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

I SEMESTER **MATHEMATICS** TIME:5HRS/WEEK

M 1302 (3)  **DIFFERENTIAL EQUATIONS** MAX.MARKS:100

w.e.f 2020-2021(‘AH’Batch) **SYLLABUS**

**COURSE OUTCOMES:** After successful completion of this course, the student will be able to:

1. Solve linear differential equations
2. Convert non-exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the First degree.
4. Solve higher-order linear differential equations, both homogeneous and non-homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential
   1. equations.

**COURSE SYLLABUS:**

**UNIT – I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE:** Linear Differential Equations, Differential equations reducible to linear form, Exact Differential equations, Equations reducible to exact from: Integrating factors,Change of variables.

**UNIT – II:**

1. **ORTHOGONAL TRAJECTORIES:**

Definitions, Cartesian Coordinates, Working rule to find the Orthogonal Trajectories of a given Family of Curves, Self-Orthogonal Family of Curves, Polar Coordinates.

**(b) DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT OF THE FIRST DEGREE**:

Equations solvable for *p*, Equations solvable for *x*, Equations solvable for *y*, Equations do not contain x (or y), Equations of the first degree in *x* and *y* – Clairaut’s Equation. Equations reducible to Clairaut’s form.

**UNIT – III: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS - I:**

Solution of homogeneous linear differential equations with constant coefficients, Solution of non-homogeneous equations with constant coefficients by means of Polynomial operators. General Solution of f(D)*y* = 0.

General Solution of f(D)*y* = Q when Q is a function of *x*, is expressed as partial fractions.

P.I. of f(D)y = Q when Q =

P.I. of f(D)y = Q when Q is bsinax or bcosax.

**UNIT – IV: (a) HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS - II:**

Solution of the non-homogeneous linear differential equations with constant coefficients

P.I. of f(D)y = Q when Q = b

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

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

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

**(b) SYSTEM OF LINEAR DIFFERENTIAL EQUATIONS:**

Definitions, Solution of a system of linear equations with constant coefficients, Degenerate and non-degenerate system, General solution of the system of two linear differential equations with constant coefficients, An equivalent triangular system, Degenerate case, The system of three linear equations.

**UNIT – V:**

**(a) HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS - III:**

Method of variation of parameters, Linear Differential Equations with non-constant Coefficients, The Cauchy-Euler Equation, Legendre's linear equation, miscellaneous differential equations.

**(b) PARTIAL DIFFERENTIAL EQUATIONS:**

Formation of partial differential equations, equations of first order, Lagrange’s linear equation, Charpit’s method, standard types of first order non-linear partial differential equations.

**CO-CURRICULAR ACTIVITIES :**

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

**PRESCRIBED TEXT BOOKS:**

A Text book of B.Sc Mathematics, Vol-I (First Semester) by S.Chand Publications – 2020 Edition.

**REFERENCE BOOKS:**

1. A Text book of Mathematics – Vol I – Vashishta&Vashishta (1998)

2. Differential Equations - J.N.Sharma, Dr.R.K.Gupta-Krishna Prakash Media Pvt Ltd (1996)

3. Differential Equations - M.L.Khanna- Jai Prakash&Co(1954)

4. Differential Equations and Their Applications by ZafarAhsan, published by Prentice-Hall of

India Pvt. Ltd, New Delhi-Second edition.

5. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand

& Company, New Delhi.

6. Differential Equations with applications and programs – S. BalachandraRao& HR

Anuradha- Universities Press.

7. Differential Equations –SrinivasVangala & Madhu Rajesh, published by Spectrum University

Press.

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

I SEMESTER  **MATHEMATICS** TIME: 2 HRS/WEEK

M 1352 (2)  **DIFFERENTIAL EQUATIONS** MAX. MARKS: 50

w.e.f 2020-2021(AH Batch) **PRACTICALSYLLABUS – I A**

**COURSE OUTCOMES:** After successful completion of this course, the student will be able to;

1. Solve linear differential equations

2.Convert non-exact homogeneous equations to exact differential equations by using integrating factors.

3. Know the methods of finding solutions of differential equations of the first order but not of the First degree.

4. Solve higher-order linear differential equations, both homogeneous and non-homogeneous, with constant coefficients.

5. Understand the concept and apply appropriate methods for solving differential equations.

**COURSE SYLLABUS:**

**UNIT – I:** Differential Equations of first order and first degree

**UNIT – II:** (a) Orthogonal Trajectories

(b) Differential Equations of first order but not of the first degree

**UNIT – III:** Higher order linear differential equations - I

**UNIT – IV:** (a) Higher order linear differential equations - II

(b) System of Linear Differential Equations

**UNIT –V:** (a) Higher order linear differential equations - III

(b) Partial Differential Equations

**PRESCRIBED TEXT BOOKS:**

A Text book of B.Sc Mathematics, Vol-I (First Semester) by S.Chand Publications - 2020 Edition

**REFERENCE BOOKS:**

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7. Differential Equations –Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.

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