Engineering Mathematics – 1 (Calculus and Algebra)

Course Code	19BS1101	Year	I	Semester	I
Course Category	Basic Sciences	Branch	CE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	utilize the techniques of matrix algebra that is needed by engineers for practical applications
CO2	apply mean value theorems to engineering problems
CO3	utilize functions of several variables in optimization
CO4	employ the tools of calculus for calculating the areas
CO5	calculate volumes using multiple integrals

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H:High, M: Medium, L:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	M											M	
CO2	H	M											M	
CO3	H	M											M	
CO4	H	M											M	
CO5	H	M											M	

Syllabus

Unit No.	Contents	Mapped CO
I	Matrices: Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous linear equations. Eigen values, Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.	CO1
II	Mean Value Theorems:Rolle‘s Theorem, Lagrange‘s mean value theorem, Cauchy‘s mean value theorem, Taylor‘s and Maclaurin‘s theorems with remainders (without proof).	CO2
III	Multivariable Calculus :Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.	CO3
IV	Multiple Integrals-I :Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.	CO4
V	Multiple Integrals-II: Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, volume as triple integral.	CO5

Learning Resources
Text Books
1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018
Reference Books
1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002. 2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013. 3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
e- Resources & other digital material
1. www.nptelvideos.com/mathematics/ 2. https://nptel.ac.in/courses/111104025/ 3. https://nptel.ac.in/courses/122101003/