ABES Institute of Technology, Ghaziabad

Lesson Plan

(Academic Year: 2024-25)

Teacher's Name: Dr. Amit Vats, Dr. S. P. Gupta, Dr. Anuj Kumar, Prof. Varuna Bhardwaj

Dr. Vaishali Tyagi, Prof. Anamika Sharma, Dr. Amita Dwivedi, Dr. Neha Goel

Subject Name: Engineering Mathematics-I **Subject Code: BAS103**

Year / Sem: B. Tech- 1st Year / 1st Sem **NBA Code: C103**

Lecture. No.	Sub Topic No.	Topics to be covered	
		Broad Topic	Detailed contents
1	2.1	UNIT-2 (Differential Calculus-I)	Successive Differentiation (n^{th} order derivatives).
2	2.2		Leibnitz theorem.
3	2.2		Application of Leibnitz theorem.
4	2.3		Basics of curve tracing: Asymptote, Double point & Nature of origin.
5	2.3		Curve tracing: Cartesian co-ordinates.
6	2.3		Curve tracing: Polar co-ordinates
7	2.4		Partial derivatives.
8	2.5		Euler's Theorem for homogeneous functions.
9	2.5		Deductions from Euler's Theorem.
10	2.6		Total derivative for composite functions with one and two variables.
11	2.6		Total derivative for composite functions with three variables.
12	3.1	UNIT-3 (Differential Calculus-II)	Taylor's theorem for a function of one variable.
13	3.1		Maclaurin's theorem for a function of one variable.
14	3.2		Taylor's theorem for a function of two variables.
15	3.2		Maclaurin's theorem for a function of two variables.
16	3.3		Maxima and Minima of functions of several variables.
17	3.4		Lagrange Method of Multipliers.
18	3.4		Numerical based on Lagrange Method of Multipliers.
19	3.5		Jacobians and its properties.
20	3.5		Jacobians of implicit function.
21	3.5		Functional relationship by Jacobians.
22	3.6		Approximation of errors.

23	1.1	**UNIT-1 (Matrices)**	Elementary transformation & inverse using elementary transformation.
24	1.2		Rank of matrix by Echelon form.
25	1.2		Rank of matrix by Normal form & Normal form of the matrix A in the form of PAQ.
26	1.3		System of Homogeneous linear equations.
27	1.3		System of non-homogeneous linear equations.
28	1.4		Characteristic equation, Cayley-Hamilton Theorem and its application.
29	1.5		Linear dependence and independence of vectors.
30	1.6		Eigen values, Eigen vectors and its properties.
31	1.7		Complex Matrices: Hermitian & Skew-Hermitian Matrices
32	1.8		Complex Matrices: Unitary Matrices.
33	1.9		Application of Matrices to Engineering problems.
34	4.1	**UNIT-4 (Multiple Integration)**	Double integral: Cartesian form & Polar form.
35	4.2		Triple integral.
36	4.3		Change of order of integration.
38	4.4		Change of variables: Cartesian into polar.
39	4.4		Change of variables: Cartesian into cylindrical.
40	4.4		Change of variables: Cartesian into spherical.
41	4.5		Beta function and its properties.
42	4.6		Gamma function and its properties.
43	4.6		Relation between Beta & Gamma function with based examples.
44	4.7		Dirichlet's integral and its applications to area, volume & mass
45	4.8		Liouville's extension of Dirichlet's integral.
46	5.1	**UNIT-5 (Vector Calculus)**	Introduction of vector, scalar function and basic operations.
47	5.1		Vector Differentiation: Gradient and its Physical interpretation.
48	5.2		Vector Differentiation: Directional derivatives.
49	5.3		Vector Differentiation: Divergence and its Physical interpretation.
50	5.4		Vector Differentiation: Curl and its Physical interpretation.
51	5.4		Vector identities for Gradient, Divergence & Curl.
52	5.5		Vector Integration: Line integral, Surface integral & Volume integral.
53	5.8		Gauss's Divergence theorem (without proof) and their applications
54	5.9		Green's theorem (without proof) and their applications
55	5.10		Stoke's theorem (without proof) and their applications

Reference books:

1. Engineering Mathematics-I, H.K. Dass, S. Chand Publications.

2. Engineering Mathematics-I, N. P. Bali, Manish Goyal, Laxmi Publications.

3. R.K. Jain & S.R.K. I Yenger, Advanced Engineering Mathematics, Tata Mc Graw-Hill.