B-Tech- sem-I (chemical) (2021- course).
winter-2022

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - I CHEMICAL : WINTER- 2022
SUBJECT : ALGEBRA & STATISTICS

Day : Monday | Time : 10:00 AM-01:00 PM

Date : 9/1/2023 | **W-24045-2022** | 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) Draw neat and labeled diagram **WHEREVER** necessary.
5) Assume suitable data if necessary.

Q.1 Find eigen values and eigen vectors of **[10]**

$$A=\begin{bmatrix}1 & 1 & 3\\ 1 & 5 & 1\\ 3 & 1 & 1\end{bmatrix}$$

OR

Q.1 Examine for linear dependence. If so, find the relation between them: **[10]**
(1, -1, 0), (0, 1, -1), (0, 0, 1)

Q.2 Find the complex number z if $\arg(z+2i)=\frac{\pi}{4}$ and $\arg(z-2i)=\frac{3\pi}{4}$ **[10]**

OR

Q.2 Find all the values of $(1-i\sqrt{3})^{1/4}$ **[10]**

Q.3 The scores obtained by two batsmen X and Y in 10 matches are given below. **[10]**

X	30	44	66	62	60	34	80	46	20	38
Y	34	46	70	38	55	48	60	34	45	46

Determine who is more consistent player?

OR

Q.3 Three judges A, B, C gave the following ranks. Find which pair of judges has common approach **[10]**

A:	1	6	5	10	3	2	4	9	7	8
B:	3	5	8	4	7	10	2	1	6	9
C:	6	4	9	8	1	2	3	10	5	7

Q.4 In a Poisson distribution if P (X = 1) = 2P (X = 2) find P (X = 4) **[10]**

OR

Q.4 The mean and variance of Binomial distribution are 6 and 2 respectively. Find $P(X \geq 1)$ **[10]**

Q.5 Prove $\nabla^2 g(r)=g''(r)+\frac{2}{r}g'(r)$ **[10]**

OR

Q.5 Find the directional derivative of $\phi=4xz^3-3x^2y^2z$ at (2, 2, -1) in the direction of $2\bar{i}-3\bar{j}+5\bar{k}$. **[10]**

Q.6 Find the equation of the sphere passing through (4, 1, 0) (2, -3, 4), (1,0, 0) and touching the plane 2x + 2y - z = 11 **[10]**

OR

Q.6 Find the equation of the cylinder whose generators are parallel to the line $\frac{x}{3}=\frac{y}{1}=\frac{z}{\sqrt{6}}$ and whose guiding curve is $x^2+y^2=25,\ z=0$. **[10]**

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