CBCS SCHEME

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21CS54

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) Vaccum 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. **(08Marks)**

b. Explain the following and also list their advantages and disadvantages.
i) Breadth First search
ii) Depth First search **(12 Marks)**

Module-2

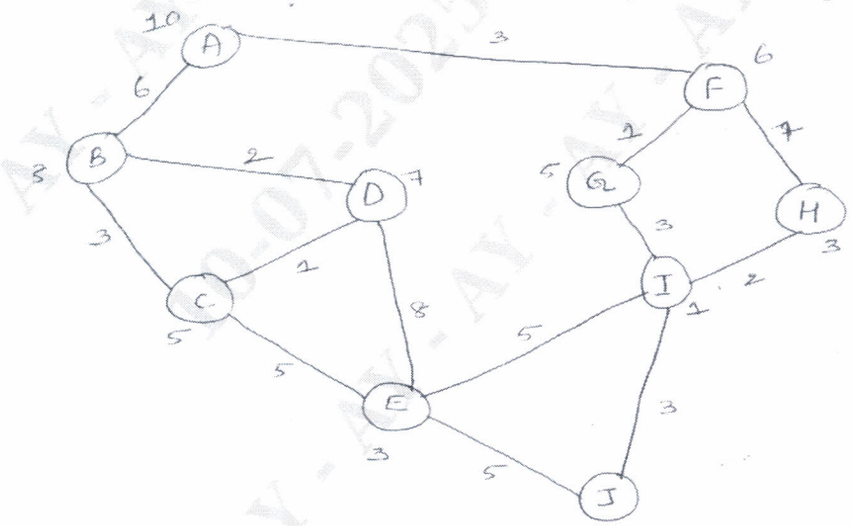
3 a. Explain greedy Best First Search with a suitable example. **(10 Marks)**

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 ID_3 algorithm. **(06 Marks)**

b. Construct ID_3 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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