UG–315	**BMS–03**

B.Sc. DEGREE EXAMINATION – JUNE 2008.

(AY 2005–2006, CY 2006 batch only)

First Year

Mathematics

DIFFERENTIAL EQUATION

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 : $(D^2 - 4)\ y = \sin^2 x$.

3. Solve : $(D^2 - 4D + 4)\ y = 3x^2 e^{2x} \sin 2x$.

4. Eliminate the arbitrary constants a and b from $z = (x + a)\ (y + b)$.

5. Solve : $x(y^2+z)p - y(x^2+z)\ q = z(x^2-y^2)$.

6. Solve : $3p^2 - 2q^2 = 4pq$.

7. Find $L\left[\frac{\sin^2 t}{t}\right]$.

8. Find $L^{-1}\left[\frac{s+3}{(s^2+6s+13)^2}\right]$.

PART B — $(5 \times 10 = 50$ marks)

Answer any FIVE questions.

9. Solve : $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \frac{\log x \cdot \sin(\log x) + 1}{x}$.

10. Solve : $\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + (4x^2-3)\,y = e^{x^2}$ by removing the first derivative.

11. Solve : $(x-1)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = (x-1)^2$ by the method of variation of parameters given that x and e^x are the particular integrals of the equation without the right hand member.

12. Verify the condition of integrability in the equation

$$(y^2 + yz)\,dx + (xz + z^2)\,dy + (y^2 - xy)\,dz = 0$$ and solve it.

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

14. Solve : $2xz - px^2 - 2qxy + pq = 0$ by Charpit's method.

15. (a) If

$$f(t) = \sin t,\ 0 < t < \pi$$
$$= 0,\ \pi < t < 2\pi$$

and $f(t + 2\pi) = f(t)$, then find $L[f(t)]$.

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

16. Using Laplace transform, solve the equation $\dfrac{d^2y}{dt^2} + y = 6\cos 2t$ given that $y = 3$, $\dfrac{dy}{dt} = 1$, when $t = 0$.