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Roll No. ....

**TCS-706**

**B. TECH. (CSE)  
(SEVENTH SEMESTER)  
END SEMESTER  
EXAMINATION, Dec., 2022  
ARTIFICIAL INTELLIGENCE**

**Time : Three Hours**

**Maximum Marks : 100**

- Note :** (i) All questions are compulsory.  
(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.  
(iii) Total marks in each main question are **twenty**.  
(iv) Each sub-question carries 10 marks.

1. (a) Consider the following set of statements :  
“As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America,

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has some missiles, and all the missiles were sold to it by Robert, who is an American citizen." Then prove that "Robert is criminal." (CO2)

(b) What is graphical representation of knowledge ? Explain the strength and weakness of the semantic nets knowledge representation system. (CO2)

(c) What is the classification of Artificial Intelligence and where it can be used ? Justify your answer with five suitable applications. (CO2)

2. (a) Write detailed note on expert system including representation, usage of domain knowledge, reasoning and explaining. (CO1)

(b) Write short notes on the following : (CO1)

(i) Top-down parsing approach

(ii) Context free grammar

(iii) Transformational grammar

(c) What are semantic nets and how do they work ? What exactly are frames ? What distinguishes them from semantic nets ? (CO2)

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3. (a) Water Jug Problem : You are given two jugs, a 4-gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug ? (CO3)

(b) (i) Compute the truth value of  $X : (A \vee B) \wedge (\sim B \rightarrow A)$  using truth table method.

(ii) Show that the following is a valid argument : (CO3)

"If it is humid then it will rain and since it is humid today it will rain."

(c) Represent the following into the appropriate semantic network diagram : (CO3)

(i) "Shyam believes that Burger is tasty".

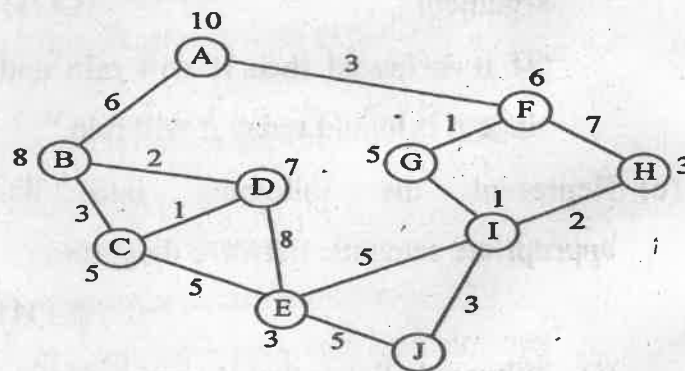
(ii) "Every student loves to party".

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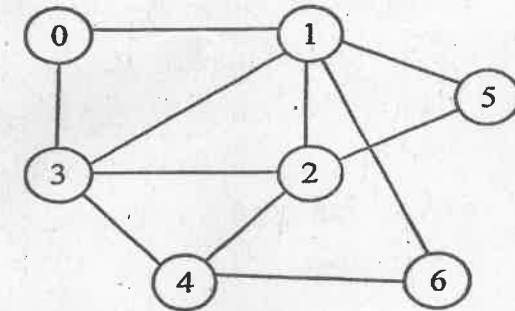
4. (a) Discuss the facts involved in designing of rule-based agents. What are the limitations of rule-based expert agents ? (CO4)
- (b) What is Conceptual Dependency (CD) ? How is it helpful to represent knowledge of Artificial Intelligence ? Explain the Shank's conceptual dependency. (CO4)
- (c) Consider the given graph. The numbers written on edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Find the most cost-effective path to reach from start state A to final state J using A\* Algorithm. (CO4)



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5. (a) What is image classification in AT ? Describe the steps involved in build an image classifier for cancer disease. (CO5)
- (b) Write short notes on the following :
- (i) Pattern Recognition
  - (ii) Convolutional Neural Network
- (c) Consider the following graph : (CO5)



Starting from state 0, execute DFS and BFS. Show the order in which the nodes are expanded. Assume that the smaller node is expanded first to break ties.

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