

UG-477

BMS-13

**B.Sc. DEGREE EXAMINATION –
JANUARY 2009.**

First Year

Mathematics

DIFFERENTIAL EQUATIONS

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Solve : $p^2 + 2xp - 3x^2 = 0$.
2. Solve : $(D^2 + 9)y = e^{2x} + 2x^2$.
3. Solve : $(D^2 - 4D + 3)y = e^x \cdot \cos 2x$.
4. Eliminate the arbitrary functions f and g from the equation $z = f(x + ay) + g(x - ay)$.
5. Solve : $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$.
6. Solve : $p^3 = qz$.

7. Find $L [t \cos 2t]$.

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

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Solve : $(y^4 + 2y) dx + (xy^3 + 2y^4 - 4x) dy = 0$.

10. Solve : $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} - 5y = \sin (\log x)$.

11. Solve the equation

$$(x - 1) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = (x - 1)^2$$

by the method of variation of parameters.

12. Solve :

$$(1 + x + x^2) \frac{d^3 y}{dx^3} + (3 + 6x) \frac{d^2 y}{dx^2} + 6 \frac{dy}{dx} = 0.$$

13. Solve : $2xz - px^2 - 2qxy + pq = 0$.

14. Solve : $z^4 q^2 - z^2 p = 1$.

15. (a) Evaluate $\int_0^{\infty} \frac{e^{-t} \sin t}{t} dt$ using Laplace transforms. (5)

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

16. Using Laplace transforms, solve the equation

$$y^{(2)} + ty' - y = 0 \text{ when } y(0) = 0, y'(0) = 1.$$
