Reg No.:_____ Name:_____

1000CST401122201

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S, FE) / S7 (PT) (S) Examination May 2024 (2019 Scheme)

Course Code: CST401

Course Name: ARTIFICIAL INTELLIGENCE

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Explain the structure of an agent.	(3)
2		Define artificial intelligence.	(3)
3		Describe the difference between admissible heuristic and consistent heuristic with the help of an example.	(3)
4		List the differences between tree search algorithm and graph search algorithm.	(3)
5		How can you use arc consistency to reduce domain size? Explain with an example	(3)
6		How do you formally define a game?	(3)
7		Find a most general unifier for the set W = {P(a, x, f (g(y))), P(z, f (z), f (u))}	(3)
8		Define horn clause and definite clause	(3)
9		What is overfitting and underfitting? How does it affect generalization?	(3)
10		How do you choose and evaluate the best hypothesis?	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

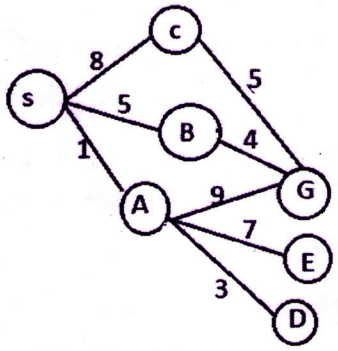
11	a)	Explain the various type of agents.	(8)
	b)	Explain the task environment PEAS for the following agents a) Robots play soccer b) Netflix on-line recommendation system c) Expert system for medical diagnosis	(6)

OR

12	a)	Explain the various task environment types with examples.	(8)
	b)	Design a rational vacuum cleaner agent. Describe a rational agent function for the case in which each movement costs one point.	(6)

Module II

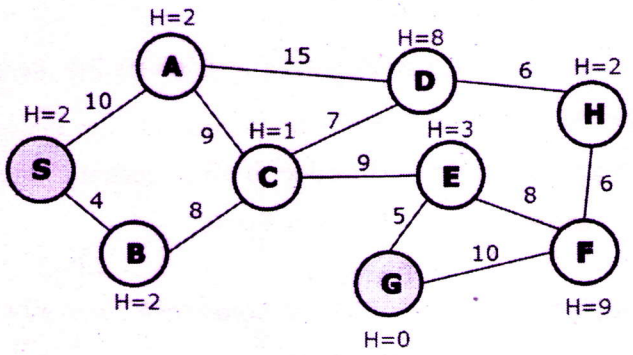
13 a) For the following figure S is the start state, G is the goal state. Show the order in which nodes are explored, solution path and path cost for uniform cost search. Give an algorithm for uniform cost search. (9)



b) Explain the algorithm for depth limited search with an example. (5)

OR

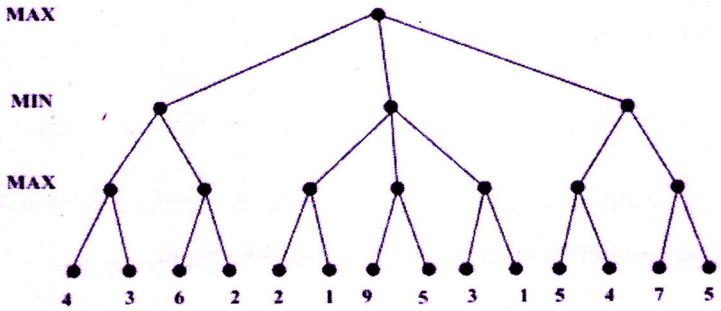
14 a) For the following figure S is the start state and G is the goal state. Show the order in which nodes are explored, solution path and path cost for A* algorithm. Explain the A* algorithm. [in case of tie use lexicographic order] (9)



b) Explain the algorithm for iterative deepening search with an example. (5)

Module III

15 a) Explain Alpha-Beta Pruning. Perform alpha beta pruning on the minimax tree given below. Move ordering from left to right. (9)

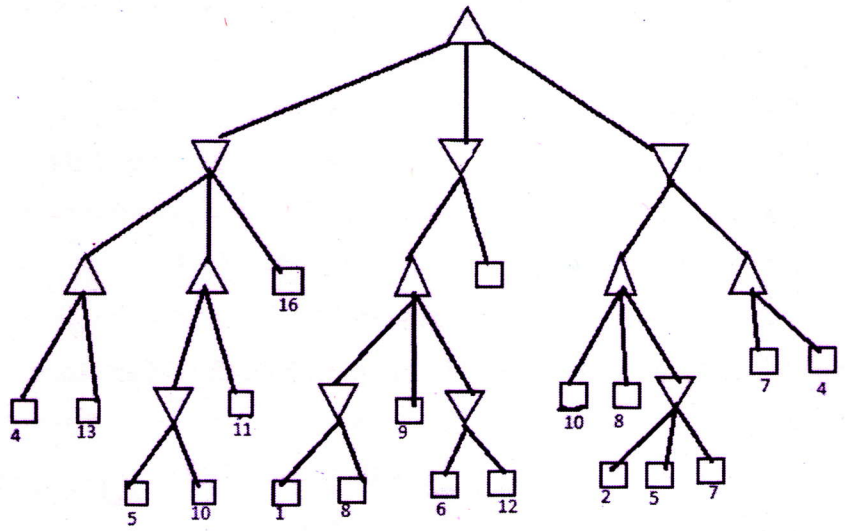


b) Formulate the following problem as a CSP. Class scheduling: There is a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach (5)

OR

16 a) Explain Back Tracking Search in CSPs with the help of an example. (7)

b) Explain Minimax algorithm. Use the Minimax algorithm to compute the minimax value at each node for the game tree below (7)



Module IV

17 a) Explain how backward chaining can be used for inference in First order Logic? (8)

Consider the following set of rules for identifying animals.

R1: IF x gives milk, THEN x is a mammal

R2: IF x has feathers AND x flies AND x lays eggs THEN x is a bird

R3: IF x eats meat AND x is a mammal THEN x is a carnivore

R4: IF x has black stripes AND x is a carnivore THEN x is a tiger

The working memory contains the following assertions:

A1: hobbes has black stripes

A2: hobbes eats meat

A3: tweety has feathers

A4: hobbes gives milk

A5: tweety flies

Use backward chaining to determine whether or not hobbes is a tiger.

b) What is a quantifier in First Order Logic? Differentiate between the two types of quantifiers, giving examples for each. (6)

OR

18 a) Consider the following statements: (8)

a) Everyone who loves all animals is loved by someone.

b) Anyone who kills an animal is loved by no one.

c) Jack loves all animals.

d) Either Jack or Curiosity killed the cat, who is named Tuna.

Represent the sentences using First Order Logic. Answer the following question using proof by resolution.

"Did Curiosity kill the cat?"

b) What do you mean by Conjunctive Normal Form? List the steps for converting a propositional logic statement to CNF. Convert $(P \rightarrow Q) \rightarrow ((Q \rightarrow R) \rightarrow (P \rightarrow R))$ to CNF using these rules. (6)

Module V

19 a) Explain Decision Tree Learning Algorithm with the help of an example. (8)

b) List and explain the different types of learning. (6)

OR

20 a) Explain Multivariate linear regression in detail. (8)

b) Explain, with the help of an example, how important attributes are selected in a Decision Tree. (6)

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