ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

# II SEMESTER MATHEMATICS Time:4hrs/week

M-Ma1-2301(3) **DIFFERENTIAL EQUATIONS**  Marks:100

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

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**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) (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) = 𝑄 when 𝑄 = 𝑏

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

P.I. of (𝐷) = 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 V.Venkateswara rao, N.Krishna Murthy, B.V.S.S.Sarma and S.Anjaneya Sastry, published by S. Chand &Company, New Delhi.

**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.

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

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