BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
Computer Science & Engineering-AI&ML
B. Tech. Sem - I :SUMMER : 2023
SUBJECT : MATHEMATICS FOR COMPUTING-I

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

Date : 09-05-2023 | S-23923-2023 | 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) Reduce the matrix in Echelon form and find rank of : **(10)**

$$A=\begin{bmatrix} 1 & 2 & 3 & -1 \\ -2 & -1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}.$$

OR

Q.1 b) Test for consistency and if possible solve them. **(10)**

$$5x_1+3x_2+7x_3=4$$
$$3x_1+26x_2+2x_3=9$$
$$7x_1+2x_2+10x_3=5$$

Q.2 a) Express the following as a linear combination of w = (5,0,–1) with v_1 = (–2,1,3), v_2 = (3,1,–1), v_3 = (–1,–2,1). **(10)**

OR

Q.2 b) Check whether the following are subspace of R^3 $w=\{(a,0,0)/a \in R\}$. **(10)**

Q.3 a) Find the Kernal of linear transform $T:V_3 \to V_2$ and its nullity for linear transformation T defined by T (x_1,x_2,x_3) = (x_1+2x_2, x_2+3x_3) **(10)**

OR

Q.3 b) If T is a linear operator on R^3 defined by T (x,y,z) = (2y+z, x–4y, 3x), find the matrix T relative to the basis {(1,1,1) (1,1,0), (1,0,0)}. **(10)**

Q.4 a) Let $T:R^3 \to R^3$ be a linear may defined by **(10)**
T (x,y,z) = (x+2y–z, y+z, x+y–2z).
Find the basis and dimension of the image U of T.

OR

Q.4 b) Let T is a linear operator on R^3 defined by T (x,y,z) = (2y+z, x–4y, 3x), find the matrix of T relative to the basis {(1,1,1), (1,1,0), (1,0,0)}. **(10)**

Q.5 a) Verify Cauchy Schwartz in equality for the vector u = (–4,2,1) and V = (8,–4,–2). **(10)**

OR

Q.5 b) Verify Pythagorean theorem for the vectors u = (3,0,1,0,4,–1) and v = (–2,5,0,2,–3,–18). **(10)**

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Q.6 a) Find lattent root and lattent vector for **(10)**

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

OR

Q.6 b) Find lattent root and lattent vector for **(10)**

$$A=\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}.$$

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