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THIRD SEMESTER [MCA] Internal Examination, December 2022

| Paper Code: MCA–203	Subject: Artificial Intelligence & Machine Learning

Time: 2 Hours	Maximum Marks: 45

Note: Attempt THREE questions in all. Question No. 1 is compulsory, and attempt one question from each unit.

1. Answer all the following questions briefly: -   1.5 × 10 = 15

    (a) List out the four categories under which AI is classified?   CO1

    (b) Describe about the following in A* search algorithm   CO1
         a) Conditions for Optimality   b) Optimality of A*

    (c) Elaborate the goal of Turing test?   CO1

    (d) Enlist the different types of machine learning problems?   CO3

    (e) Contrast between Classification and Regression?   CO3

    (f) Suppose you want to do weather forecasting. Choose an appropriate   CO3
         algorithm and justify your choice of the same?

    (g) Compare artificial intelligence, machine learning and deep learning?   CO1

    (h) Explain how do we treat a problem as a state space search?   CO1

    (i) Demonstrate over fitting through a suitable example?   CO3

    (j) Enlist atleast 3 popular classification algorithms?   CO3

UNIT - I

2. (a)   5   CO1

STRAIGHT LINE DISTANCE ,h(n)
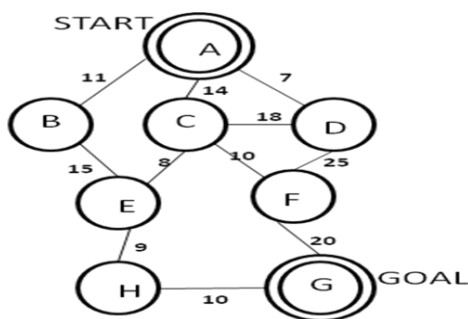
STRAIGHT LINE DISTANCE ,h(n)
B→G =32
C→ G =25
D→G=35
E→G=19
F→G=17
H→G=10
A→ G=41
G→G=0

Using Best first Search find the path from the start to the goal node?

    (b) Given an initial state of 8-puzzle problem and final state to be reached-   5   CO1

2	8	3
1	6	4
7		5

Initial state

1	2	3
8		4
7	6	5

final state

Find the most cost-effective path to reach the final state from initial state using the A* algorithm?

(c)   Trace the constraint satisfaction procedure to solve the following   5   CO1
      cryptarithmetic problem:
        CROSS
      +ROADS

      DANGER

3.   (a)   Given an initial state of 8-puzzle problem and final state to be reached-   5   CO1

1	4	2
	3	5
6	7	8

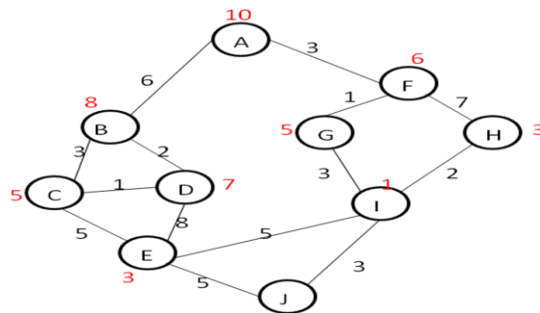| 1		2
3	4	5
6	7	8

        Initial state   final state
      Find the path to reach the final state from initial state using the Hill
      climbing search?

     (b)   Consider the following graph-   5   CO1

      Find the most cost-effective path to reach from start state A to final state
      J using A*.

     (c)   Trace the constraint satisfaction procedure to solve the following   5   CO1
      cryptarithmetic problem:
        SEND
      +MORE

      MONEY

UNIT - III

4.   (a)   Suppose 10000 patients get tested for flu; out of them, 9000 are actually   5   CO3
      healthy and 1000 are actually sick. For the sick people, a test was
      positive for 620 and negative for 380. For the healthy people, the same
      test was positive for 180 and negative for 8820. Construct a confusion
      matrix for the data and compute the precision and recall for the data.

     (b)   Tom who is the owner of a retail shop, found the price of different T-   5   CO3
      shirts vs the number of T-shirts sold at his shop over a period of one
      week. He tabulated this like shown below:

Price of t-shirts in $ (x)	Number of t-shirts sold (y)
2	4
3	5
5	7
7	10
9	15

Using the concept of least squares linear regression to find the line of best fit

(c) Justify the measures required to evaluate a regression model like Sum of Squares Error and Sum of Squares Regression?   5   CO3

5. (a) Suppose 500 patients get tested for flu; out of them, 90 are actually healthy and 410 are actually sick. For the sick people, a test was positive for 310 and negative for 100. For the healthy people, the same test was positive for 80 and negative for 10. Construct a confusion matrix for the data and compute the precision and recall for the data.   5   CO3

(b) Consider a team that played 100 matches and won 25 of them and lost 75 of them. Calculate the Odds of teamlosing and teamwinning as well as the probability of teamlosing and teamwinning?   5   CO3

(c) Justify the additional measures required to evaluate a classifier like Precision, Recall and F1 score?   5   CO3