BACHELOR OF TECHNOLOGY (CBCS - 2023)

B. Tech. Sem-II INFORMATION TECHNOLOGY : WINTER : 2024

SUBJECT: ENGINEERING MATHEMATICS-II

Day : Saturday
Date : 30/11/2024

W-27742-2024

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) Assume suitable data WHEREVER necessary.

Q.1 Solve $(4x+3y+1)dx+(3x+2y+1)dy=0$. **(10)**

OR

Q.1 Solve $x(x-y)\frac{dy}{dx}=y(x+y)$. **(10)**

Q.2 A resistance of 100 ohms and an inductance of 0.5 henry are connected in series with a battery of 20 volts. Find the current in the circuit when I = 0 at t = 0. Also, find the time that elapses before the current reaches on half of its maximum value? **(10)**

OR

Q.2 A pipe 20 cm in diameter contains steam at 150^0c and is protected with a covering 5cm thick material for which k = 0.0025. If the temperature of the outer of the covering is 40^0c, find the temperature half-way through the covering under steady state conditions. **(10)**

Q.3 Obtain the Fourier cosine series for $f(x)=\sin x \ in \ (0,\pi)$. **(10)**

OR

Q.3 Find the Fourier series for $f(x)=\pi^2-x^2 \ in \ (-\pi,\pi)$. **(10)**

Q.4 If $U_n=\int_0^{\pi/4}\tan^n\theta d\theta$. Show that $n(U_{n+1}+U_{n-1})=1$. **(10)**

OR

Q.4 Show that $\int_a^b e^{-x^2}dx=\frac{\sqrt{\pi}}{2}(\text{erf(b)}-\text{erf(a)})$. **(10)**

Q.5 Find the equation of sphere passing through (0, 0, 0), (0,-1, 1), (-1, 2, 0) and (1, 2,3). **(10)**

OR

Q.5 Find the equation of right circular cone whose vertex is (0,0,0) and axis is the line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and semi vertical angle is 30^0. **(10)**

Q.6 Evaluate $\iint_R\sqrt{xy(1-x-y)}dxdy$ over the region bounded by $x=0, y=0 \ and \ x+y=1$. **(10)**

OR

Q.6 Evaluate $\int_0^a\int_{y^2/a}^{y}\frac{y}{(a-x)\sqrt{ax-y^2}}dxdy$. **(10)**

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