FACULTY OF SCIENCE
B.Sc. II-Semester (CBCS) Examination, May / June 2017
Subject : Mathematics
Paper – II : Differential Equations

Time : 3 Hours   Max. Marks: 80

PART – A (5 x 4 = 20 Marks)
(Short Answer Type)
Note : Answer any FIVE of the following questions.

1 Show that the equation

$$xdx + ydy = \frac{a^2(xdy - ydx)}{x^2 + y^2} \text{ is exact.}$$

2 Solve $\dfrac{dx}{x(y^2 - z^2)} = \dfrac{dy}{y(z^2 - x^2)} = \dfrac{dz}{z(x^2 - y^2)}$

3 Solve $\dfrac{d^3 y}{dx^3} + y = e^{-x} + 1$

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

5 Find the particular integral of $\dfrac{d^2 y}{dx^2} + y = \sec x$ by method of variation of parameters.

6 Solve $x^2 \dfrac{d^2 y}{dx^2} - x\dfrac{dy}{dx} + y = 2\log x$

7 Solve $pz - qz = (x + y)^2 + z^2$

8 Solve $\sqrt{p} + \sqrt{q} = 1$

PART – B (4 x 15 = 60 Marks)
(Essay Answer Type)
Note: Attempt ALL the questions.

9 (a) Solve $(xy^2 - x^2)dx + (3x^2 y^2 + x^2 y - 2x^3 + y^2)dy = 0$

OR

   (b) Solve $y + px = x^4 p^2, \left(p = \dfrac{dy}{dx} \right).$

10 (a) Solve $(D^2 - 4D + 4)y = 8(x^2 + e^{2x} + \sin 2x).$

OR

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

11 (a) Solve $(D^2 + 4D + 4)y = 4x^2 + 6e^x$ by method of undertermined coefficients.

OR

    (b) Solve $x^4 \dfrac{d^3 y}{dx^3} + 2x^3 \dfrac{d^2 y}{dx^2} - x^2 \dfrac{dy}{dx} + xy = 1$

12 (a) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy.$

OR

    (b) Solve $\dfrac{\partial u}{\partial x} = 2\dfrac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$ by the method of separation of variables.

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