

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-II COMPUTER SCIENCE & ENGINEERING-AI & ML: SUMMER : 2024**  
**SUBJECT: ENGINEERING MATHEMATICS-II**

Day : Tuesday  
Date : 21/05/2024

S-27700-2024

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.
- 4) Assume suitable data, if necessary.

Q. 1 Find the Fourier series of (10)

$$f(x) = \begin{cases} \cos x & -\pi < x < 0 \\ \sin x & 0 < x < \pi \end{cases}$$

OR

Find the Fourier series of  $f(x) = x - x^2$  in  $(-\pi, \pi)$ . (10)

Q. 2 Find the Fourier cosine transform of  $f(x) = 2e^{-5x} + 5e^{-2x}$ . (10)

OR

Find inverse Fourier cosine transform of  $\frac{\sin a\lambda}{\lambda}$ . (10)

Q. 3 Find the inverse Laplace transform of  $\frac{s^2}{(s+a)^3}$ . (10)

OR

Find the Laplace transform of  $t \int_0^t e^{-2t} \sin t dt$ . (10)

Q. 4 Change the order of  $\int_1^{2y^2} \int_y f(x, y) dx dy$ . (10)

OR

Evaluate  $\int_0^1 \int_0^1 \frac{dx dy}{1+yx^2}$ . (10)

Q. 5 Find  $\nabla^2 e^r$  where  $r = \sqrt{x^2 + y^2 + z^2}$ . (10)

OR

Show that  $\vec{F} = (6xy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$  is irrotational. Find the scalar  $\phi$  such that  $\vec{F} = \nabla\phi$ . (10)

Q. 6 Using Green's theorem evaluate  $\int_c (xy - x^2)dx + y^2 dy$  along the curve  $c$  formed (10)  
by  $y = 0, x = 1, y = x$ .

OR

Evaluate  $\iiint_s (4xz\vec{i} - y^2\vec{j} + yz\vec{k}) \cdot d\vec{s}$  over the cube bounded by the planes (10)  
 $x = 0, x = 2, y = 0, y = 2, z = 0, z = 2$ .

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