MA1013E MATHEMATICS II
(Common to CE/ME/PE/MSE branches)

Pre-requisites: Nil

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Total Lecture Sessions: 39

Course Outcomes:

CO1: Find the parametric representation of curves and surfaces in space and evaluate integrals over curvesand surfaces

CO2: Understand the convergence of sequences and series and various methods of testing for convergence.

CO3: Solve linear ODEs with constant coefficients.

CO4: Formulate some engineering problems as ODEs and hence solve such problems.

CO5: Use Laplace transform and its properties to solve differential equations and integral equations.

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.

Numerical sequences, Cauchy sequence, convergence of sequences, series, convergence of series, tests for convergence, absolute convergence. Sequence of functions, power series, radius of convergence, Taylor series, periodic functions and Fourier series expansions, half-range expansions.

Existence and uniqueness of solution of first order ordinary differential equations (ODE)s, methods of solutionsof first order ODE, linear ODE, linear homogeneous second order ODEs with constant coefficients, fundamental systemof solutions, Wronskian, linear independence of solutions, method of undetermined coefficients, solution by variation of parameters, Euler-Cauchy differential equations, applications of ODEs.

Laplace transform, sufficient condition for existence, inverse Laplace transform, Dirac delta function, transforms of derivatives and integrals, shifting theorems, convolution, differentiation and integration of transform, solution of differential equations and integral equations using Laplace transform.

References:

[1] Kreyszig, E., 2015, *Advanced Engineering Mathematics*, 10th ed., India: Wiley, New Delhi.
[2] Anton, H., Bivens, I., and Davis, S., 2015, *Calculus*, 10th ed., John Wiley & Sons, New York.
[3] Arnold, V.I., 2006, *Ordinary Differential Equations*, Springer, New York.
[4] Dyke, P., 2014, *An Introduction to Laplace Transforms and Fourier Series*, Springer, New York.