**M. Tech. 2nd Semester**

**(Open Elective)**

**Advanced Computational Methods and Optimization CET-754**

**L T P Theory : 50 marks**

**3 1 - Sessional : 50 marks**

 **Time : 3 Hours**

**Numerical Methods:** Newton Raphson method for solution of simultaneous equations. Numerical solutions of partial different equations: Finite difference method, finite element method, and method of characteristics. Explicit and implicit methods to solve simple parabolic different equations, convergence, Boundary value problems and successive over relaxation methods. Numerical dispersion errors and their prevention, Comparison of solutions by analytical and finite difference techniques for one dimensional instantaneous discharge simple computer based examples.

**Optimization:** Definition and classifications of optimization problems, importance in Environmental Studies, Single and multivariable optimization without and with constraints.

**Linear Programming:** Standard form of problem, pivotal reduction of equations, Single and Two phase simplex methods, Piece wise linear approximation of nonlinear optimization.

**Statics and Probability:** Frequency Distribution – Characteristics of Distributions: Central Tendency and Dispersion, Concepts of Probability –Binomial, Poisson and Normal Distribution –Applications –Method of Least Square and Regression-Multiple Regression – The Chi –squared test, F test, t-est. Analysis problems using Computer Programming.

**NOTE TO PAPER SETTER:**

Set 8 questions in all, 4 from Part A, 2 from Part B and 2 from Part C.

Candidates have to attempt 5 questions selecting atleast 1 question from each part.

**BOOKS RECOMMENDED:**

1. Advanced Engg. Mathematics : E Kreyzic

2. Numerical Mathematics Analysis : I B Scarborough

3. Higher Engg. Mathematics : B S Grewal

4. Advanced Engg Mathematics : V P Jaggi & A B Mathur

5. Operational Mathematics : R Charchill