CE8017 WATER RESOURCES SYSTEMS ENGINEERING

DETAILED SYLLABUS

OBJECTIVES:

- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- To make the students apply an appropriate system approach to optimally operate a water resource system.

UNIT I SYSTEM APPROACH

Definition, classification, and characteristics of systems - Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – steps in systems engineering.

UNIT II LINEAR PROGRAMMING

Introduction to Operation research - Linear programming Problem Formulation-graphical solution- Simplex method –Sensitivity analysis - application to operation of single purpose reservoir

UNIT III DYNAMIC PROGRAMMING

Bellman's optimality criteria, problem formulation and solutions – Water Allocation for three state (user), Forward and Backward Recursion techniques in Dynamic Programming - Shortest pipe line route problem - Application to reservoirs capacity expansion

UNIT IV SIMULATION

Basic principles and concepts – Monte Carlo techniques – Model development – Inputs and outputs – Single and multipurpose reservoir simulation models – Deterministic simulation – Rule Curve development for reservoir

UNIT V ADVANCED OPTIMIZATION TECHNIQUES

Integer and parametric linear programming – Goal programming types – Applications to reservoir release optimization – application of evolutionary algorithms like Genetic algorithm, Particle swarm, Simulated Annealing to reservoir release optimization

TEXTBOOK:

1. Vedula, S., and Majumdar, P.P. "Water Resources Systems" – Modeling Techniques and Analysis Tata McGraw Hill, 5th reprint, New Delhi, 2010.

REFERENCES:

1. Hall Warren, A. and John A. Dracup., "Water Resources System Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998

2. Chadurvedi M.C., "Water resource Systems Planning and Management", Tata McGraw Hill inc., New Delhi,1997

3. Taha H.A., "Operation Research", McMillan Publication Co., New York, 1995.

4. Maass A., Husfchimidt M.M., Dorfman R., ThomasH A., Marglin S.A and Fair G. M., "Design of Water Resources System", Hardward University Press, Cambridge, Mass.,1995.

5. Goodman Aluvin S., "Principles of Water Resources Planning", Prentice Hall of India, 1984