

2/4 B.Tech - THIRD SEMESTER

EC3T1

Engineering Mathematics-III

Credits: 4

Lecture : 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Course Objectives:

- To learn to find approximate root of algebraic and transcendental equations and get familiarity with interpolation.
- Good exposure is targeted towards numerical differentiation and integration.
- To acquire knowledge in basic concepts like continuous; differentiation; integration and also series expansions; Cauchy's integral theorem; different types of singularities and evaluation of real integrals.

UNIT – I

Solution of Algebraic and Transcendental Equations: Introduction – Bisection method – Method of false position – Iteration method – Newton-Raphson's method.

UNIT - II

Interpolation: Introduction- Errors in polynomial interpolation – finite differences forward differences- backward differences – central differences – Symbolic relations - Differences of a polynomial - Newton's formulae for interpolation – Interpolation with unevenly spaced points- Lagrange's Interpolation formula.

UNIT – III

Numerical Differentiation and Integration: Differentiation using finite differences -Trapezoidal rule – Simpson's 1/3 rule –Simpson's 3/8 rule.

UNIT – IV

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

UNIT - V

Functions of a complex variable: Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method. Introduction to elementary functions..

UNIT – VI

Complex Integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Complex

power series: Radius of convergence – Expansion in Taylor’s series, Maclaurin’s series and Laurent series

UNIT - VII

Singular points – Isolated singular point – pole of order n – essential singularity.

Residue – Evaluation of residues - Residue theorem - Evaluation of integrals of the type $\int_{-\infty}^{\infty} f(x)dx$, $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$

UNIT - VIII

Conformal mapping: Standard transformations - Translation, rotation, inversion -Transformation by ez , $\ln z$, z^2 , z^n (n positive integer), $\sin z$, $\cos z$, $z+a/z$. and bilinear transformation– fixed point – cross ratio – properties –determination of bilinear transformation mapping 3 given points.

Learning Resources

Text Books:

1. A Textbook on Mathematical Methods - V. Ravindranath, P. Vijayalaxmi- Himalaya Publishing House-1st Revised Ed. 2011.
2. Higher Engineering Mathematics – B.S. Grewal- Khanna Publishers – 42nd Ed.: 2012, June.
3. Engineering Mathematics (Volume – III) - T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, and M.V.S.S.N. Prasad- S. Chand- 9th Revised Ed: 2012.

References:

1. Advanced Engineering Mathematics – Erwin Kreyszig-John Wiley - 8th Ed.:2006
2. A Text Book of Engineering Mathematics – B. V. Ramana- Tata McGraw Hill- 3rd Ed., 2008.
3. Text Book of Engineering Mathematics: Special Functions and Complex Variables– Shahanaz Bathul- PHI, 2008.