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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: ES – Cluster Elective **Duration: 3 hrs.**
Course Code: 19ET6CE1AI **Max Marks: 100**
Course: Artificial Intelligence

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

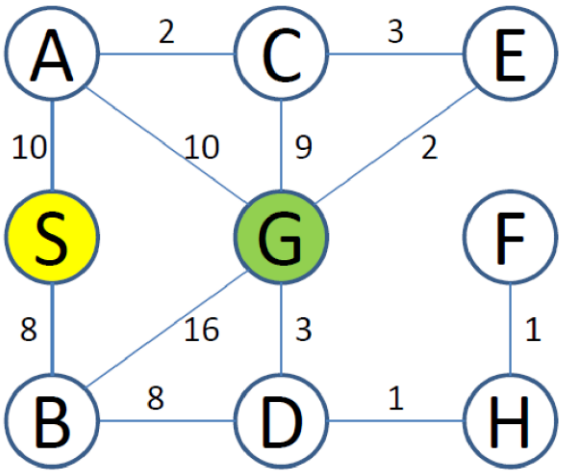
1 a) For the "Playing a tennis match" activity, characterize the activity in terms of the following properties. Justify your characterization. **10**
i) Fully observable vs. partially observable
ii) Deterministic vs. stochastic
iii) Episodic vs. sequential
iv) Static vs. dynamic
v) Discrete vs. continuous

b) Outline the structure and working of Goal-based agents and Utility-based agents with examples. **10**

UNIT - II

2 a) Write the A* search algorithm. Apply A* heuristic search strategy for the graph given below to find the shortest path from Initial State S to Goal State G. The heuristic values from each node to the Goal node are given in the table below. **12**

	S	A	B	C	D	E	F	H	G
heuristic	12	5	5	5	2	2	1	1	0

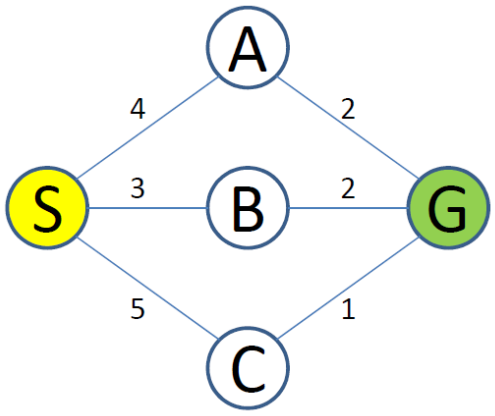


b) Detail out on the limitations of steepest-ascent variation of hill climbing. Discuss the possible ways to deal with those limitations. **08**

OR

3 a) Differentiate between blind search and heuristic search strategies. **06**

b) Illustrate the working of Uniform Cost Search for the graph given below. Talk about the algorithm's completeness, optimality and time complexity. (S is the Start and G is the Goal state) **07**



c) Write the AO* search algorithm. Illustrate the working of AO* algorithm (from initial state to goal state) with an example. **07**

UNIT - III

4 a) Look at the following sentences and decide for each if it is valid, unsatisfiable, or neither. Verify your decisions using truth tables. **10**
i) ((Smoke ∧ Heat) → Fire) ↔ ((Smoke → Fire) V (Heat → Fire))
ii) (Big ∧ Dumb) V ¬Dumb
iii) Big V Dumb V (Big → Dumb)

b) Illustrate with an example, how coloring the map can be viewed as a constraint satisfaction problem. **10**

OR

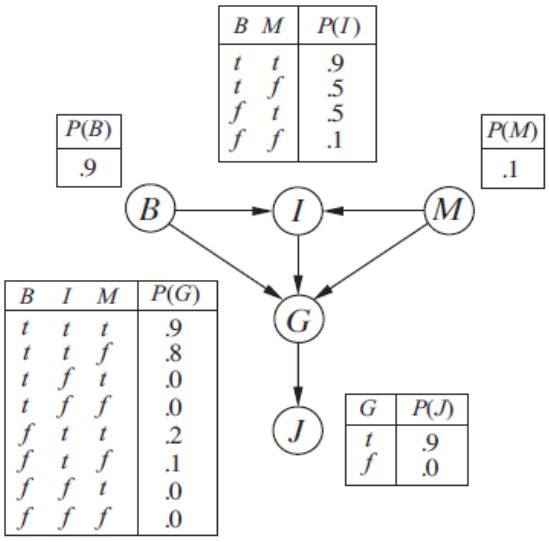
5 a) Explicate the cryptarithmetic problem of eliminating possibilities and apply the same for solving the following cryptarithmetic problem. **10**
TWO + TWO = FOUR

b) Explicate the different types of local consistency in a constraint satisfaction problem network. **10**

UNIT - IV

6 a) Describe uncertain knowledge in Artificial Intelligence with examples. How do we handle them? **05**

b) Consider a simple Bayesian network given below with Boolean Variables B = Broke Election Law, I = Indicted, M = Politically Motivated Prosecutor, G = Found Guilty and J = Jailed. Calculate the value of P (b, i, ¬ m, g, j). **07**



c) State and explain Bayes' rule. Illustrate the working of Bayes' rule in combining evidence. **08**

UNIT - V

7 a) A self-driving car is approaching an intersection with a malfunctioning traffic light. There are two possible actions: (1) stop and wait until the light is fixed or (2) cautiously proceed through the intersection. Using decision theory, determine the optimal action for the self-driving car. **06**

b) Differentiate between the state transition function and the reward function in Markov Decision Process. **06**

c) How does the concept of a reward signal influence the learning process in reinforcement learning? Explain with an example. **08**

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