Quiz 1: Units 3 & 4
Introduction to Artificial Intelligence

23 October 2026

Duration: 50 Minutes
Maximum Marks: 25

Question 1 (10 marks)

Observed river discharge (m^3/s)

Obs.	1	2	3	4	5	6	7	8
Observed	52	60	68	74	81	90	96	105
Predicted	50	63	66	78	80	87	98	102

(a) Compute: MAE, RMSE, and R^2. Show all calculations.

(b) Explain the following terms.

- Training dataset
- Validation dataset
- Test dataset

Question 2 (5 marks)

A civil engineering company develops a machine learning model to automatically detect cracks in concrete structures using images. The model is tested on 200 concrete surface images, and the confusion matrix is given below.

Actual / Predicted	**Crack detected**	**No crack detected**
Crack present	72	18
Crack absent	10	100

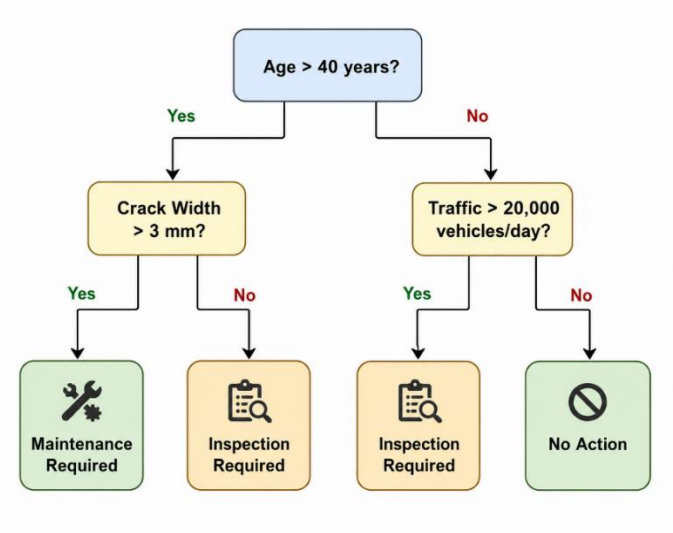
Compute the following:

- (a) Calculate the Precision of the model. (1 mark)
- (b) Calculate the Recall of the model. (1 mark)
- (c) Calculate the Accuracy of the model. (1 mark)
- (d) Calculate the F1-score of the model. (2 marks)

Assume that "Crack present" is the positive class. Express all results as percentages, rounded to two decimal places.

Question 3 (10 Marks) – ML Algorithms

(a) A Decision Tree is used to predict whether a bridge requires immediate maintenance. The rules are shown in the figure below



Using the above tree, determine the prediction for each bridge.

Bridge	Age (Years)	Crack Width (mm)	Traffic/day	Prediction
A	45	4.2	15000	
B	32	2.0	25000	
C	50	2.5	18000	
D	28	1.5	12000	
E	41	3.8	30000	

(b) Explain the following algorithms:

- Linear Regression
- Random Forest
- k-NN
- k-Means