15MA101	CALCULUS AND SOLID GEOMETRY	L	T	P	C
		3	1	0	4
Co-requisite:	NA				
Prerequisite:	NA				
Data Book / Codes/Standards					
Course Category	B CORE	MATHEMATICS			
Course designed by	Department of Mathematics				
Approval	-- Academic Council Meeting -- , 2016				

PURPOSE	To acquire analytical ability on solving Calculus and Solid Geometry problems as applied to the respective all branches of Engineering.		
INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**	
At the end of the course, student will be able to			
1.	Apply advanced matrix knowledge to Engineering problems.	a	e
2.	Equip themselves familiar with functions of several variables.	a	e
3.	Familiarize with the applications of ordinary differential equations	a	e
4.	Improve their ability in solving geometrical applications of differential calculus problems.	a	e
5.	Expose to the concept of three dimensional analytical geometry.	a	e

Session	Description of Topic	Contact hours	C-D-I-O	IOs	Reference
	UNIT I: MATRICES	**12**			
1.	Characteristic equation	1	C,I	1	1-7
2.	Eigen values and Eigen vectors of a real matrix	2	C,I	1	1-7
3.	Properties of Eigen values	2	C,I	1	1,3,4,6
4.	Cayley – Hamilton theorem orthogonal reduction of a symmetric matrix to diagonal form	2	C,I	1	1,3,4,6
5.	Orthogonal matrices	1	C,I	1	1,3,4
6.	Reduction of quadratic form to canonical form	2	C,I	1	1,3,4,6
7.	Quadratic form to canonical form by orthogonal transformations.	2	C,I	1	1,3
	UNIT II: FUNCTIONS OF SEVERAL VARIABLES	**12**			
8.	Function of two variables – Partial derivatives	2	C,I	2	1,3,4,6
9.	Total differential	2	C,I	2	1,3,4,6
10.	Taylor’s expansion	2	C,I	2	1,3
11.	Maxima and Minima	2	C,I	2	1,3,4,6
12.	Constrained Maxima and Minima by Lagrangian Multiplier method	2	C,I	2	1,3,

13.	Jacobians	2	C,I	2	1-7
	UNIT III: ORDINARY DIFFERENTIAL EQUATIONS	**12**			
14.	Linear equations of second order with constant and variable coefficients	2	C,I	3	2,5,7
15.	Homogeneous equation of Euler type	2	C,I	3	2,5,7,1
16.	Homogeneous equation of Legendre's Type	2			
17.	Equations reducible to homogeneous form	2	C,I	3	2,5,7
18.	Variation of parameters	2	C,I	3	1,2
19.	Simultaneous first order with constant co-efficient.	2	C,I	3	1,2
	UNIT IV: GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	**12**			
20.	Curvature – Cartesian coordinates	2	C,I	4	7
21.	Curvature – polar coordinates	2	C,I	4	7
22.	Circle of curvature	2	C,I	4	1
23.	Centre of curvature	2	C,I	4	7
24.	Evolutes	2	C,I	4	4,5
25.	Envelopes	2	C,I	4	7
	UNIT V: THREE DIMENSIONAL ANALYTICAL GEOMETRY	**12**			
26.	Equation of a sphere – Plane section of a sphere	2	C,I	5	3,4
27.	Tangent Plane – Orthogonal spheres	2	C,I	5	3,4
28.	Equation of a cone	2	C,I	5	4
29.	Right circular cone	2	C,I	5	3,4
30.	Equation of a cylinder	2	C,I	5	2,3
31.	Right circular cylinder.	2	C,I	5	3,4
	Total contact hours	60			

LEARNING RESOURCES	
Sl. No.	**TEXT BOOKS**
1.	Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10^{th} edition, 2012.
2.	K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian &V.Srinivasan, "*Engineering Mathematics*",Gamma publications, Revised Edition, 2013.

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

Course nature				**Theory**			
Assessment Method (Weightage 100%)							
In-semester	**Assessment tool**	Cycle test I	Cycle test II	Cycle Test III	Surprise Test	Quiz	**Total**
	Weightage	**10%**	**15%**	**15%**	**5%**	**5%**	**50%**
					End semester examination Weightage :		**50%**