

7. (a) Solve  $y'' + (1-x)y' - y = e^x$ . (7)

(b) Transform the differential equation

$$\cos x \cdot y'' + \sin x \cdot y' - 2y \cos^3 x = 2 \cos^5 x$$

into the one having  $z$  as independent variable, where

$z = \sin x$  and solve it. (8)

Roll No. ....

Total Pages : 4

**321406**

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**B.Sc. (PHYSICS) - IV SEMESTER**

**INTRODUCTION TO DIFFERENTIAL EQUATIONS**

**(OSU-214-V)**

Time : 3 Hours]

[Maximum Marks : 75

*Instructions :*

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART - A**

1. (a) Form the differential equation from the equation  $x = a \sin(at + b)$ . (1.5)

(b) Find solution of given differential equation

$$(x - y)^2 \frac{dy}{dx} = a^2. \quad (1.5)$$

- (c) Find the solution of given differential equation  $x^2ydx - (x^3 + y^3)dy = 0$ . (1.5)
- (d) Find Complementary function of given equation  $\frac{d^3y}{dx^3} + y = 0$ . (1.5)
- (e) Solve  $\frac{d^2x}{dt^2} - 4\frac{dx}{dt} + 13x = 0$ , given  $x(0) = 2$ ,  $\frac{dx}{dt}(0) = 2$ . (1.5)
- (f) Calculate Wronskian of given equation  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ . (1.5)
- (g) What is the difference between order and degree of differential equation? (1.5)
- (h) Explain Method of undetermined coefficients. (1.5)
- (i) Solve the equation  $y = 2px - p^2$ . (1.5)
- (j) Solve the equation  $x - yp = ap^2$ . (1.5)

### PART - B

2. (a) Solve the given differential equation  $x^4\frac{dy}{dx} + x^3y + \operatorname{cosec}(xy) = 0$ . (7)
- (b) Solve the given differential equation  $\frac{dy}{dx} = y \tan x - y^2 \sec x$ . (8)
3. (a) Find solution of given differential equation  $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$ . (7)

- (b) (i) Solve the equation  $p(p + y) = x(x + y)$ .
- (ii) Find the general and singular solution of given equation  $xp^3 - yp^2 + 1 = 0$ . (8)

4. (a) Find the complete solution of given equation  $(D^2 + 1)^2y = x^4 + 2\sin x \cos 3x$ . (7)
- (b) Solve by the method of variation of parameter,  $y'' - 2y' + 2y = e^x \tan x$ . (8)
5. (a) Solve the given equation by changing the independent variable  $x^6y'' + 3x^5y' + a^2y = \frac{1}{x^2}$ . (7)
- (b) Solve the given differential equation by using Method of variation of parameters  $(x - 1)D^2y - xDy + y = (x - 1)^2$ , where  $D = d/dx$ . (8)

- (a) Find the solution of given equation by using method of undetermined coefficients  $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = x + \sin x$ . (7)
- (b) Find C.F. and P.I. of given differential equation  $\frac{d^2y}{dx^2} + a^2y = \tan ax$ . (8)