

2021

B.A./B.Sc. (General) Third Semester

Mathematics

Paper – II: Differential Equations - I

Time allowed: 3 Hours

Max. Marks: 30

**NOTE:** Attempt five questions in all, selecting atleast two questions each Unit. $x-x-x$ **UNIT – I**

- I. a) Define exact differential equation and solve  $\frac{dy}{dx} = \frac{x-4y+7}{4x+y-8}$ .
- b) If  $Mdx + Ndy = 0$  is homogeneous in  $x, y$  show that  $\frac{1}{Mx + Ny}$  is I.F.  
Where  $Mx + Ny \neq 0$  (2x3)
- II. a) Solve  $x = y + a \log p$ ,  $p > 0$ .
- b) Find singular solution of  $y = px + p^2$ . (2x3)
- III. a) Find orthogonal trajectory of  $y = ax^2$
- b) Solve  $(D^2 + 2D + 1)y = e^{-x}$  (2x3)
- IV. a) Solve  $(D^2 + 4)y = x \cos x$
- b) Solve  $(D^2 + 3D + 2)y = \sin(e^x)$ . (2x3)

**UNIT – II**

- V. a) Solve  $\{x^2D^2 - 3xD + 3\}y = x^2$
- b) Solve  $\{(5 + 2x)^2 D^2 - 6(5 + 2x) D + 8\} y = 0$ . (2x3)
- VI. a) Solve by method of reduction of order  $(D^2 + 4)y = \sec(2x)$
- b) Solve by variation of parameters  
 $(D^2 + 1)y = \tan x$  (2x3)
- VII. a) Solve  $\{x^2 D^2 - (x^2 + 2x)D + (x + 2)\} y = x^3 e^x$  by changing dependent variable.
- b) Solve  $\{xD^3 + (x^2 - 3) D^2 + 4xD + 2\} y = 0, x > 0$ . (2x3)

P.T.O.

(2)

VIII. Solve  $\frac{dx}{dt} + \frac{dy}{dt} + x - y = e^t$  and  $\frac{dx}{dt} + \frac{dy}{dt} + \frac{dx}{dt} - \frac{dy}{dt} + x + y = t^2$ . (6)

 $x-x-x$ 

Dr. Himanshu Singla

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