

Roll.No.

20UCHAT2002

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 Chemistry- END SEMESTER EXAMINATIONS - NOVEMBER 2025  
SEMESTER - II

**20UCHAT2002 - Allied Mathematics - II**

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

**Section B**

Answer any **SIX** questions (6 × 5 = 30 Marks)

1. Find the Fourier coefficients  $a_0$  and  $a_n$  for the function  $f(x) = e^{ax}$  in  $0 < x < 2\pi$ .
2. Find (i)  $L(\cos^3 2t)$  (ii)  $L(\sin 2t \sin t)$ .
3. Find  $L^{-1} \left\{ \frac{s - 3}{s^2 + 4s + 13} \right\}$ .
4. Find  $\text{Div } \vec{F}$  and  $\text{curl } \vec{F}$  at  $(1, -1, 1)$   
if  $\vec{F} = xz^3\vec{i} - 2x^2yz\vec{j} + 2yz^4\vec{k}$
5. Solve  $xp + p^2 = q$ .
6. Find  $L(t \sin^2 at)$ .
7. Show that  $L^{-1} \left\{ \log \frac{s^2 + a^2}{s^2 + b^2} \right\} = 2 \frac{\cos bt - \cos at}{t}$ .
8. Using Green's Theorem show that  
 $\oint (3x^2 - 8y^2)dx + (4y - 6xy)dy = 20$ .  
over the region of rectangle with vertices  $(0, 0), (2, 0), (2, 2),$  and  $(0, 2)$ .

**Section C**

Answer any **THREE** questions (3 × 10 = 30 Marks)

9. Find the Fourier series for the function  
 $f(x) = x^2$  in  $-\pi \leq x \leq \pi$ .
10. Solve  $x(y-z) p + y(z-x) q = z(x - y)$ .
11. Show that  $L \left( \frac{e^{-at} - e^{-bt}}{t} \right) = \log \frac{s + b}{s + a}$

Condt...

12. Find  $L^{-1}\left\{\frac{1}{s(s+1)(s+9)}\right\}$

13. If  $\vec{F} = (3x^2 + 6y)\vec{i} - 14yz\vec{j} + 20xz^2\vec{k}$  evaluate  $\int_C \vec{F} \cdot d\vec{r}$  from the point (0,0,0) to the point (1,1,1) Where C is given by  $x = t, y = t^2$ , and  $z = t^3$ .

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