

UG-466

BMS-03

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

(AY – 2005-06 and CY – 2006 batches only)

First Year

Mathematics

DIFFERENTIAL EQUATIONS

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Solve : $\sin px \cdot \cos y = \cos px \cdot \sin y + p$.
2. Solve : $(x^2 - 1) \frac{dy}{dx} = 2 + 5x$.
3. Solve : $(x^2 + 4) \frac{dy}{dx} = x \cdot \cos 2x$.
4. Eliminate the arbitrary function f from $f(x^2 + y^2, z - xy) = 0$.
5. Solve : $x^2 p + y^2 q = x + y \frac{dz}{dx}$.

6. Solve : $\sqrt{p} + \sqrt{q} = \sqrt{y}$.

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

8. Find $L^{-1}\left[\frac{s}{(s+3)^2+4}\right]$.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Solve : $(x^2)\frac{d^2y}{dx^2} + (x)\frac{dy}{dx} + y = 4 \cos \log(x)$.

10. Solve : $2\frac{dx}{dt} + x + \frac{dy}{dt} = \cos t$

$\frac{dx}{dt} + 2\frac{dy}{dt} + y = 0$.

11. Solve $\frac{d^2y}{dx^2} + 4y = \operatorname{cosec} 2x$ by the method of variation of parameters.

12. Verify the condition of integrability in the equation $(2y - y^3 - y^2z)dx + (y^2 - x^2z - x^3)dy + (y^2 + x^2y)dz = 0$ and solve it.

13. Solve : $p + 3q = 5z + \tan^{-1}(3x)$.

14. Find the complete integral of the equation $p^2 + q^2 - 2px - 2qy + 2xy = 0$.

15. (a) Using Laplace transform, Evaluate $\int_0^\infty \frac{\cos 6t - \cos 4t}{t} dt$.

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

16. Using Laplace transform, solve the equation

$$t \frac{d^2 y}{dt^2} - t \frac{dy}{dt} + 2y = t - 1 \text{ when } y(0) = 0.$$
