(i) Printed Pages : 2   Roll No. ....

(ii) Questions : 8   Sub. Code : | 1 | 7 | 2 | 4 | 2 |

Exam. Code : | 0 | 0 | 0 | 3 |

B.A./B.Sc. (General) 3rd Semester
(2124)
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) If in the differential equation $Mdx + Ndy = 0$, M and N are homogenous functions of same degree in x and y then

show that $\dfrac{1}{Mx + Ny}$ is I-F, where $Mx + Ny \neq 0$.   3

(b) Solve $(x^2 + y^2 + 2x)\, dx + 2y\, dy = 0$.   3

2. (a) Solve $y - 2px = \tan^{-1}(xp^2)$ 3

(b) Find Singular solution of $(xp - y)^2 = p^2 - 1$.   3

3. (a) Find Orthogonal trajectories of family of parabolas $y = ax^2$.   3

(b) Solve $(D^3 + 1)\, y = \cos 2x$.   3

4. (a) Solve $(D^2 + 1)\, y = xe^{2x}$.   3

(b) Solve $(D^2 - 3D + 2)\, y = \sin(e^{-x})$ 3

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UNIT—II

5. (a) Solve $\{x^2D^2 + 4xD + 2\}y = e^x$, $x > 0$ 3

    (b) Solve $\{(2x-1)^3D^3 + (2x-1)D - 2\}y = 0$ 3

6. (a) Using variation of parameters solve $(D_2 + 1)y = \tan x$.   3

    (b) Solve $(D^2 + a^2)y = \sec ax$ by reduction of order.   3

7. Solve $x^2 \dfrac{d^2y}{dx^2} - (x^2 + 2x)\dfrac{dy}{dx} + (x+2)y = x^3 e^x$, by changing the dependent variable.   6

8. (a) Solve $\dfrac{dx}{dt} = 3x - y$ and $\dfrac{dy}{dt} = 4x - y$ 3

    (b) Solve $(1 + x^2)\dfrac{d^2y}{dx^2} + 3x\dfrac{dy}{dx} + y = 0$ 3