



GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (WATER RESOURCES ENGINEERING) (33)

Master of Engineering

Subject Code: 3723302

Semester – II

Subject Name: HYDROSYSTEM ENGINEERING AND MANAGEMENT

Type of course: Core IV

Prerequisite: Fundamental knowledge of optimization methods, linear and non-linear programming, water resources projects.

Rationale:

Students will be able to understand linear and non linear optimization techniques, application to single and multiple reservoir, catchment, command area and canal flow planning and optimization, and soft computing techniques viz, ANN, fuzzy logic etc.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction to the concept of a system engineering, System application to water resources engineering.	6
2	Optimization techniques, graphical, Linear Dynamic and stochastic programming	12
3	Simulation and mathematical modeling of water resources systems, Application to reservoir optimization and multi-reservoir planning.	12
4	Optimal allocation of water resources for various uses. Case studies of water resources management.	8
5	Introduction to soft computing models Like ANN, GAGP & Fuzzy Logic, and Hybrid Techniques.	6

Reference Books:

1. Water resources system engineering - Hall & Dracup
2. System Approach to water resources management edited by A.K.Biswas
3. Introduction to operation research-Computer oriented Algorithmic Approach-Billy E.Gillett
4. Optimization-theory and application – S.S.Rao
5. Hierarchical analysis of water resources system – Yacov Y. Haimes
6. Water Resources planning and Management – Louks, stedinger and Haith



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7. Hydro system Engineering and Management – L. W. Mays & Y. K. Tung
8. Water Resources Systems Planning and Management – Chaturvedi
9. Applied Water Resources System Planning – David C. Major & Robert Lanton
10. Mathematical Foundations for design in Civil Engineering–Robert M. Star & R. M. Nicholas

Course Outcomes: At the end of the course, Student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the need of optimization of water resources projects	20
CO-2	Understand various linear and non linear techniques	20
CO-3	Simulate mathematic models	20
CO-4	Utilise soft techniques to optimise water resources management	20
CO-5	Study different case studies related to the course.	20

Suggested Specification table with Marks (Theory): (For ME only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10%	20%	25%	15%	20%	10%

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

List of tutorials:

Linear and non linear optimization techniques, reservoir operation, canal operation, simulation and mathematical models of water resources projects, problems on soft computing techniques.

List of Open Source Software/learning website:

1. http://en.wikipedia.org/wiki/Category:Hydraulic_engineering