BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - I E&C :SUMMER- 2022
SUBJECT : LINEAR ALGEBRA, CALCULUS & SOLID GEOMETRY

Day : Monday
Date : 18-07-2022

S-24083-2022

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.

Q.1 Show that the system **(10)**

$$3x+4y+5z=\alpha$$
$$4x+5y+6z=\beta$$
$$5x+6y+7z=\gamma$$

is consistent only when α, β, γ are in arithmetic progression.

OR

Q.1 Find the Eigen values and the Eigen vectors of the following matrix **(10)**

$$A=\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

Q.2 A balloon is in the form of right circular cylinder of radius1.5 m and length 4 m and is surrounded by hemispherical ends. If the radius is increased by 0.01 m and the length by 0.05 m. find the % change in the volume of a balloon. **(10)**

OR

Q.2 If $u=\sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then show that $x^2u_{xx}+2xyu_{xy}+y^2u_{yy}=\frac{\tan^3 u-\tan u}{4}$. **(10)**

Q.3 Examine for minimum and maximum values of f(x,y) = sinx + siny + sin (x+y). **(10)**

OR

Q.3 If u,v,w are the roots of the equation $(\lambda-x)^3+(\lambda-y)^3+(\lambda-z)^3=0$ in λ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. **(10)**

Q.4 Find Fourier series of $f(x)=\pi^2-x^2$, $x\in(-\pi,\pi)$. **(10)**

OR

Q.4 Find $\frac{d}{dx}\left(erf_c(ax)\right)$. **(10)**

Q.5 Find the equation of the sphere through the points (4,–1,2), (0,–2,3), (1,5,–1), (2,0,1). **(10)**

OR

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

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

OR

Q.6 Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)\,dxdydz$. **(10)**

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