

BACHELOR OF TECHNOLOGY (CBCS - 2023)  
B. Tech. Sem-II Computer Science & Engineering-AI & ML : WINTER : 2024  
SUBJECT: ENGINEERING MATHEMATICS-II

Day : Saturday  
Date : 30/11/2024

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) 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  $150^{\circ}\text{C}$  and is protected with a covering 5cm thick material for which  $k=0.0025$ . If the temperature of the outer of the covering is  $40^{\circ}\text{C}$ , 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  $30^{\circ}$ . (10)

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

OR

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

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