

## MA 101 (Engineering Mathematics-I)

Credits (L-T-P) : 4 (3- 1- 0)

### Unit I

SINGLE VARIABLE CALCULUS- Rolle's Theorem, Mean value theorems, Taylor and Maclaurin's theorem with remainders, Indeterminate forms, Maxima and Minima. Evaluation of definite integrals, Improper integrals: Beta and Gamma functions and their properties, Application of definite integrals to evaluate surface area and volume of revolution.

### Unit II

SEQUENCE AND SERIES- Convergence of sequences and series, Tests for convergence, The Integral Test, Comparison Test, Absolute convergence; The Ratio and Root Tests, Alternating Series and Conditional convergence, Power series, Taylor series, Convergence of Taylor Series.

### Unit III

MULTIVARIABLE CALCULUS- Limits, Continuity and differentiability in higher dimensions, Partial differentiation, Chain rules, Jacobian, Directional Derivatives and Gradient Vectors, Tangent plane and Normal line, Extreme values and Saddle points, Lagrange's multiplier method. Taylor's series for a function of several variables. Curvature and Torsion, Unit binomial vector.

### Unit IV

MULTIPLE INTEGRAL- Double Integral, triple integral, Fubini's Theorem, Change of order for double integral, Change of variables (*double integral: polar form, triple integral: Cylindrical and Spherical form*). Application of area and volume, center of mass

### Unit V

FUNDAMENTAL THEOREMS OF VECTOR CALCULUS- Vector line integrals, Scalar surface integrals, and vector surface integral, Green's Theorem, Vector fields, Divergence and curl of vector fields. Stokes' Theorem and Gauss divergence theorems. (Without proofs)

**Textbook** Thomas' Calculus , 11th Edition, Pearson Education Asia, 2009.

### Reference Books

- [1] R. K. Jain and S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications.
- [2] E. Kreyszig, *Advanced Engineering Mathematics*, John Wiley and Sons, 2005.
- [3] J. Stewart, *Calculus*, Cengage Learning, Sixth Edition.