TE SEM 5 C scheme Summer 2025 17/06/25

Duration: 3hrs **[Max Marks:80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 a By using matrices, solve the following system of linear equation [5]
$x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6$

c Enumerator the different techniques used in data cleaning. [5]

d Describe feature engineering [5]

e Explain the need of Dimension Reduction Algorithm [5]

2 a Find the singular value decomposition of the matrix $A = \begin{bmatrix} 2 & 2 \\ -1 & 1 \end{bmatrix}$ [10]

b In a manufacturing industry, item supplied on a critical raw material have been received in ten lots against a monthly order or 200 units. Test at 5% level of significance whether the supplies are uniform (Chi Square method) [10]

Lot No	1	2	3	4	5	6	7	8	9	10
No of Units	25	12	21	18	14	20	30	15	22	23

3 a Describe stem and leaf plot. Display data in stem and leaf plot the following 20 student's right data (cm). [10]
143, 163, 154, 159, 172, 165, 162,171, 146, 165, 176, 145, 165, 182, 175, 186, 160, 158, 167, 172. Find mode.

b i) Explain scatter plot with example [5]

ii) Differentiate between simple, random sampling, stratified random sampling. [5]

4 a What is a Graph? Explain any four types of Graphs along with its uses. [10]

b Explain types of data. Compare and contrast the quantitative and qualitative data. [10]

5 a Partition the given data into 4 bins using Equi-depth binning method and perform smoothing according to the following method [10]

i) Smoothing by bin mean
ii) Smoothing by bin median
iii) Smoothing by bin boundaries

Data : 11, 13, 13, 15, 15, 16, 19, 20, 20, 20, 21, 21, 22, 23, 24, 30, 40, 45, 45, 45, 71, 72, 73, 75

b Minimize $f(x_1, x_2) = 4x_1 - 2x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$. Starting from point $x_1 = \binom{0}{0}$ [10]

6 a What is feature mapping in dimensionality reduction? Explain any 5 techniques of feature mapping. [10]

b Compute the standard deviation for the following sets [10]
Set 1 = {0, 8, 12, 20} Set 2 = {8, 9, 11, 12}

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