

Roll.No.

22UIAT2002

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 CS with AI- END SEMESTER EXAMINATIONS - NOVEMBER 2025

SEMESTER - II

**22UIAT2002 - Allied Mathematics - II**

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

### Section B

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

1. Evaluate  $\int x^4 \sin x dx$ .
2. Evaluate  $L(e^t \cos^3 t)$ .
3. Find the directional derivative of the given scalar point function  $xy + yz + zx$  at the given point  $(1, 1, 3)$  in the given direction  $\vec{i} + 2\vec{j} + 2\vec{k}$ .
4. Evaluate  $\int \vec{f} \cdot d\vec{r}$  along the straight line joining  $(0, 0)$  and  $(1,1)$  i)  $\vec{f} = x\vec{j} - y\vec{i}$ .
5. Solve  $(D^2 - 1)Y = x^3 + e^x + \cos 2x$ .
6. Find the inverse Laplace Transform of  $\frac{1}{s(s+1)(s+9)}$
7. Find the value of the constants a,b,c so that  $\vec{F} = (x + 2V + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2Z)\vec{k}$  is Solenoidal.
8. Show that the work done in moving a particle in a force field  $\vec{F} = 3xy\vec{i} + (x + y)\vec{j} - z\vec{k}$  along the curve  $x = t+1, y=t - 1, z=t^2$  from  $(2, 0, 1)$  to  $(4, 2, 9)$  is -12.

### Section C

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

9. If  $f(x) = \begin{cases} 0 & -\pi \leq x \leq 0 \\ \sin x & 0 \leq x \leq \pi \end{cases}$  then show that

$$f(x) = \frac{1}{\pi} - \frac{2}{\pi} \left[ \sum_{n=1}^{\infty} \frac{\cos 2nx}{4n^2 - 1} \right] + \frac{\sin x}{2}$$

10. Solve  $x(y-z)p + y(z-x)q = z(x-y)$

Contd...

11. Using Laplace transform, solve  $(D^2 + 2D - 3)y = \sin t$  given that  $y = \frac{dy}{dt} = 0$  when  $t=0$
12. Prove that  $\vec{a} = (2x + yz)\vec{i} + (4y + xz)\vec{j} - (6z - xy)\vec{k}$  is solenoidal as well as irrotational. Also find the scalar potential of  $\vec{A}$ .
13. Verify Stoke's theorem for  $\vec{F} = (x^2 + y^2)\vec{i} + 2xy\vec{j}$  taken over the rectangle bounded by  $x = 0, x = a, y = 0, y = b$ .

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