SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(Maths) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - III
20UMACT3005 - Differential Equations and Laplace Transforms

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks$)$

1. Solve: $p - \dfrac{1}{p} = \dfrac{x}{y} - \dfrac{y}{x}$

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

3. Form the partial differential equation by eliminating the arbitrary constants a and b from $z = (x^2 + a)(y^2 + b)$

4. Eliminating the arbitrary function from $\phi(x^2 + y^2 + z^2, x + y + z) = 0$

5. Define Laplace transform and state any two properties of Laplace transform.

6. Compute $L^{-1}\left[log\left(\dfrac{s^2 + 1}{(s-1)^2} \right) \right]$

7. Compute $L^{-1}\left[\dfrac{2s + 3}{(s-3)^5} \right]$

8. Find $L(e^{2t}t\ sin5t)$

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks$)$

9. (i) Solve $p = \log(px - y)$
   (ii) Solve $yp^2 + 2xp - y = 0$

10. Solve the differential equation by using method of variation of parameter
    $y'' + 7y' - 8y = e^{2x}$

11. (i) Solve $\sqrt{p} + \sqrt{q} = 1$
    (ii) Solve $x(y-z)p + y(z-x)q = z(x-y)$

12. (i) Determine $L(t \cos at)$
    (ii) Determine $L(\sin^5 5t)$

13. Using Laplace transform, solve the equation
    $\dfrac{d^2y}{dt^2} + 5\dfrac{dy}{dt} + 6y = 2$, $y(0) = y'(0) = 0$.

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