15MA104	Multiple Integrals and Differential Equations	L	T	P	C
		3	2	0	4
	Total contact hours = 60 hours				
	(Common to Bio group)				

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

Instructional objectives:	
1	To understand maxima and minima of two and three variables.
2	To expose to the concepts of Differential equations
3	To expose to the concepts of Multiple integrals.
4	To expose to the concept of vector calculus
5	To expose to the concept of three dimensional analytical geometry.

UNIT I FUNCTIONS OF SEVERAL VARIABLES

Functions of two variables – partial derivatives – total differentiation – Taylor's expansion – maxima and minima of functions of two and three variables - Jacobians. **(12 Hours)**

UNIT II DIFFERENTIAL EQUATIONS

Differential equations of first order – Linear equations of second order with constant coefficients and variable coefficients – method of variation of parameters. **(12 Hours)**

UNIT III MULTIPLE INTEGRALS

Double integration in Cartesian and polar coordinates – Change of order of integration – Triple integration in Cartesian coordinates. **(12 Hours)**

UNIT IV VECTOR CALCULUS

*Review of Vector Algebra. Gradient, divergence and curl – solenoidal, and irrotational fields – directional derivatives – line integrals – surface integrals – volume integrals, Integral theorems (without proof) and its applications- cubes and parallelepipeds only **(12 Hours)**

UNIT V THREE DIMENSIONAL ANALYTICAL GEOMETRY

Direction cosines and direction ratios of a line – angle between two lines. Equation of a plane – equation of straight line – shortest distance between two skew lines – coplanar lines.

(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, "Multiple Integrals and Differential Equations", Revised Edition, 2013.

REFERENCES:

1. Grewal B.S, Higher Engineering Mathematics, 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.