

Course No: BS-MATH 111

Title: Engineering Mathematics – I

Semester: I (New)

Credit: 3 (2+1)

Teaching Schedule –Theory with weightages (%)

Lecture No.	Topics to be covered	Weightages (%)
Matrices and its Applications		
1-9	Rank of Matrix Inverse of Matrix by Gauss- Jordan Reduction to normal form Applications: Consistency of linear system of equations Linear transformation Orthogonal transformation Eigen values and Eigen vectors Properties of Eigen Values Cayley Hamilton theorem(without proof) Reduction to Diagonal form, quadratic form, nature of quadratic form	30%
Differential Calculus and its Applications		
10-11	Maclaurin’s series, Taylor’s series	30%
12-13	Indeterminate Forms: L’Hospital’s Rule/ Cauchy Rule Forms: $\frac{0}{0}, \frac{\infty}{\infty}, \infty - \infty, 0 \times \infty, 0^0, 1^\infty, \infty^0$	
14-19	Partial Differentiation and its applications Function of two or more independent variables Partial derivatives Homogeneous function & Euler’s Theorem Total derivative & Derivative of implicit function Change of variable Maxima and Minima	
Integral Calculus and its Applications		
20-28	Gamma and Beta Function Volume of solids of revolution Surface areas of revolution Double Integral: Definition, Evaluation Change of order of integration – Cartesian form Triple Integral: Definition, Evaluation	20%
Vector Calculus and its Applications		
29-31	Scalar and Vector point function Derivative of vector function Vector operator Del Gradient of scalar point function, geometrical meaning of gradient, Directional Derivative Divergence and Curl of Vector point function	20%

	Physical interpretations of Divergence and Curl Solenoidal and Irrotational field Identities involving Del and second order differential operator(without proof)	
32-34	Vector Integration - Line integral, work done, surface integral, Green's Theorem (without proof) Stoke's Theorem(without proof) Volume integral Gauss divergence theorem (without proof)	

Practical Exercises

Exercise No.	Topic
1	Applications of Matrices
2	Applications of Eigen values and Eigen vectors
3	Applications of Cayley-Hamilton theorem, diagonalization of matrices, quadratic forms, nature of a quadratic form.
4	Applications of Taylor's and Maclaurin's series
5	Applications of Indeterminate forms
6	Applications of Partial differentiation
7	Maxima and minima
8	Applications of Beta and Gama functions
9	Tracing of Cartesian curves
10	Applications: Volume and surface revolution
11	Applications: To find area by double integral and to find volume of solids
12	Applications mass of lamina, centre of gravity, centre of pressure, moment of inertia
13	Applications of Vector differentiation, Gradient, Directional derivative
14	Applications of Divergence and Curl , solenoidal and irrotational field
15	Applications of Line integral-work done, surface and volume integrals
16	Applications of Green's Theorem, Stoke's Theorem, Gauss divergence theorem.

Suggested Reading

Text Book

1. Dr. Shinde K. J. *et.al.*, 2017; A Text Book of Agricultural Engineering Mathematics –I

Reference Books

1. Narayan Shanti, 2004; Differential Calculus. S. Chand and Co. Ltd. New Delhi.
2. Narayan Shanti, 2004; Integral Calculus. S. Chand and Co. Ltd. New Delhi.

3. Grewal B. S., 2015; Higher Engineering Mathematics. Khanna Publishers Delhi.(43rd Edition)
4. Narayan Shanti, 2004;A Text Book of Vector Calculus. S. Chand and Co. Ltd. New Delhi.
5. Narayan Shanti, 2004; A Text Book of Matrices. S. Chand and Co. Ltd. New Delhi.