawals, type of well, Well irrigation, hydraulics, and capacity of well, aquifer, specific retention, specific yield.	08
Unit-III	Water Requirements of Crops Function of irrigation water, types of soil and water availability, assessment of quantity of irrigation water, depth and frequency of irrigation, duty, delta and factors affecting, consumptive use of water.	06
Unit-IV	Irrigation Necessity, Benefits and ill effects, Methods: Uncontrolled flooding, free flooding, border strip method, contour farming, sprinkler and drip irrigation. Canal design and silt theories, Canal regulation works.	08
Unit-V	River Engineering Stages of river, meandering of river, river training works, land erosion and control, reservoir, barrage, weir.	03
Unit-VI	Dam Engineering Gravity Dam: Forces acting, stability analysis, elementary and practical profile. Earth Dam: Types and causes of failure, protection works.	10

Self-Study: The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/ References:

- Hibbeler, R. C. Text book of Fluid Mechanics, Pearson.
- Subramanya, K. Fluid Mechanics and Hydraulic Machines, Tata McGraw-Hill Publishing Co. Ltd.
- Subramaniya, K. Engineering Hydrology, Tata McGraw Hill.
- Modi P. N., Irrigation Water Resources and Water Power Engineering, Standard Book House.
- Raghunath, H.M. Ground Water, Wiley Eastern.
- Dr P. Jayarami Reddy, A text book of Hydrology, Laxmi Publication (P) Ltd.
- Todd, *Groundwater Hydrology*, John Wiley & Sons.
- Garg S. K., Irrigation and hydraulic structures, Khanna Publishers
- Linsley, R.K. & Paulhus, J.L.H., *Water Resource Engineering*, McGraw Hill Book Co.
- Asawa, G.L. *Irrigation and Water Resources Engineering*, New Age International Publisher.
- Bansal, R. K. A Text Book of Fluid mechanics & Hydraulic Machines, Laxmi Publications.
- Ramamrutham, S. Hydraulic Fluid Mechanics and Fluid Machines, Dhanpat Rai.
- Rajput, R. K. Text book of Fluid Mechanics and Hydraulic Machines, S. Chand & Co.
- Punmia B. C., Irrigation and Hydraulic Structures, Laxmi Publications.

Suggested List of Experiments: Laboratory work will be based on the above syllabus with minimum 8 experiments/exercises to be incorporated. The students in a suitable group size will design and perform one experiment as a part of laboratory work.

Sr. No.	Name of Experiment/Exercise	Hours
1.	Measurement of Rainfall using Non-Recording and Recording Rain Gauges	2
2.	Determination of Infiltration capacity of soil using Single Ring and Double Ring Infiltrometer	4
3.	Measurement of Evaporation using Pan Evaporimeter	2
4.	Hydrograph analysis	4
5.	Determination of Borewell yield and Measurement of Groundwater level	2
6.	Measurement of soil water potential by using a tensiometer	2
7.	Design of a Gravity Dam	6
8.	Design of an Unlined canal for irrigation	6