CHE/ME 211   COMPUTATIONAL TECHNIQUES

Lectures   : 4 periods / week   Internal Assessment : 40 Marks

Semester Exam   : 3 hrs   Semester End Examination : 60 Marks

UNIT – I

Partial Differential Equations: Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equations, Equations solvable by direct integration, Linear equations of the first order, Non-Linear equations of the first order using Charpit's Method, Homogeneous Linear Equations with Constant Coefficients, Rules for finding the Complementary Function, Rules for finding the Particular Integral, Non-Homogeneous Linear Equations. **(15)**

UNIT – II

Applications of Partial Differential Equations: Introduction, Method of separation of variables, One dimensional wave equation, One dimensional heat equation- steady and unsteady states, Two dimensional heat flow equation- Steady state heat flow –Laplace's equation in Cartesian coordinates. **(15)**

UNIT – III

Numerical Methods: Solution of Algebraic and Transcendental Equations: Introduction, Newton-Raphson Method, Solution of Linear Simultaneous Equations: Gauss Seidel Iterative Method.

Finite Differences & Interpolation: Introduction, Finite difference operators, Symbolic relations, Differences of a polynomial, Newton's forward and backward interpolation formulae, Interpolation with Unequal intervals: Lagrange's Interpolation, inverse interpolation.

Numerical Differentiation: Finding first and second order Differentials using Newton's formulae. **(15)**

UNIT – IV

Numerical Integration: Trapezoidal rule, Simpson's one-third rule.

Numerical Solutions of Ordinary Differential Equations (first order): Picard's Method, Euler's Method, Runge-Kutta Method of fourth order, Simultaneous equations (R K method).

Numerical Solutions of Partial Differential Equations: Classification of Partial Differential Equation of second order, Solutions of Laplace's and Poisson's Equations by iteration methods. **(15)**

TEXT BOOK:

Higher Engineering Mathematics, B.S.Grewal, 40th edition, Khanna publishers, New Delhi, 2007.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Johnwiley & Sons, 8th edition, 2007.

2. A text book of Engineering Mathematics by N.P. Bali, Lakshmi publications, 6th edition, 2003.