B.Sc. DEGREE EXAMINATION,NOVEMBER 2019
II Year III Semester
Differential Equations and Laplace Transforms

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Solve $x^2p^2 + 3xyp + 2y^2 = 0$.
2. Write down the equation of Clairaut's form.
3. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 8y = 0$.
4. Find the particular integral of $\left(D^2 + 5D + 6\right) y = e^x$.
5. Eliminate a and b from $z = (x + a)(y + b)$ and form a partial differential equation.
6. Define Lagrange's equation.
7. Find $L(t^2 + 2t + 3)$.
8. Find $L^{-1}\left[\frac{1}{(s+a)^2}\right]$.
9. i) What is the value of $L[cosh\ at]$?
   ii) What is the value of $L\left[sinh\ at\right]$?
10. i) What is the value of $L[t\ sin\ at]$?
    ii) What is the value of $L[t\ cosh\ at]$?
11. Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 5y = 0$
12. Form a partial differential equation by eliminating arbitrary constants a and b from $z = axy + b$.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Solve $xp^2 - 2yp + x = 0$.
14. Solve $\frac{d^4y}{dx^4} + 8\frac{d^2y}{dx^2} + 16y = 0$.
15. Solve $(y^2 + z^2)p - xyq = -xz$.
16. Find $L(t^2e^{-3t})$.

17. Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{-x}$, using Laplace transforms, given that $y(0) = 0$, $y'(0) = 1$.
18. Eliminate the arbitrary functions f and ϕ from the relation $z = f(x + ay) + \phi(x - ay)$.
19. Solve $(D^2 + D + 1)y = x^2$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Solve $y = xp + x\left(1 + p^2\right)^{\frac{1}{2}}$.
21. Solve $\left(D^2 - 4D + 3\right) y = sin\ 3x\ cos\ 2x$.
22. Find the complete integral of $pq + qx = y$.
23. Find $L^{-1}\left[\frac{1}{(s+1)(s^2+2s+2)}\right]$.
24. Solve the equation $\mathbf{\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = sin\ t}$, given that $\mathbf{y = \frac{dy}{dt} = 0}$, when $\mathbf{t = 0}$.

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