BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

Computer Science & Engineering-AI&ML

B. Tech. Sem - II :SUMMER : 2023

SUBJECT : MATHEMATICS FOR COMPUTING-II

Day : Monday

Time : 10:00 AM-01:00 PM

Date : 22-05-2023

S-23929-2023

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 for $f(x) = \frac{\pi^2}{12} - \frac{x^2}{4}$ in $(-\pi, \pi)$. **(10)**

OR

Find the Fourier cosine series of $f(x) = x(\pi - x)$ in $(0, \pi)$. **(10)**

Q. 2 Find the Fourier sine integral representation for the function **(10)**

$$f(x) = \begin{cases} \pi/2 & 0 < x < \pi \\ 0 & x > \pi \end{cases}$$

OR

Find Fourier sine transform of $\frac{e^{-ax}}{x}$. **(10)**

Q. 3 Find the inverse Laplace transform of $F(s) = \cot^{-1}(s-1)$. **(10)**

OR

Find the Laplace transform of **(10)**

$f(t) = \frac{e^{-2t} \sin 2t}{t}$.

Q. 4 Show that $\int_0^\infty \int_y^\infty \frac{e^{-x}}{x} dxdy = 1$. **(10)**

OR

Evaluate $\int_0^1 \int_{4y}^4 e^{x^2} dxdy$. **(10)**

Q. 5 Find the directional derivative of $\phi = 5x^2y - 5y^2z + 2z^2x$ at $(1,1,1)$ in the direction of the line $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$. **(10)**

OR

For what value of constant a the vector field **(10)**

$\overline{F} = (axy - z^3)\bar{i} + (a-2)x^2\bar{j} + (1-a)xz^2\bar{k}$ is irrotational.

Q. 6 Verify Green's theorem for the field $\overline{F} = x^2\bar{i} + xy\bar{j}$ over the region R enclosed by $y = x^2$ and the line $y = x$. **(10)**

OR

Verify Divergence theorem for $\overline{F} = x^2\bar{i} + z\bar{j} + yz\bar{k}$ taken over the cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$. **(10)**

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