15MA102	Advanced Calculus and Complex Analysis	L	T	P	C
		3	2	0	4
	Total contact hours = 60 hours				
	(Common to all Branches of Engineering except Bio group)				

Purpose:
To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

Instructional objectives:	
1	To have knowledge in multiple integrals
2	To improve their ability in Vector calculus
3	To equip themselves familiar with Laplace transform
4	To expose to the concept of Analytical function
5	To familiarize with Complex integration

UNIT I MULTIPLE INTEGRALS

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates – Conversion from Cartesian to polar – Volume as a Triple Integral.   **(12 Hours)**

UNIT II VECTOR CALCULUS

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals –Green's, Gauss divergence and Stoke's theorems (without proof) – Verification and applications to cubes and parallelopipeds only.   **(12 Hours)**

UNIT III LAPLACE TRANSFORMS

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – periodic functions – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.   **(12 Hours)**

UNIT IV ANALYTIC FUNCTIONS

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings: $1/z$, az , $az+b$ and bilinear transformation.   **(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)**

TEXT BOOKS:
1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012.
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian & V.Srinivasan, "Advanced Calculus and Complex Analysis", Revised Edition, 2013.

REFERENCES:

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 42nd Edition,2012.
2. Veerajan, T., Engineering Mathematics I, Tata McGraw Hill Publishing Co., New Delhi, 5th edition, 2006.
3. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000.
4. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
5. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., Chennai,2000