Calculus and Linear Algebra

Course Code	20BS1101	**Year**	I	**Semester**	I
Course Category	Basic Science	**Branch**	CSE	**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	**Understand** the basic concepts of calculus and linear algebra.(L2)
CO2	**Apply** the echelon form to obtain the solution of system of linear equations and eigen vectors of a matrix.(L3)
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. (L3)
CO4	**Analyse** the solution set of linear system of equations and nature of the quadratic forms. (L4)
CO5	**Analyse** the behaviour of functions using mean value theorems, extremum of the given function and limits of integration. (L4)
CO6	**Apply** the concepts of calculus and linear algebra to the given problem and **submit a report**

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	1
CO2	3								2	2			1	1
CO3	3								2	2			1	1
CO4		3											1	1
CO5		3											1	1
CO6	3								2	2			1	1

Syllabus

Unit No.	Syllabus	Mapped CO‘s
1	**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
2	**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
3	**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
4	**Multivariable Calculus:**	CO1,CO3,

	Functions of several variables, Jacobian, Functional dependence, maxima and minima of functions of two variables, method of Lagrange's multipliers.	CO5,CO6
5	**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 Resources

Text Books

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 Books

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