## 22MT110 MATRICES AND DIFFERENTIAL EQUATIONS

Hours Per Week :

| L | T | P | C |
| :---: | :---: | :---: | :---: |
| 3 | 2 | 0 | 4 |

## PREREQUISITE KNOWLEDGE:

School level Mathematics, Differentiation and Integration

## COURSE DESCRIPTION AND OBJECTIVES:

This course will help the students to learn the concepts of matrices and differential equations. Also they can apply these concepts in any engineering and science domains.

## MODULE-1

12L+8T+0P=20 Hours

## MATRICES

Definition of matrix; Types of matrices, Algebra of matrices, adjoint of a matrix, inverse of a matrix by elementary operations, Rank of a matrix, Echelon form, Normal form.

12L+8T+0P=20 Hours

## APPLICATIONS OF MATRICES

Consistency of system of linear equations, Solution of system of linear equations by Gauss elimination method and Gauss Jordan method.

Eigen values and Eigen vectors (up to $3 \times 3$ matrices only) and properties (without proofs).

## PRACTICES:

- Identify the matrix and do various operations on it.
- Finding rank of matrix.
- Solving a system of equation using matrix method
- Find Eigen values and Eigen vectors.


## MODULE-2

UNIT-1
12L+8T+0P=20 Hours

## ORDINARY DIFFERENTIAL EQUATIONS

First Order Differential Equations: Introduction to ODE, variable separable method, homogenous and non-homogenous differential equations, linear differential equations, Bernoulli's equations.

Second Order Differential Equations: Linear Homogeneous and non-homogeneous differentia equations with constant coefficients (RHS is eax, $\mathrm{xn}, \sin (\mathrm{ax})$ or $\cos (\mathrm{ax})$ ).

## APPLICATIONS OF ODE

Applications of ODE: Newton's law of cooling, Law of natural growth and decay, LC circuit.

## PRACTICES:

- Finding Solutions of Differential Equations.
- Apply the concepts of Differential equations.


## COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

| CO <br> No. | Course Outcomes | Blooms <br> Level | Module <br> No. | Mapping <br> with POs |
| :---: | :--- | :--- | :--- | :--- |
| 1 | Apply elementary transformations to find the rank <br> and inverse. | Apply | 1 | $1,2,9,10,12$ |
| 2 | Solve the Ordinary differential equations. | Apply | 2 | $1,2,9,10,12$ |
| 3 | Apply the differential equation in various problems. | Apply | 2 | $1,2,9,10,12$ |
| 4 | Examine the consistency of the system of linear <br> equations. | Analyse | 1 | $1,2,9,10,12$ |

## TEXT BOOKS:

1. N. P. Bali, K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", 2nd Edition, Universal Science Press, New Delhi, 2018.
2. B. S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, 2018.

## REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley \& Sons, Inc., 2015
2. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3rd Edition, S. Chand \& Co., 2015.
3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers, 2020.
