(FOR COE Mumbai Centre)

BACHELOR OF TECHNOLOGY (CBCS - 2023)

B. Tech. Sem-II CS&E-AI&ML : WINTER : 2024

SUBJECT: ENGINEERING MATHEMATICS-II

Day : Saturday
Date : 12:00:00 AM

W-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) Draw neat and labelled diagrams **WHEREVER** necessary.
4) Assume suitable data, if necessary.

Q. 1 Find Fourier series of $f(x) = x \quad (-\pi < x < \pi)$ **(10)**

OR

Q. 1 Find Fourier series expansion of : $f(x) = e^{-x} \quad (0 \le x \le 2\pi)$ **(10)**

Q. 2 Find Fourier transform of $f(x) = \begin{cases} 1 - x^2 & |x| < 1 \\ 0 & \text{otherwise} \end{cases}$ **(10)**

OR

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

Q. 3 Find Laplace transform of $\dfrac{\sin t}{t}$ **(10)**

OR

Q. 3 Find inverse Laplace transform of $\dfrac{1}{(s-1)(s+2)(s+3)}$ **(10)**

Q. 4 Evaluate: $\int_0^1 \int_0^{1-x} x^2 y \, dxdy.$ **(10)**

OR

Q. 4 Solve: $\int_0^1 \int_x^{x^2} (x + y) \, dxdy.$ **(10)**

Q. 5 Find directional derivative of $\phi = e^{2x-y-z}$ at $(0, 0, 0)$ in the direction of $\bar{i} - \bar{j} + \bar{k}$ **(10)**

P. T. O.

OR

Q. 5 Find : $\nabla^2 \left(e^r\right)$. (10)

Q. 6 Find the work done in moving a particle once round the ellipse (10)
$\frac{x^2}{25} + \frac{y^2}{16} = 1,\ z = 0$ under the field of force given by
$\bar{F} = (2x - y + 2z)\,\bar{i} + \left(x + y - z^2\right)\bar{j} + (3x - 2y + 3z)\,\bar{k}$

OR

Q. 6 Evaluate: $\iint_S \left(x^3\,\bar{i} + y^3\,\bar{j} + z^2\,\bar{k}\right) \cdot d\bar{s}$ where S is the surface of the sphere (10)
$x^2 + y^2 + z^2 = 4$.

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