SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES, CHITTOOR
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

II B.Tech I Sem

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16SAH211 **MATHEMATICS – III**
(Common to all Branches)

Course Objectives:

- To develop logical thinking in solving various mathematical models
- Emphasis will be more on logical and problem solving development in Numerical methods and their applications
- Train the students thoroughly in Mathematical concepts of partial differential equations
- Introduce the concept of Vector differentiation and integration that finds applications

UNIT – I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND INTERPOLATION

Solution of Algebraic and Transcendental Equations: Introduction - The Bisection method - The method of false position - The Iteration method - Newton-Raphson method (Single Variable).

Interpolation: Introduction - Finite differences - Forward differences - Backward differences - Newton's forward and backward difference formulae for interpolation - Lagrange's formula.

UNIT – II NUMERICAL DIFFERENTIATION, NUMERICAL INTEGRATION AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Numerical differentiation, Numerical integration: Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta methods - Predictor- Corrector method - Milne's method.

UNIT - III PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables.

UNIT - IV VECTOR DIFFERENTIATION

Introduction to Vector Differentiation , Scalar and Vector point functions- Gradient of a Scalar function - Divergence & Curl of a Vector function and their properties.

UNIT - V VECTOR INTEGRATION

Line Integral - Potential function - Area , Surface and volume integrals - Green's , Stoke's and Gauss divergence theorem(excluding their proof) - Verification of Green's, Stoke's and Gauss divergence theorems.

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Course Outcomes:

- Students gain knowledge to tackle engineering problems using the concepts of Numerical methods.
- Ability of mathematical modeling of systems using partial differential equations and to solve the partial differential equations
- Understand Curl,divergence and gradient with their applications
- Understand line integral, surface integral and volume integral and correlate them with the applications of Stokes, Greens and Divergence theorem.

Text Books:

1. Mathematical Methods, 2012, T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and
   M.V.S.S.N. Prasad , S. Chand and Company Publishers, New Delhi.
2. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi
3. Introductory Methods of Numerical Analysis, S S Sastry, 4/e 2005, PHI Publishers.

Reference Books:

1. Engineering Mathematics–I, 2012, T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand and Company Ltd, New Delhi.
2. Engineering Mathematics for JNTU, 2012, B.V. Ramana, Tata McGraw Hill Publishers, New Delhi
3. Advanced Engineering Mathematics, 8/e, 2009, Erwin Kreyszig, Wiley India, New Delhi.
4. Numerical Methods for Scientific and Engineering Computations, 4/e , 2004, M K Jain , S R K Iyengar, R K Jain .
5. A Text Book of Engineering Mathematics, 2011, N.P.Bali, Laxmi publications(P)Ltd, New Delhi.