

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution)

Course Code	Course Title					Core/Elective
25BS101MT	MATRICES & DIFFERENTIAL CALCULUS (Common to CSE, CSE(AI), CSE(DS), CSE(AIML), ECE, CE, ME)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
Basics in Matrices, differentiation and integration	3	1	0	40	60	4

Course objectives: To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their applications to the mathematical problems.
4. Finding maxima and minima of functions of two and three variables.
5. Concept of double, and triple integrals.

Course Outcomes: After learning the contents of this course, the student must be able to

1. Find a rank of matrix and to analyze the solution of the system of linear equations.
2. Find the eigen values and eigen vectors, and to reduce the quadratic form to canonical form.
3. Apply Mean value theorems.
4. Find the extreme values of functions of two and three variables.
5. Evaluate double, and triple integrals.

UNIT-I: Matrices:

Rank of a matrix by Echelon form, Solving System of homogeneous and non-homogeneous linear equations, Linearly dependence and independence of vectors, Gauss elimination method, Gauss-Jordan method.

UNIT-II: Eigen values and Eigen vectors:

Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of Eigen values, Cayley-Hamilton theorem (without proof), Finding inverse of a matrix by Cayley-Hamilton theorem, Quadratic forms and Nature of quadratic forms, Reduction of quadratic form to canonical form.

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UNIT-III

Calculus of one Variable: Rolle's theorem, Lagrange's Mean-value theorem, Cauchy's mean value theorem, Taylor's series (All theorems without proof), Curvature, Radius of Curvature, Centre of Curvature, Circle of Curvature(Cartesian form only).

UNIT-IV

Multivariable Calculus (Differentiation): Functions of two variables, Limits and Continuity, First order Partial derivatives, Total derivative, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobians, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-V

Multivariable Calculus(Integration): Double integrals, Change of variables from Cartesian to plane polar coordinates, Triple integrals.

Suggested Reading:

1. R.K.Jain & S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.
3. N.P.Bali & Dr.Manish Goyal, A textbook of Engineering Mathematics(Volume I), 10th Edition, Laxmi Publications, 2022.
4. H.K.Dass and Er.Rajnish Verma, Higher Engineering Mathematics, S.Chand and Company Limited, New Delhi.

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