

Roll.No.

20UMACT3005

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 Mathematics- END SEMESTER EXAMINATIONS - NOVEMBER 2025

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)

- Find the general solution of the differential equation
(i) $p^2 - 9p + 18 = 0$.
(ii) $p^2 + 1 = x^2$
- Solve: $(D^2 - 2D + 5)y = e^x \sin 2x$.
- Form the Partial differential equation by eliminating the arbitrary functions f and g from $z = f(x+ay) + g(x-ay)$.
- State and prove change of scale property of Laplace transformation.
- Evaluate $L^{-1} \left[\frac{5s + 3}{(s - 1)(s^2 + 2s + 5)} \right]$.
- Solve : $(x^2 D^2 - 3xD)y = x + 11$.
- Obtain a singular solution of the differential equation $y = px + ap(1-p)$.
- Solve: $p^2 + q^2 = x + y$.

Section C

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

- Solve: $x - yp = ap^2, 0 < p < 1$.
- Using the method of variation of parameters, Solve $(D^2 + n^2)y = \sec nx$.
- Solve: $x(y^2 - z^2)p + y(x^2 - z^2)q = z(y^2 - x^2)$.
- Find (i) $L \left[\frac{\cos at - \cos bt}{t} \right]$ (ii) $L[t^2 \sin at]$
- Using Laplace transform, Solve $y'' + 6y' + 5y = e^{-2t}$ given that $y(0) = 0, y'(0) = 1$.
