CH/CE/ME111	MATRICES AND CALCULUS	L	T	P	C	Int	Ext
		2	1	-	3.0	30	70

Semester I [First Year]

COURSE OBJECTIVES:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Compute eigen values and eigen vectors of a given matrix.
2. Apply mean value theorems to real life problems.
3. Examine given function of two variables for the extreme values using partial differentiation.
4. Evaluate double and triple integrals of functions of two and three variables.

UNIT I [CO:1] **(12)**

Matrices :

Rank of a matrix by echelon form, normal form. Inverse of Non- singular matrices by Gauss-Jordan method. System of linear equations: Consistency of system of equations-Homogeneous and Non-Homogeneous equations, Eigenvalues, Eigenvectors, Diagonalization of a matrix.

UNIT II [CO:2] **(12)**

Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

Calculus:

Mean Value Theorems : Rolle's Theorem and Lagrange's mean value theorem (without proofs). Taylor's and Maclaurin's series expansion of functions of single variable.

UNIT III [CO:3] **(12)**

Partial differentiation and Applications :

Partial derivatives, Euler's theorem on homogeneous functions, total derivatives, Maxima and minima of functions of two variables, method of Lagrange multipliers.

Multiple Integrals :

Evaluation of double integrals in Cartesian, change of order of integration.

UNIT IV [CO:4] **(12)**

Evaluation of double integrals in polar, Change of variables Cartesian to polar, Finding areas by double integrals. Triple integrals and volume by triple integrals.

LEARNING RESOURCES:

TEXT BOOK:

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2017.

REFERENCE BOOK(s):

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2018.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 5th Edition (9th reprint), 2021.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/