

## SEMESTER-II

### COURSE 1: DIFFERENTIAL EQUATIONS

Theory

Credits: 4

5 hrs/week

#### 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  $f(D)y = Q$  when  $Q = bx^k$

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

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