

Roll.No.

20UPHAT4004

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 - IV

20UPHAT4004 - Allied Mathematics - II

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

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

1. Find the Fourier series for $f(x)$ if $f(x) = \begin{cases} -x, & -\pi \leq x \leq 0 \\ x, & 0 \leq x \leq \pi \end{cases}$
2. Eliminate f and ϕ from $z = f(x + ay) + \phi(x - ay)$.
3. Solve: $q - p + x - y = 0$.
4. Find $L(e^{2t} + 3 \cos^2 t)$.
5. Prove $L[f'(t)] = sL[f(t)] - f(0)$.
6. Prove $x^2p + y^2q = (x + y)z$.
7. Find the Laplace transform of 2^{at}
8. Evaluate $L[te^{-t} \sin t]$

Section C

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

9. Show that the Fourier series for $x(2\pi - x)$ in $[0, 2\pi]$ is
$$x(2\pi - x) = \frac{2\pi^2}{3} - 4\left(\frac{\cos x}{1^2} + \frac{\cos 2x}{2^2} + \frac{\cos 3x}{3^2} + \dots\right)$$
10. (a) Eliminate the arbitrary function f and g from $z = e^x f(y) + e^y g(x)$.
(b) Solve: $\frac{\partial^2 z}{\partial x^2} = \cos x$.
11. Solve: $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.
12. (a) Find the Laplace transform of $f(t)$ if $f(t) = \begin{cases} e^t, & 0 \leq t \leq 1 \\ 0, & 1 < t < \infty \end{cases}$
(b) Find $L(\cos h(at + b))$.
13. (a) State five properties of Laplace transform.
(b) Find $L\left[\frac{\cos t - \cos 2t}{t}\right]$
