II SEMESTER   **MATHEMATICS**   Time:2hrs/week

M-Ma1-2351(2)   **DIFFERENTIAL EQUATIONS**   Marks:50

w.e.f AK 2023-2024 (Admitted batch) **PRACTICAL SYLLABUS**

Course Objectives:

To enable the students to –

- ➢ Analyze the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.

- ➢ Evaluate a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.

- ➢ Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.

- ➢ Solve simultaneous linear equations with constant coefficients and total differential equations

- ➢ Find the solution of First order partial differential equations for some standard types

- ➢ Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations

- ➢ Compute all the solutions of Higher Order Linear Differential Equations with Constant Coefficients and non-Constant Coefficients

Course Outcomes

After successful completion of this course, the student will be able to
1. Solve first order first degree linear differential equations.
2. Convert a non-exact homogeneous equation to exact differential equation by using an integrating factor.
3. Know the methods of finding solution of a differential equation of first order but not of first degree.
4. Solve higher-order linear differential equations for both homogeneous and non-homogeneous, with constant coefficients.
5. Understand and apply the appropriate methods for solving higher order differential equations.

COURSE CONTENT

UNIT – 1: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE:

Linear Differential Equations – Bernoulli's Equations - Exact Differential Equations –

Integrating factors - Equations reducible to Exact Equations by Integrating Factors -

i) Inspection Method   ii) $\frac{1}{Mx+Ny}$ iii) $\frac{1}{Mx-Ny}$

UNIT – 2:

DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT OF FIRST DEGREE

Equations solvable for p, Equations solvable for y, Equations solvable for x – Clairaut's equation - Orthogonal Trajectories: Cartesian and Polar forms.

UNIT – 3

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS:

Solutions of homogeneous linear differential equations of order n with constant coefficients - Solutions of non-homogeneous linear differential equations with constant coefficients by means of polynomial operators

      (i) $Q(x) = e^{ax}$ (ii) $Q(x) = Sin\ ax$ (or) $Cos\ ax$

UNIT – 4

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (CONTINUED.)

Solution to a non-homogeneous linear differential equation with constant coefficients

P.I. of $(D)y = Q$ when $Q = bx^k$

P.I. of $(D)y = Q$ when $Q = e^{ax}V$, where V is a function of x

P.I. of $(D)y = Q$ when $Q = xV$, where V is a function of x

UNIT – 5:

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH NON-CONSTANT COEFFICIENTS:

Linear differential Equations with non-constant coefficients; Cauchy-Euler Equation; Legendre Equation; Method of variation of parameters

ACTIVITIES :
Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving Sessions.

TEXT BOOK :
Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.

REFERENCE BOOKS:
1. Ordinary and Partial Differential Equations by Dr. M.D. Raisinghania, published by S. Chand & Company, New Delhi.
2. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha-Universities Press.
3. Differential Equations -Srinivas Vangala &Madhu Rajesh, published by Spectrum University Press.

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