

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.Physics - END SEMESTER EXAMINATIONS - APRIL 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. Obtain the Fourier coefficient a_0 and a_n for $f(x) = x^2$ in $(-\pi, \pi)$.
2. Find the value of $L(\cos at)$.
3. Find $L^{-1}\left\{\frac{1}{s(s+1)(s+2)}\right\}$.
4. Find $\nabla\phi$ at $(1, 1, 1)$ if $\phi = x^2y + y^2x + z^2$.
5. Solve: $p^2 + q^2 = x + y$.
6. If $L\{f(t)\} = F(s)$, prove that $L\{f(t)\} = \frac{1}{a} F\left(\frac{s}{a}\right)$, $a > 0$.
7. Find $L^{-1}\left\{\frac{1}{s(s+1)}\right\}$.
8. Find $\nabla\phi$ if $\phi = xyz - x^2$.

Section C

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

9. Obtain the Fourier coefficient a_0 and a_n for $f(x) = \frac{\pi - x}{2}$ in $(0, 2\pi)$.
10. Solve: $(mz - ny)p + (nx - lz)q = ly - mx$.
11. Prove that $L\left[\frac{f(t)}{t}\right] = \int_s^\infty f(s) ds$.
12. Find $L^{-1}\left\{\frac{s-2}{s^2+2s+2}\right\}$.
13. Find the directional derivative of $xyz - xy^2z^3$ at the point $(1, 2, -1)$ in the direction of the vector $\vec{i} - \vec{j} - 3\vec{k}$.
