

B.TECH 1st Year 2ND SEMESTER (Syllabus)

21MAB102T	Advanced Calculus and Complex Analysis	L	T	P	C
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Total contact hours = 60 hours					

UNIT I: INTEGRAL CALCULUS

Evaluation of double integration in Cartesian and polar coordinates – Evaluation of double integration in polar coordinates - Evaluation of double integral by changing of 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 – Triple Integration in Cartesian coordinates– Volume as a Triple Integral. **(12 Hours)**

UNIT II: VECTOR CALCULUS

Review of vectors in two and three dimensions – Gradient, divergence, curl – Solenoidal and 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. **(12 Hours)**

UNIT III: LAPLACE TRANSFORMS

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.

(12 Hours)

UNIT IV: ANALYTIC FUNCTIONS

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.

(12 Hours)

UNIT V: COMPLEX INTEGRATION

Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its applications – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem – Contour integration – Unit circle and semi circular contour.

(12 Hours)