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.DS - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - II
22UDSAT2002 - Allied Mathematics - II

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

Section B

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

1. Show that $\int_0^{\pi} \frac{x}{a^2 - cos^2 x} dx = \frac{\pi^2}{2a\sqrt{a^2-1}}$.
2. Solve $x(z^2 - y^2)p + y(x^2 - z^2)q = z(y^2 - x^2)$.
3. Eliminate the arbitrary function f from the equation $f(xy + z^2, x + y + z) = 0$.
4. Find the value of $L(sin3tcost)$.
5. Evaluate $L^{-1}\left[\frac{4s+5}{(s-1)^2(s+2)}\right]$.
6. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$, $z = x^2 + y^2 - 3$ at the point (2,-1,2).
7. Show that $\nabla^2 logr = \frac{1}{r^2}$.
8. If $\bar{F} = xz\bar{i} + yz\bar{j} + z^2\bar{k}$ evaluate $\int_c \bar{F}.dr$ from the point (0,0,0) to (1,1,1) where C is given by $x = t$, $y = t^2$, $z = t^3$.

Section C

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

9. Find the fourier series for $f(x)$ in [-π,π]

   f|x| $= \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0<x<\pi \end{cases}$

10. Solve $(D2 + 4D + 3)y = e^{-x}sinx + xe^{-3x}$.
11. Using Laplace Transform, solve $\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 5y = e^{-2t}$ given that $y = 0$, dy/dt = 1 when $t = 0$.

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12. Prove that $\bar{A} = (2x + yz)\bar{i} + (4y + xz)\bar{j} - (6z - xy)\bar{k}$ is solenoidal and also irrotational. Also find the scalar potential of $\bar{A}$.

13. Evaluate by Green's theorem $\int_c (xy + x^2)dx + (x^2 + y^2)dy$ where C is the square formed by the lines x=-1, x=1, y= -1, y = 1 in the xoy plane.

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