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-2023
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 a_0 and a_n in the Fourier series expansion of f(x) = (π-x) /2 in (0,2π).
2. Form the PDE by eliminating a and b from z = ax + by + a^2+b^2.
3. Find (a) L[t^2e^{-2t}]
   (b) L[e^{-2t}cost].
4. Find $L^{-1}[\frac{s+2}{(s-4)(s^2+1)}]$.
5. Find Unit vector normal to the surface x^2+3y^2+2z^2 = 6 at the point (2,0,1).
6. Find the laplace transform of $\frac{(\cos 3t - \cos 2t)}{t}$
7. Solve : x (y − z) p + y (z − x)q = z (x − y).
8. Prove that div $\overrightarrow{r}$ = 3 and curl $\overrightarrow{r}$ = 0. Where $\overrightarrow{r}$ is the position vector.

Section C

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

9. Find the Fourier sine series for the function f (x) = x + x^2 in (- π , π).
10. Solve : (y + z) p + (z + x) q = x + y.
11. State and prove shifting property and change of scale property in laplace transform.
12. Solve : y′′ +4 y′ + 3y = e^{-2t} ; and given that y(0) = 0 ; y′(0) = 0.
13. If $\overrightarrow{F}$ = 4xz $\overrightarrow{i}$ -y^2 $\overrightarrow{j}$ +yz $\overrightarrow{k}$, evaluate $\iint_S \overrightarrow{F}.\overrightarrow{n}$ ds. where S is the surface of the cube bounded by x=0,x=1,y=0,y=1,z=0 and z=1.