# ENGINEERING MATHEMATICS - II

## B.Tech. First Year, II - Semester

## Common for all branches

## [R-15 Regulation]

| Credits | Periods | | | Exam Hrs. | Sessional Marks | Exam Marks | Total Marks |
|---------|---------|----------|-----|-----------|-----------------|------------|-------------|
| | Theory | Tutorial | Lab | | | | |
| 3 | 3 | 1 | - | 3 | 40 | 60 | 100 |

**Purpose :**

 To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering

**Course Objectives:**

- To impart knowledge in basic concepts of solving linear system of equations.
- To enable the students to study the eigen values and eigen vectors of matrix.
- To introduce the concepts of ordinary differential equations and their applications to engineers.
- To enable the students to solve any higher order differential equations and to solve the differential equations related to simple electric circuits, Newtons law of cooling.
- To introduce the students to Laplace transforms and their applications.

| **Course Outcomes : At the end of the course, the student will be able to** |
|---|

| 1 | Solve linear system equations using of matrix algebra techniques. |
|---|---|
| 2 | Determine the eigen values and vectors of a matrix. |
| 3 | Apply different techniques in solving differential equations that model engineering problem. |
| 4 | Use the application of differential equations like simple electric circuits, Newton's law of cooling and to solve any higher order linear ordinary differential equation with constant coefficients. |
| 5 | Solve linear differential equations and network analysis using Laplace transforms. |

**CO-PO Mapping :**

| | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PO-9 | PO-10 | PO-11 | PO-12 |
|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO-1 | 3 | 2 | | | | | | | | | | 1 |
| CO-2 | 3 | 2 | | | | | | | | | | 1 |
| CO-3 | 3 | 2 | | 1 | | | | | | | | 1 |
| CO-4 | 3 | 2 | | 1 | | | | | | | | 1 |
| CO-5 | 3 | 2 | | 1 | | | | | | | | 1 |

# SYLLABUS

**UNIT – I:  LINEAR ALGEBRA**                                                        **(11 Periods)**

Rank of matrix – Elementary transformation of a matrix – Gauss Jordan method of finding the inverse – Normal form of the matrix – PAQ form – Consistency of linear system of equations – System of homogeneous and non- homogeneous equations.


**UNIT – II :  LINEAR TRANSFORMATIONS & CANONICAL FORMS**     **(12 Periods)**

Linear transformations – Orthogonal transformations – Vectors (Linearly independent & dependent) – Eigen values – Eigen vectors – Properties of eigen values – Cayley-Hamilton theorem (without proof) – Reduction to diagonal form – Reduction of quadratic form to canonical form – Nature of quadratic form,.


**UNIT – III :  DIFFERENTIAL EQUATIONS OF FIRST ORDER AND ITS
         APPLICATIONS**                                                        **(10 Periods)**

First order Linear differential equations – Bernoulli's equations – Exact differential equations – Equations reducible to exact equations  – Orthogonal trajectories – Simple  electric circuits  –  Newton law of cooling.


**UNIT – IV: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS**     **(10 Periods)**

Definitions – Rules for finding the complementary function – Rules for finding the particular integral – Method of variation of parameters – Equations reducible to linear equations with   constant coefficient   – Cauchy's homogeneous linear equation – Legendre's linear equation.

**UNIT – V :  LAPLACE TRANSFORMS**                                        **(17 Periods)**

Introduction – Definitions  – Transforms of elementary functions  –  Properties of Laplace transforms  –  Transforms of  periodic functions  –  Transforms of derivatives  – Transforms of integrals  –  Multiplication by $t^n$ –   division by $t$ – Evaluation of integrals by Laplace transforms.  Inverse Laplace transforms – Other methods of finding inverse transforms (Excluding Residue method) Convolution theorem – Application's  to Differential equations  – Unit step function  –  Unit impulsive functions.

**TEXT BOOK:**

1. **Dr. B.S. Grewal**,  "*Higher Engineering Mathematics*", 43rd edition, Khanna Publishers, New Dehli.

**REFERENCE BOOKS:**

1. **Dr. N.P. Bali,  Dr.  Ashok Saxena, Dr. N.Ch. S. Narayana**,  "*A Text book on Engineering Mathematics*",  Laxmi Publications (P)Ltd.,  New Delhi.
2. **H. K. Dass**, "*Advanced Engineering Mathematics*",  S. Chand and Company Ltd.
3. **Dr. M. K. Venkataraman**, "*Higher Engineering Mathematics*",  National Publications Co. Madras.
4. **Erwin Kreyszig**. "*Advanced Engineering Mathematics*",  John Wiley and Sons, New York.