

## ENGINEERING MATHEMATICS – II

Lectures	: 4 periods / week	Internal Assessment	: 40 Marks
Tutorials	: 1 period / week	Semester End Examination	: 60 Marks
Semester Exam	: 3 hrs	Credits	: 4

### UNIT – I (15)

**Matrices:** Rank of a matrix, vectors, Consistency of linear system of equations, Linear transformations, Characteristic equation, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), Reduction to diagonal form.

### UNIT – II (15)

Reduction of quadratic form to canonical form, Nature of a quadratic form, Complex matrices.

**Differential Calculus:** Rolle's Theorem (without proof), Lagrange's Mean value Theorem (without proof), Taylor's and Maclaurin's Series for single variable (without proof). Maxima and minima of two variables, Lagrange's method of undetermined multipliers.

### UNIT – III (15)

**Vector Calculus:** Scalar and vector point functions, Del applied to scalar point functions, Gradient, Del applied to vector point functions, Physical interpretation of divergence and curl, Del applied twice to point functions, Del applied to products of point functions. Integration of vectors, Line integral, Surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integral, Gauss divergence theorem (without proof).

### UNIT – IV (15)

**Laplace Transforms:** Introduction, Transforms of elementary functions, properties of Laplace Transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, multiplication by  $t^n$ , division by  $t$ . Evaluation of integrals by Laplace Transforms, Periodic function, Inverse Transforms, Convolution theorem (without proof), Application to Differential equations with constant coefficients.

#### **Text Book:**

Higher Engineering Mathematics by B.S. Grewal, Khanna publishers, 40<sup>th</sup> edition, 2007.

#### **Reference Book:**

Advanced Engineering Mathematics by Kreyszig, 8<sup>th</sup> edition, 2007.

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### LESSON PLAN & DELIVERY:

Instruction Period No.	Topic covered
	<b>UNIT-I: Matrices</b>
1	Introduction, Rank of a matrix
2	Normal Form, Problems
3	Problems, Normal Form through PAQ
4	Problems, Consistency of Linear Systems
5	Non Homogeneous System of equations
6	Problems, Homogeneous System of equations
7	Problems, Linear Transformations
8	Eigen values, Eigen vectors, Characteristic equation
9	Eigen value problems
10	Eigen value problems
11	Properties of Eigen values
12	Cayley-Hamilton Theorem
13	Problems
14	Reduction to diagonal form
15	Problems

	<b>UNIT-II: Quadratic Forms and Differential Calculus</b>
16	Reduction of quadratic form to Canonical form
17	Nature of a quadratic form , problems
18	problems
19	Complex Matrices
20	Problems
21	Rolle's Theorem, problems
22	Lagrange's Mean value Theorem, Problems
23	problems
24	Taylor's and Maclaurin's Series for single variable
25	Problems
26	Problems
27	Maxima and minima of two variables
28	Problems
29	Lagrange's method of undetermined multipliers
30	Problems
	<b>UNIT III: Vector Calculus</b>
31	Introduction, Scalar and vector point functions
32	Del applied to scalar point functions, Gradient
33	Directional Derivative, Problems
34	problems
35	Del applied to vector point functions, Problems
36	Del applied twice to point functions
37	Problems, Del applied to products of point functions
38	Integration of vectors, Line integral
39	Problems, Surface integral
40	Problems, Green's Theorem in the plane
41	problems
42	Stoke's Theorem
43	Problems, Volume integral
44	Gauss's Divergence theorem
45	problems
	<b>UNIT IV: Laplace Transforms</b>
46	Introduction, Transforms of elementary functions
47	Properties of Laplace Transforms, Existence conditions

48	problems
49	Transforms of derivatives
50	Transforms of integrals
51	problems
52	Multiplication by t, division by t
53	problems
54	Evaluation of Integrals by Laplace Transforms
55	Laplace Transform of Periodic function
56	Inverse Transforms
57	problems
58	Convolution Theorem
59	Application to D.E's with constant coefficients
60	problems

**Text Book:**

Higher Engineering Mathematics by Dr.B.S. Grewal, Khanna publishers, 40<sup>th</sup> edition, 2007.

**Reference Book:**

Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> edition, 2007.