Reg. No. :

Question Paper Code:U4E02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Artificial Intelligence & Data Science

21UAD402- ARTIFICIAL INTELLIGENCE

(Common to CSE(AI&ML))

(Regulations 2021)

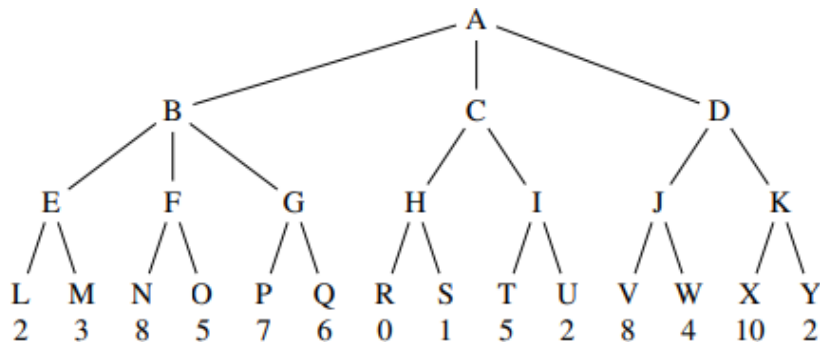Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (5 x 5 = 25 Marks)

1. Explain the Turing test approach to act humanly.   CO1-U

2. Consider the following game tree is which the utility values are all   CO2-App
    from the first player's point of view. Assume that first player is the
    maximizing player.
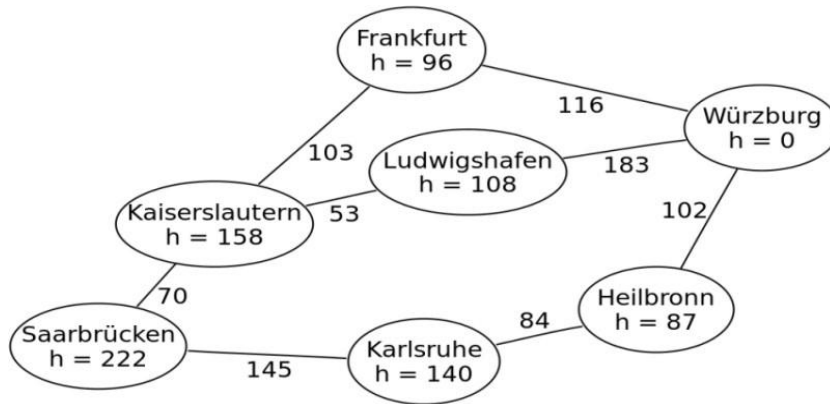
3. Write down the semantics of Bayesian Network with an example.   CO2-App

4. What is Markov's Decision Process? How has it contributed to the   CO1-U
    development of AI?

5. Consider a simple grid world environment represented by a 4x4   CO2-App grid, where an agent can move in four directions: up, down, left, and right. The grid world has a start state (S), a goal state (G), and two intermediate states (A and B) as depicted below:

| S		A	
	B		
			G

PART – B (5 x 15= 75 Marks)

11. (a) A Water jug problem states "you are provided with two   CO2-App   (15) jugs, first one with 4-gallon capacity and the second one with 3- gallon capacity. Neither have any measuring markers on it. How can you get exactly 2 gallons of water into 4-gallon jug"?

  (i) Write any one of the solution to the above problem.(8Mark)

  (ii) Give the initial state, actions, goal test and path cost for the solution.(7 Mark)

Or

(b) There are two jugs, one with a capacity of 8 liters and   CO2-App   (15) another with a capacity of 5 liters. They need to measure exactly 6 liters of water to irrigate their fields effectively. The problem is they can only carry one jug at a time due to the distance from the well.

12. (a) Consider the partial map of Germany. Find the   CO2-App   (15) shortest path from Saarbruecken to Wuerzburg using A* search algorithm.

Frankfurt h = 96 — Würzburg h = 0 (116)
Frankfurt — Ludwigshafen h = 108 (103)
Ludwigshafen — Würzburg (183)
Würzburg — Heilbronn (102)
Kaiserslautern h = 158 — Ludwigshafen (53)
Kaiserslautern — Saarbrücken h = 222 (70)
Saarbrücken — Karlsruhe h = 140 (145)
Karlsruhe — Heilbronn h = 87 (84)

Or

(b) 8 Puzzle Problem: Here, we have a 3x3 matrix with movable tiles numbered from 1 to 8 with a blank space. The tile adjacent to the blank space can slide into that space. The objective is to reach a specified goal state similar to the goal state, as shown in the below figure.In the figure, our task is to convert the current state into goal state by sliding digits into the blank space. CO2-App (15)
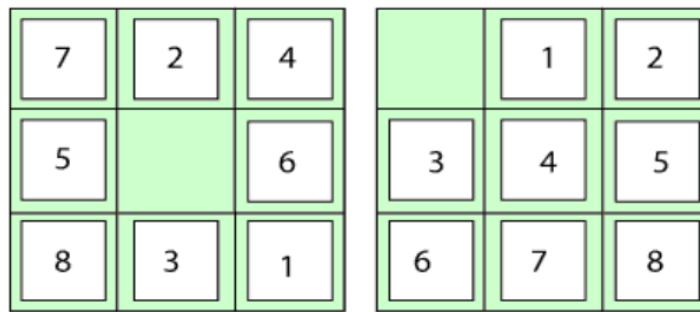
13. (a) You have two neighbours, John and Mary, who have promised to call you at work when they hear the alarm. John always calls when he hear the alarm, but sometimes confuses the telephone ringing with the alarm and calls then, too. Mary on the other hand, likes rather loud music and sometimes misses the alarm altogether. Given the evidence of who has or has not called, we would like to estimate the probability of a burglary. Draw a Bayesian network for this domain with suitable probability tables. CO2-App (15)

Or

(b) Solve the given hidden markov problem example CO2-App (15)

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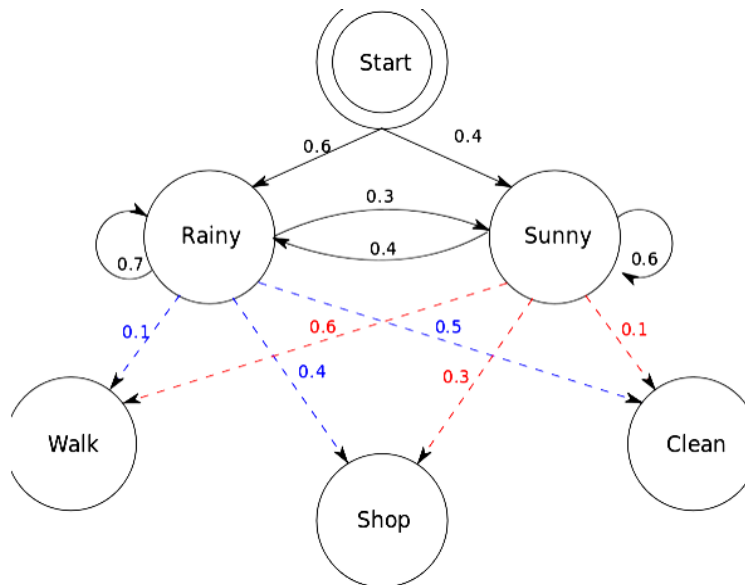
14. (a) Discuss about the utility function and utility theory in detail. CO1-U (15)

Or

(b) Implement the Policy iteration algorithm for 4x3 grid world. CO1-U (15)

15. (a) Explain various techniques involved in active reinforcement learning. CO1-U (15)

Or

(b) Explain in detail about Q learning with example. CO1-U (15)

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