18MAB102T   ADVANCED CALCULUS AND COMPLEX ANALYSIS
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3 1 0 4

Module – 1
Evaluation of double integration Cartesian and plane polar coordinates – Evaluation of double integration by changing order of integration – Area as a double integral (Cartesian) – Area as a double integral (Polar) – Triple integration in Cartesian coordinates – Conversion from Cartesian to polar in double integrals – Volume using triple integral – Application of Multiple integral in Engineering.

Module – 2
Review of vectors in 2, 3 dimensions – Gradient, divergence, curl – Solenoidal, Irrotational fields – Vector identities (without proof) – Directional derivatives – Line integrals, Surface integrals, Volume integrals – Green's theorem (without proof) – Gauss divergence theorem (without proof), Verification, Applications to Cubes, parallelopiped only – Stoke's theorem (without proof) – Verification, Applications to Cubes, parallelopiped only – Applications of Line and Volume integrals in Engineering.

Module – 3
Laplace Transforms of standard functions – Transforms properties – Transforms of Derivatives and Integrals – Initial value theorems (without proof) and verification for some problems – Final value theorems (without proof) and verification for some problems – Inverse Laplace transforms using partial fractions – Inverse Laplace transforms using second shifting theorem – LT using Convolution theorem – problems only – ILT using Convolution theorem – problems only – LT of periodic functions – problems only – Solve linear second order ordinary differential equations with constant coefficients only – Solution of Integral equation and integral equation involving convolution type – Application of Laplace Transform in Engineering.

Module – 4
Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions – Determination of analytic function using Milne Thomson's method – Conformal mappings: Magnification, Rotation, Inversion, Reflection – Bilinear Transformation – Cauchy's integral theorem (without proof) – Cauchy's integral theorem applications – Application of Bilinear transformation and Cauchy's Integral in Engineering.

Module – 5
Cauchy's integral formulae – Problems – Taylor's expansions with simple problems – Laurent's expansions with simple problems – Singularities – Types of Poles and Residues – Cauchy's residue theorem (without proof) – Contour integration: Unit circle, semicircular contour – Application of Contour integration in Engineering.

LEARNING RESOURCES

1. B. H. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill, New Delhi, 11th Reprint, 2010.
5. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
6. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.