UG–745 **BMS-03**

B.Sc. DEGREE EXAMINATION – JUNE 2006.

First Year

DIFFERENTIAL EQUATIONS

Time : 3 hours Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Solve : $xp^2 - 2yp + x = 0$.

2. Solve : $(D^2 + 3D + 2)\,y = x^2$.

3. Solve : $(D^2 - 2D + 4)\,y = e^x . \cos x$.

4. Form a partial differential equation by eliminating the function of ϕ from

$$\phi\,(x + y + z,\ x^2 + y^2 - z^2) = 0.$$

5. Solve : $(mz - ny)p + (nx - lz)\,q = ly - mx$.

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

7. Prove that $L\,[t^n] = \dfrac{\overline{|(n+1)}}{s^{n+1}}$ and hence find $L\,[t^{\frac{1}{2}}]$.

8. Find $L^{-1}\left[\dfrac{s+2}{(s^2+4s+5)^2}\right]$.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Solve : $(2x+1)^2\ y'' - 2(2x+1)y' - 12y = 6x$.

10. Solve : $(4D+2)x + (9D+31)y = e^t$

$(3D+1)x + (7D+24)y = 3$.

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

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

13. Solve : $p + 3q = 5z + \tan(y - 3x)$.

14. Solve : $p^3 + q^3 = 27z$.

15. (a) Find $L[(f(t)]$ where

$f(t) = 0$ when $0 < t < 2$

$= 3$ when $t > 2$.

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

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