BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - II CS&E-A&M :SUMMER- 2022
SUBJECT : MATHEMATICS FOR COMPUTING-II

Day : Tuesday
Date : 26-07-2022

S-23929-2022

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 **WHEREVER** necessary.
5) Draw neat diagram **WHEREVER** necessary.

Q.1 a) Find Fourier series for $f(x)=e^{4x}$ in $(0,2\pi)$. **(10)**

OR

Q.1 b) Find Fourier series for $f(x)=\sqrt{1-\cos x}$ in $(-\pi,\pi)$ and hence deduce that $\frac{1}{2}=\sum_{n=1}^{\infty}\frac{1}{4n^2-1}$. **(10)**

Q.2 a) Express $f(x)=e^{-kx}$ $k>0$ as Fourier sine and cosine integral and show respectively that **(10)**

i) $\int_0^{\infty}\frac{\omega\sin\omega x}{k^2+\omega^2}d\omega=\frac{\pi}{2}e^{-kx}$

ii) $\int_0^{\infty}\frac{\cos\omega x}{k^2+\omega^2}d\omega=\frac{\pi}{2k}e^{-kx}$.

OR

Q.2 b) Find complex Fourier series for $f(x)=e^{2x}$ in $(0,2\pi)$. **(10)**

Q.3 a) **(10)**

i) Evaluate : $\int_0^{\infty}e^{-2t}\,t\cos t\,dt$

ii) Find : $L\left\{e^{-4t}\int_0^t u\sin 3u\,du\right\}$

OR

Q.3 b) **(10)**

i) Find : $L^{-1}\left\{\frac{(s^2-1)^2}{s^5}\right\}$

ii) Find : $L^{-1}\left\{\frac{s^2+2s+3}{(s^2+2s+s)(s^2+2s+2)}\right\}$

Q.4 a) **(10)**

Evaluate : i) $\int_0^a\int_0^{\sqrt{a^2-x^2}}x^2y\,dydx$

ii) $\int_0^a\int_0^a\int_0^a\left(y^2z^2+z^2x^2+x^2y^2\right)dxdydz$

OR

Q.4 b) i) Find area of circle $x^2+y^2=16$. **(10)**
ii) Find by double integration the area of the Cardioid $r=a(1+\cos\theta)$.

PTO

Q.5 a) i) In what direction is the directional derivative of $\phi = x^2y^2z^4$ at (3,–1,–2) maximum? Find its magnitude **(10)**

OR

Q.5 b) Find the angle between the normals to the surface $xy = z^2$ at P (1,1,1) to Q (4,1,2). **(10)**

Q.6 a) Find div $\overline{F}$ and curl $\overline{F}$ where $\overline{F} = (x^2+yz)\,i + (y^2+zx)\,j + (z^2+xy)\,k$. **(10)**

OR

Q.6 b) If $\overline{F} = 2x^2i - 3yzj + xz^2k$ and $\phi = 2z - x^3y$, find $\overline{F} \bullet \nabla\phi$ at (1,–1,1). **(10)**

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