

(i) Printed Pages :3]

Roll No.

(ii) Questions :8]

Sub. Code :

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Exam. Code:

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**B.A./B.Sc. (General) 3rd Semester
Examination**

1127

MATHEMATICS

(Differential Equations-I)

Paper : II

Time : 3 Hours]

[Max. Marks : 30

Note :- Attempt five questions, selecting at least two questions from each Unit.

Unit-I

1. (a) Is integrating factor of $Mdx + Ndy = 0$ unique.
Justify.

(b) State and Prove sufficient condition for
 $Mdx + Ndy = 0$ to be exact.

3,3

2. (a) Solve :

$$x^2 p^2 - 2xyp + 2y^2 - x^2 = 0$$

(b) Solve :

$$\frac{2y}{x} - p = f\left(\frac{px - y}{x^2}\right) \quad 3,3$$

3. (a) Find singular solution of $3p^2 e^2 - px + 1 = 0$.

(b) Find orthogonal trajecton'es of family of ellipses with centres at (0, 0) and two vertices at (1, 0), (-1, 0). 3,3

4. (a) Solve :

$$(D^4 - D^2) y = 4$$

(b) Solve :

$$(D^2 - 4D + 4)y = e^{2x} \cos x^2 \quad 3,3$$

Unit-II

5. (a) Solve :

$$(x^2 D^2 + xD - 9) y = 0$$

given that $y = x^3$ is a solution.

(b) Solve by niethod of variation of parameters

$$(D^2 - 1)y = 2(1 - e^{-2x})^{-1/2} \quad 3,3$$

6. Reduce :

$$2x^2y \frac{d^2y}{dx^2} + 4y^2 = x^2 \left(\frac{dy}{dx} \right)^2 + 2xy \left(\frac{dy}{dx} \right)$$

to Cauchy's form and hence solve it.

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7. (a) Solve :

$$[(1+x)^2 D^2 + (1+x)D + 1]y = 4 \cos [\log (1+x)]$$

(b) Solve :

$$x \frac{d^2y}{dx^2} - \frac{dy}{dx} - 4x^3y = 8x^3 \sin x^2$$

by changing the independent variable.

3,3

8. (a) Find general solution of the linear system :

$$\frac{dx}{dt} = -2x + 7y$$

$$\frac{dy}{dt} = 3x + 2y$$

(b) Solve : $Dx + 4Dy = 3y$ and $D^2x - Dy = 2x + 2t$

where $D = \frac{d}{dt}$.