

## Engineering Mathematics – 1 (Calculus and Algebra)

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

### Course Outcomes

Upon successful completion of the course, the student will be able to

<b>CO1</b>	utilize the techniques of matrix algebra that is needed by engineers for practical applications
<b>CO2</b>	apply mean value theorems to engineering problems
<b>CO3</b>	utilize functions of several variables in optimization
<b>CO4</b>	employ the tools of calculus for calculating the areas
<b>CO5</b>	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											L	
CO2	H	M											L	
CO3	H	M											L	
CO4	H	M											L	
CO5	H	M											L	

### 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

<b>Learning Resources</b>
<b>Text Books</b>
1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018
<b>Reference Books</b>
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.
<b>e- Resources &amp; other digital material</b>
1. <a href="http://www.nptelvideos.com/mathematics/">www.nptelvideos.com/mathematics/</a> 2. <a href="https://nptel.ac.in/courses/111104025/">https://nptel.ac.in/courses/111104025/</a> 3. <a href="https://nptel.ac.in/courses/122101003/">https://nptel.ac.in/courses/122101003/</a>