(i) **Printed Pages : 2**

(ii) **Questions : 8**

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 :

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

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

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

2. (a) Solve y = p sinp + cosp. 3

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

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

   $$\dfrac{x^2}{1} + \dfrac{y^2}{b^2} = 1.$$ 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 $\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx} - 6y = x$.　　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 $\dfrac{d^2y}{dx^2} + \cot x \dfrac{dy}{dx} + 4y \csc^2 x = 0$.　　3

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

8.　Find general solution of the system :

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