

MA1002E MATHEMATICS I
(Common to CSE/EP branches)

Pre-requisites: Nil

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3	1	0	5	3

Total Lecture sessions : 39

Course Outcomes:

- CO1: Find the limits, check for continuity and differentiability of real valued functions of one variable.
- CO2: Find the limits, check for continuity and differentiability of real valued functions of two variables.
- CO3: Find the maxima and minima of real valued functions of one variable or two variables.
- CO4: Find the parametric representation of curves and surfaces in space and evaluate integrals over curves and surfaces.

Functions of one variable: limit, continuity - differentiability - local maxima and local minima - mean value theorems - Taylor's theorem - L'hôpital's rule - integration - fundamental theorem of calculus - volume - area - improper integrals - Gamma and Beta functions. Parameterised curves in space - arc length - tangent and normal vectors - curvature and torsion.

Functions of several variables: limit - continuity - partial derivatives - partial differentiation of composite functions - directional derivatives - gradient - local maxima and local minima of functions of two variables - critical point - saddle point - Taylor's formula for two variables - Hessian - second derivative test - method of Lagrange multipliers - Evaluation of double integrals - improper integrals - change of variables - Jacobian - polar coordinates - triple integral - cylindrical and spherical coordinates - mass of a lamina - center of gravity - moments of inertia.

Vector field: divergence - curl - identities involving divergence and curl - scalar potential - Line integral - independence of path - irrotational and solenoidal vector fields - Green's theorem for plane - parameterized surface - surface area and surface integral - flux - Gauss' divergence theorem - Stokes' theorem.

References:

1. H. Anton, I. Bivens and S. Davis, *Calculus*, (10th edition) John Wiley & Sons, New York, 2015.
2. G. B. Thomas, M.D. Weir and J. Hass, *Thomas' Calculus*, (12th edition) Pearson Education, New Delhi, India 2015.
3. E. Kreyszig, *Advanced Engineering Mathematics*, (10th edition) John Wiley & Sons, New York 2015.
4. Apostol, *Calculus Vol 1*, (1st edition) Wiley, New Delhi 2014.