

**Name of Faculty: Dr. Sanjeet Kumar**

**Designation: Professor & Head**

**Department: Mathematics,**

**LNCT&S, Bhopal (M.P)**

## **Assignment-1**

**Subject: Mathematics-II**

**(BT-202)**

**(Common to All Branches)**

**Topic: Ordinary Differential Equations -I**

**1. Solve**

(i)  $(1 + y^2)dx = (\tan^{-1} y - x)dy$

(ii)  $\frac{dy}{dx}(x^2 y^3 + xy) = 1$

(iii)  $\frac{dy}{dx} + \frac{y}{x} = x^2$  given  $y = 1$  when  $x = 1$

(iv)  $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$

(v)  $(3x^2 y^4 + 2xy)dx + (2x^3 y^3 - x^2)dy = 0$

2. Solve the differential equation

(i)  $p(p - y) = x(x + y)$

(ii)  $p^2 + 2py \cot x - y^2 = 0$

(iii)  $y = 2px + y^2 p^3$

3. Solve the differential equation

(i)  $(D^2 + 3D + 2)y = 4 \cos^2 x$

(ii)  $(D^2 - 4D + 4)y = 8(e^{2x} + \sin 2x + x^2)$

(iii)  $(D^2 + 2D + 4)y = e^x \cdot \sin 2x$

(iv)  $(D^2 - 2D + 1)y = x \cdot e^x \cdot \sin x$

(v)  $(D^2 + a^2)y = \sec ax$

4. Solve Cauchy Homogeneous Linear Differential Equation:

(i)  $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 3y = x^2 \log x$

(ii)  $x^3 \frac{d^3 y}{dx^3} + 2x^2 \frac{d^2 y}{dx^2} + 2y = 10 \left( x + \frac{1}{x} \right)$

5. Solve the simultaneous equation:

(i)  $\frac{dx}{dt} + y = \sin t$   
 $\frac{dy}{dt} + x = \cos t$

(ii)  $\frac{dx}{dt} + 5y + y = e^t$   
 $\frac{dy}{dt} - x + 3y = e^{2t}$

given that  $x=2$  and  $y=0$  when  $t=0$

-----XXXXX-----