B. Tech. Civil Engineering				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
CE319: Water Resources Planning and System Engineering	**L**	**T**	**P**	Nil
	3	**0**	**2**	

Course Objective: The objective of the course is to provide students with the knowledge and skills needed to design, plan, and manage water resource systems effectively. The course focuses on understanding the hydrological, economic, and environmental aspects of water resources, integrating principles of sustainability and resilience. Students will learn to apply quantitative and qualitative methods for decision-making, optimise water resource allocation, and address challenges such as climate change, water scarcity, and stakeholder conflicts. Through case studies and practical projects, students will develop the ability to create and implement comprehensive water management strategies.

S. No	Course Outcomes (CO)
CO1	Apply hydrological and systems analysis techniques to water resource planning.
CO2	Develop and optimise sustainable water management strategies.
CO3	Analyse economic, environmental, and social impacts of water resource decisions.
CO4	Utilise decision-making tools for effective water allocation and conflict resolution.
CO5	Address challenges in water management, including climate change and resource scarcity.

S. No.	Contents	Contact Hours
UNIT 1	Introduction: Water resources planning process, multi-objective planning. Evaluation of Water Plans: Basic concepts of engineering economics, welfare economics, and economic comparison of alternatives.	8
UNIT 2	Water Plan Optimisation: Plan formulation, objective functions and constraints, analytical optimisation, numerical optimisation, linear programming, dynamic programming, simulation, planning under uncertainty.	10

UNIT 3	Deterministic River Basin Modelling: Stream flow modelling, estimation of reservoir storage requirements – dead storage, active storage for water supply/irrigation/power generation, flood storage. Optimal allocation.	8
UNIT 4	Conjunctive Use/Groundwater Management Models: LP-based conjunctive use modelling, aquifer response models, link-simulation, embedded, matrix response-based models, soft modelling.	8
UNIT 5	Water Quality Management Models: Basic water quality modelling, objectives of management, control alternatives, optimal plans.	8
	Total	**42**

REFERENCES

S. No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	Hall, W.A. and Dracup, J.A., "Water Resources Systems Engineering", McGraw-Hill Book Company.	1970
2	Loucks, D.P., "Water Resource Systems Planning and Analysis", Prentice Hall.	1981
3	Maass et al., "Design of Water-Resource Systems", Harvard University Press.	1962
4	Vedula S. and Mujumdar, P.P., "Water Resources Systems", Tata McGraw-Hill.	2005