

(i) Printed Pages : 2

Roll No.

(ii) Questions : 8

Sub. Code :

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Exam. Code :

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B.A./B.Sc. (General) 3rd Semester
(2122)

MATHEMATICS

Paper-II (Differential Equations-I)

Time Allowed : Three Hours]

[Maximum Marks : 30

Note :—Attempt five questions in all, by selecting at least two questions from each Unit.

UNIT-I

1. (a) Solve the differential equation :

$$x(x^2 + y^4)dx + 2y^3dy = 0. \quad 3$$

- (b) Show that if $Mdx + Ndy = 0$ is homogenous in x and

y then $\frac{1}{Mx + Ny}$ is I.F., where $Mx + Ny \neq 0$. 3

2. (a) Solve $y = p \sin p + \cos p$. 3

- (b) Find singular solution of $y = px + p^2$. 3

3. (a) Find orthogonal trajectories of family of ellipses

$$\frac{x^2}{1} + \frac{y^2}{b^2} = 1. \quad 3$$

- (b) Solve $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$. 3

4. (a) Solve $(D^4 - 1)y = \cos ax \cos bx$. 3

(b) Solve $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = x$. 3

UNIT-II

5. Solve $\{x^2D^2 + 3xD + 1\}y = (1 - x)^{-2}$. 6

6. (a) Solve by variation of parameters $(D^2 + a^2)y = \sin ax$. 3

(b) Solve by reduction of order $(D^2 - 1)y = x - 1$. 3

7. (a) Solve $\frac{d^2y}{dx^2} + \cot x \frac{dy}{dx} + 4y \operatorname{cosec}^2 x = 0$. 3

(b) Solve $x \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} + 2y = 0$. 3

8. Find general solution of the system :

$$\frac{dx}{dt} = 5x - y, \frac{dy}{dt} = 3x + y. \quad 6$$