

CBCS SCHEME



21CS54

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Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025 Artificial Intelligence and Machine Learning

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Provide state space representation showing states, initial state, actions, Transition model and Goal test for the following problems.
 - i) 8 - Puzzle problem
 - ii) 8 - Queens problem
 - iii) Vacuum World.

(12 Marks)
- b. Define Artificial Intelligence. Discuss the four approaches for Artificial Intelligence.

(08 Marks)

OR

- 2 a. Differentiate Informed (Heuristic) and uninformed search techniques. Give examples.

(08 Marks)
- b. Explain the following and also list their advantages and disadvantages.
 - i) Breadth First search
 - ii) Depth First search

(12 Marks)

Module-2

- 3 a. Explain greedy Best First Search with a suitable example.

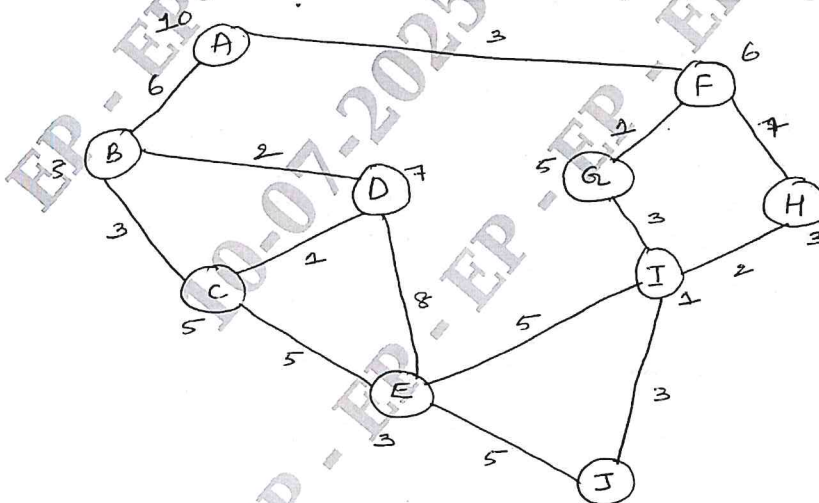
(10 Marks)
- b. What are the applications of machine learning in different domains ?

(10 Marks)

OR

- 4 a. Explain A* Algorithm.

(06 Marks)
- b. Apply the A* Algorithm to the following graph and obtain the optional path from starting node 'A' to goal node 'J'. Heuristic values are provided corresponding the respective node.



(14 Marks)

Module-3

- 5 a. Explain K-NN algorithm. (06 Marks)
- b. Consider the student performance training data set of 8 data instances shown in Table 5.1. given Test instance (6.1, 40, 5) and a set of categories (Pass, Fail) also called as classes consider Assign $k = 3$ as task of classification. Calculate Euclidean distance and weighted k – Nearest - Neighbour Algorithm. (14 Marks)

Sl.No.	CGPA	Assessment	Project submitted	Result
1	9.2	85	8	Pass
2	8	80	7	Pass
3	8.5	81	8	Pass
4	6	45	5	Fail
5	6.5	50	4	Fail
6	8.2	72	7	Pass
7	5.8	38	5	Fail
8	8.9	91	9	Pass

Table 5.1

OR

- 6 a. Distinguish between the terms: Classifications, Regression and Estimations. (08 Marks)
- b. What are the metrics are used to validate the results of regression. Consider the following Training item set Table 6.1 and apply the validation metrics.

Items X_i	Actual sales (in Thousands) Y_i
I_1	80
I_2	90
I_3	100
I_4	110
I_5	120

Table 6.1

Note: Consider the actual values of sales for fresh two items I_6, I_7 and validate. (12 Marks)

Module-4

- 7 a. How does a C4.5 algorithm perform better than ID3? What metric is used in the Algorithm? (10 Marks)
- b. Differentiate between probabilistic model and deterministic model. (10 Marks)

OR

- 8 a. Write ID₃ algorithm. (06 Marks)
- b. Construct ID₃ Tree for the training Data set shown in Table 8.1

Sl. No.	CGPA	Inter activeness	Practical knowledge	Communication skills	Job offer
1	≥ 9	Yes	Very Good	Good	Yes
2	≥ 8	No	Good	Moderate	Yes
3	≥ 9	No	Average	Poor	No
4	< 8	No	Average	Good	No
5	≥ 8	Yes	Good	Moderate	Yes
6	≥ 9	Yes	Good	Moderate	Yes
7	< 8	Yes	Good	Poor	No
8	≥ 9	No	Very Good	Good	Yes
9	≥ 8	Yes	Good	Good	Yes
10	≥ 8	Yes	Average	Good	Yes

(14 Marks)

Module-5

- 9 Write short notes on :
- i) Mean – Shift clustering
 - ii) Proximity Measures
 - iii) Applications of ANN
 - iv) Grid – Bared approach.

(20 Marks)

OR

- 10 a. Explain Fuzzy C – means Algorithm.

(10 Marks)

- b. What is Fuzzy logic ? How does FCM Algorithm helps in cluster formation?

(10 Marks)

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