UG–C–2283 **BMS–13X/ BPHYA–01X**

U.G. DEGREE EXAMINATION — DECEMBER 2023

Mathematics

First Year

DIFFERENTIAL EQUATIONS

Time : 3 hours Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions out of Five questions in 100 words.

All questions carry equal marks.

1. Test for exactness and solve $\left(e^y + 1\right)\cos x\, dx + e^y \sin y dy = 0$.

2. Solve $\left(D^2 - 4D + 13\right)y = 0$.

3. State the Condition of exactness for a n^{th} order differential equation.

4. Form the partial differential equation by eliminating the arbitrary function from $z = f\left(x^2 - y^2\right)$.

5. Find $L^{-1}\left[\frac{1}{(s+1)^2+1}\right]$.

PART B — $(3 \times 7 = 21$ marks)

Answer any THREE questions out of Five questions in 200 words.

All questions carry equal marks.

6. Solve $(px - y)(py + x) = 2p$.

7. Solve $\left(D^2 + 5D + 4\right)y = x^2 + 7x + 9$.

8. Solve $\frac{dx}{y} = \frac{dy}{x} = \frac{dz}{z}$.

9. Solve $z = px + qy + \sqrt{1 + p^2 + q^2}$.

10. Solve $L\left[te^{-t}\sin t\right]$.

PART C — ($4 \times 10 = 40$ marks)

Answer any FOUR questions out of Seven questions in 500 words.

All questions carry equal marks.

11. Solve $p^2 + 2yp\cot x - y^2 = 0$.

12. Solve $y'' + y = \operatorname{cosec} x$.

13. Solve $\dfrac{dx}{x + y - xy^2} = \dfrac{dy}{x^2 y - x - y} = \dfrac{dz}{z\left(y^2 - x^2\right)}$.

14. Solve $\left(x^2 - yz\right)p + \left(y^2 - zx\right)q = z^2 - xy$.

15. Using Laplace transform, solve $y' - y = 1 - 2t, y(0) = -1$.

16. Solve $\left(x^2 D^2 + 4xD + 2\right)y = \sin(\log x)$.

17. Using Charpit's method, find the complete integral of the partial differential equation $(p + y)^2 + \left(q + x^2\right) = 1$.

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