

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (WATER RESOURCES ENGINEERING) (33)

HYDRO SYSTEM ENGINEERING

SUBJECT CODE: 2723302

SEMESTER: II

Type of course: Optimization and soft computing techniques

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

Rationale: Students will be able to understand linear and non linear optimization techniques, application to single and multiple reservoir 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)	PA (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr.No	Topics	Teaching Hrs.	Module Weightage
1.	Introduction to the concept of a system engineering, System application to water resources engineering.	6	15
2	Optimization techniques, graphical, Linear Dynamic and stochastic programming	12	30
3	Simulation and mathematical modeling of water resources systems, Application to reservoir optimization and multi-reservoir planning.	12	30
4	Optimal allocation of water resources for various uses. Case studies.	6	10
5	Introduction to soft computing models Like ANN, GAGP & Fuzzy Logic, and Hybrid Techniques.	6	15

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

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

Tutorials and exercise on:

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

Course Outcome:

After learning the course the students should be able to: to understand the need of optimization of water resources projects, understand various linear and non linear techniques, simulation and mathematical models and soft techniques for optimal management of water resources.

Open Ended Projects: case studies of various water resources projects

Major Equipments: nil

List of Open Source Software/learning website:

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

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.