CALCULUS AND LINEAR ALGEBRA

Course Code	20BS1101	Year	I	Semester	I
Course Category	Basic Science	Branch	ME	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

CO	Statement	Skill	BTL	Units
CO1	**Understand** the basic concepts of calculus and linear algebra.	Understand	L2	1,2,3,4,5
CO2	**Apply** the echelon form to obtain the solution of system of linear equations and eigen vectors of a matrix.	Apply	L3	1,2,
CO3	**Apply** the concepts of calculus to find the series expansion and extremum of a given function ,area enclosed by plane curves and volume of the solids.	Apply	L3	3,4,5
CO4	**Analyse** the solution set of linear system of equations and nature of the quadratic forms.	Analyze	L4	1,2
CO5	**Analyse** the behaviour of functions using mean value theorems, extremum of the given function and limits of integration.	Analyze	L4	3,4,5
CO6	**Apply** the concepts of calculus and linear algebra to the given problem and **submit a report**	Apply	L3	1,2,3,4,5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1: Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													1	
CO2	3								2	2			1	
CO3	3								2	2			1	
CO4		3											1	
CO5		3											1	
CO6	3								2	2			1	

Syllabus

UNIT	Contents	Mapped COs
I	**Matrices-Linear System of Equations:** Rank of a matrix by Echelon form, Normal form, PAQ form, solving system of homogeneous and non-homogeneous linear equations.	CO1 CO2 CO4 CO6
II	**Eigen values and Eigen Vectors:** Eigen values, Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms.	CO1 CO2 CO4 CO6

III	**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 proofs).	**CO1** **CO3** **CO5** **CO6**
IV	**Multivariable Calculus:** Functions of several variables, Jacobian, Functional dependence, maxima and minima of functions of two variables, method of Lagrange's multipliers.	**CO1** **CO3** **CO5** **CO6**
V	**Multiple Integrals:** Double integrals, change of order of integration, double integration in polar coordinates, Triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, volume as triple integral. **Application-** Areas enclosed by plane curves.	**CO1** **CO3** **CO5** **CO6**

Learning Recourse(s)
Text Book(s)
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2019. 2. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006
Reference Book(s)
1. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 2008.
e- Resources & other digital material
1. https://nptel.ac.in/courses/111/108/111108157/ 2. https://www.nptel.ac.in/courses/111/104/111104125/ 3. https://youtu.be/xDSejIvZmg4 4. http://202.53.81.118/ -> PVPSIT FED-Moodle