

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)
SEMESTER	7
COURSE TITLE	COMPUTATIONAL METHODS IN WATER RESOURCES ENGINEERING
COURSE CODE	01CI0718
COURSE CREDITS	3

Objective:

- 1 To provide an overview of computation techniques in water resources engineering
- 2 To develop a model of surface & subsurface water resources system
- 3 To introduce modern computational methods in water resources engineering.
- 4 To make aware with different software used in modeling of WRS.

Course Outcomes: After completion of this course, student will be able to:

- 1 Discover various computation methods in water resources engineering.
- 2 Rate modeling concepts in various water resources systems
- 3 Develop a model for surface water resources system and Irrigation engineering
- 4 Analyze the water distribution system using suitable software
- 5 Appraise artificial intelligence in the water resources system

Pre-requisite of course: Basics of Water Resources Engineering, Advanced Engineering Mathematics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction Introduction and definition of numerical methods, Introduction and definition of numerical methods	4
2	Introduction and definition of numerical methods Concepts of modeling, Overview of computer model: Surface hydrology, Subsurface hydrology modeling, Cropping Patterns Modeling, Cropping Patterns Modeling, Hydropower modeling	12
3	Computing Techniques Numerical methods, Finite difference and finite element method, Application in Surface Water Modeling, Application in Subsurface Water Modeling, Solute transport problems, Pipe network analysis	12

Contents : Unit	Topics	Contact Hours
4	Software Learning Software Learning, Introduction of SWAT and Application, Introduction of LOOP and Application, Introduction of MADFLOW	10
5	Modern Computation Method AI in Irrigation Engineering, AI in water resources management	4
Total Hours		42

Textbook :

- 1 An Introduction to Finite Element Method, Reddy, J. N., Tata McGraw-Hill, 2011
- 2 Introduction to Computational Fluid Dynamics, Niyogi, P., Chakrabarty, S. K., Laha, M. K., Pearson Education, 2014
- 3 Water Resources Systems: Modelling Techniques and Analysis, Vedula S. and Majumdar P.P. , Tata MCgraw Hill Publishing Company ltd, New Delhi, 2010

References:

- 1 Applied Hydrology, Applied Hydrology, Chow, V.T., Maidment, D.R., Mays. L.W., McGraw Hill, 2015
- 2 Numerical Methods for Engineer, Numerical Methods for Engineer, Chapra, Steven C. Canale, Raymond P., Tata MCgraw Hill Publishing Company Ltd, New Delhi., 2017
- 3 Numerical Methods for scientific and Engineering Computational, Numerical Methods for scientific and Engineering Computational, Jain, M. K.; Iyernger, S.R. & Jain R. K. , New International (P) ltd., 2016

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	20.00	45.00	10.00	10.00	10.00

Instructional Method:

- 1 Prerequisites of the course and its pattern shall be discussed at the commencement of the course.
- 2 Lectures shall be conducted in the classroom using various teaching aids.
- 3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
- 4 A minimum of two internal exams will be conducted and an average of two will be considered as a part of a 15% overall evaluation

Instructional Method:

- 5 At the end of each unit/topic, an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work
- 6 The assignments/tutorials/technical visits are planned in such a way that they cover the practical aspects of the course contents.