Question 10

→ From the given Question, there are two labels, ● & X. Considering or classes ● as 1 and X as 0. So the feature values and labels, or classes are as below.

f	class
1	1
2	1
3	0
6	0
6	0
7	1
10	1
11	1

(1)

Since we need to divide the data equally into two parts. Splitting the data into train & test data.

Train data → {1, 2, 3, 6}

class → {1, 1, 0, 0}

Test data → {6, 7, 10, 11}

class → {0, 1, 1, 1}

Confusion matrix for Test data will be as

Actual ↓ \ Predicted →	0	1
0	TN	FP
1	FN	TP

Using Euclidean distance, find the distance between the Test sample 6 and Train samples 1, 2, 3, 6, we get

$d_1 = \sqrt{(6-1)^2} = 5$

$d_2 = \sqrt{(6-2)^2} = 4$

$d_3 = \sqrt{(6-3)^2} = 3$

$d_4 = \sqrt{(6-6)^2} = 0$

So ~~Train~~ Using 3-NN classifier, train samples nearer to the Test sample 6 are 6, 3, 2 & their labels/classes are 0, 0, 1. Taking the maximum out of them, the predicted output is 0. So ~~it is~~ Actual is 0 & Predicted is 0. So it is TN

Illy for Test samples 7, 10 & 11 we get

for 7 → 3-NN are 0, 0, 1 So FN Since actual is 1 & Predicted is 0

10 → 3-NN are 0, 0, 1 So FN Since actual is 1 & Predicted is 0

11 → 3-NN are 0, 0, 1 So FN Since actual is 1 & Predicted is 0

(2) So, Confusion matrix is

	0	1
0	1	0
1	3	0

⇒ TN = 1
FP = 0
FN = 3
TP = 0

So, Accuracy $= \frac{TP+TN}{P+N} = \frac{TP+TN}{TN+FP+FN+TP} = \frac{1}{4} = 0.25$

Sensitivity $= \frac{TP}{TP+FN} = \frac{TP}{P} = \frac{0}{0+3} = 0$

Specificity $= \frac{TN}{FP+TN} = \frac{TN}{N} = \frac{1}{0+1} = 1$