Exam Date & Time: 28-Dec-2020 (10:00 AM - 01:45 PM)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

Faculty of Technology and Engineering
Devang Patel Institute of Advance Technology and Research
Department of Computer Science & Engineering

Artificial Inteligence [CS341]

Marks: 70 **Duration: 225 mins.**

SECTION-I

Answer all the questions.

1 Strong Artificial Intelligence is _____ (1)

1)	the embodiment of human intellectual capabilities within a computer		2)	a set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans		3)	the study of mental faculties through the use of mental models implemented on a computer		4)	All of the mentioned	

2 The problem-solving agent with several immediate options of unknownvalue can decide what to do by just examining different possiblesequences of actions that lead to states of known value, and thenchoosing the best sequence. This process of looking for such asequence is called Search. (1)

1)	True		2)	False	

3 Which search is implemented with an empty first-in-first-out queue? (1)

1)	Depth-first search		2)	Breadth-first search		3)	Bidirectional search		4)	None of the mentioned	

4 How should knowledge be represented to be used for an AI Technique? (1)

1)	When two individual situations are represented, knowledge should provide generalization such that only common properties of both situations are represented rather than representing both situations individually		2)	Knowledge should be represented such that it should be understood by the people who have provided it		3)	Knowledge should be represented in a way that it can be easily modified		4)	All of these	

5 dog('Buddy', likes('Buddy', toast)). - This statement is (1)

1)	Rule & Horn Clause		2)	Fact & Horn Clause		3)	Horn Clause with Head and body		4)	Not a Horn clause	

6 Which one from the options would return true/yes for given prologprogram? (1)

boy(Ram,123).

girl(Sita,234).

student(Ram,123).

1)	?- girl(Sita,x).		2)	?- boy('Ram',123).		3)	All of above.		4)	None of above.	

7 Suppose the predicate F(x, y, t) is used to represent the statementthat person x can fool person y at time t. which one of thestatements below expresses best the meaning of the formula$\forall x \exists y \exists t(\neg F(x, y, t))$?

(1)

1)	Everyone can fool some person at some time		2)	No one can fool everyone all the time		3)	No one can fool everyone all the time		4)	No one can fool some person at some time	

8 Which one of the following is the most appropriate logical formulato represent the statement? "Gold and silver ornaments areprecious". The following notations are used: G(x): x is a goldornament S(x): x is a silver ornament P(x): x is precious

(1)

1)	$\forall x(P(x) \rightarrow (G(x) \wedge S(x)))$		2)	$\forall x((G(x) \wedge S(x)) \rightarrow P(x))$		3)	$\exists x((G(x) \wedge S(x)) \rightarrow P(x)$		4)	$\forall x((G(x) \vee S(x)) \rightarrow P(x))$	

9 What is the first order predicate calculus statement equivalent tothe following?

Every teacher is liked by some student

(1)

1)	$\forall(x)$ [teacher (x) $\rightarrow \exists$ (y) [student (y) $\rightarrow$ likes (y, x)]]		2)	$\forall$ (x) [teacher (x) $\rightarrow \exists$ (y) [student (y) ^ likes (y, x)]]		3)	$\exists$ (y) $\forall$ (x) [teacher (x) $\rightarrow$ [student (y) ^ likes (y, x)]]		4)	$\forall$ (x) [teacher (x) ^ $\exists$ (y) [student (y) $\rightarrow$ likes (y, x)]]	

10 The _____ is a touring problem in which each city must be visitedexactly once. The aim is to find the shortest tour.

(1)

1)	Finding shortest path between a source and a destination		2)	Travelling Salesman problem		3)	Map colouring problem		4)	Depth first search traversal on a given map represented as a graph	

11 When will Hill-Climbing algorithm terminate?

(1)

1)	Stopping criterion met		2)	Global Min/Max is achieved		3)	No neighbour has higher value		4)	All of the mentioned	

12 Consider following sentences regarding A *, an informed searchstrategy in Artificial Intelligence (AI).

(a) A * expands all nodes with f (n) < C *.

(b) A * expands no nodes with f (n) $\geq$ C *.

(c) Pruning is integral to A *.

Here, C * is the cost of the optimal solution path. (1)

Which of the following is correct with respect to the abovestatements?

1)	Both statement (a) and statement (b) are true.		2)	Both statement (a) and statement (c) are true.		3)	Both statement (b) and statement (c) are true.		4)	All the statements (a), (b) and (c) are true.	

13 Which is used to improve the performance of heuristic search?

(1)

1)	Quality of nodes		2)	Quality of heuristic function		3)	Simple form of nodes		4)	None of the mentioned	

14 _____ trees can be used to infer in Horn clause systems. (1)

1)	. Min/Max Tree	2)	And/Or Trees	3)	Minimum Spanning Trees	4)	Binary Search Trees

15 How is Fuzzy Logic different from conventional control methods? (1)

1)	IF and THEN Approach	2)	FOR Approach	3)	WHILE Approach	4)	DO Approach

16 How many terms are required for building a bayes model? (1)

1)	1	2)	2	3)	3	4)	4

17 Choose form the following areas where NLP can be useful. (1)

1)	Automatic Text Summarization	2)	Automatic Question-Answering Systems	3)	Information Retrieval	4)	None of the mentioned

18 Why is the XOR problem exceptionally interesting to neural networkresearchers? (1)

1)	Because it can be expressed in a way that allows you to use a neural network	2)	Because it is complex binary operation that cannot be solved using neural networks	3)	Because it can be solved by a single layer perceptron	4)	Because it is the simplest linearly inseparable problem that exists.

19 Which is not a property of representation of knowledge? (1)

1)	Representational Verification	2)	Representational Adequacy	3)	Inferential Adequacy	4)	Inferential Efficiency

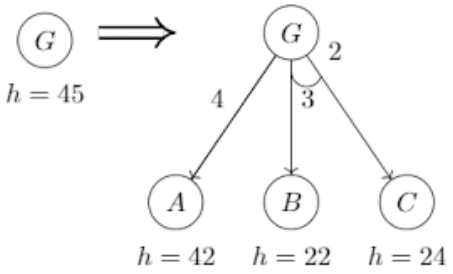
20 What are the limitations of the semantic networks? (1)

1)	Intractability	2)	Lack in expressing some of the properties	3)	Incomplete	4)	Has memory constraints

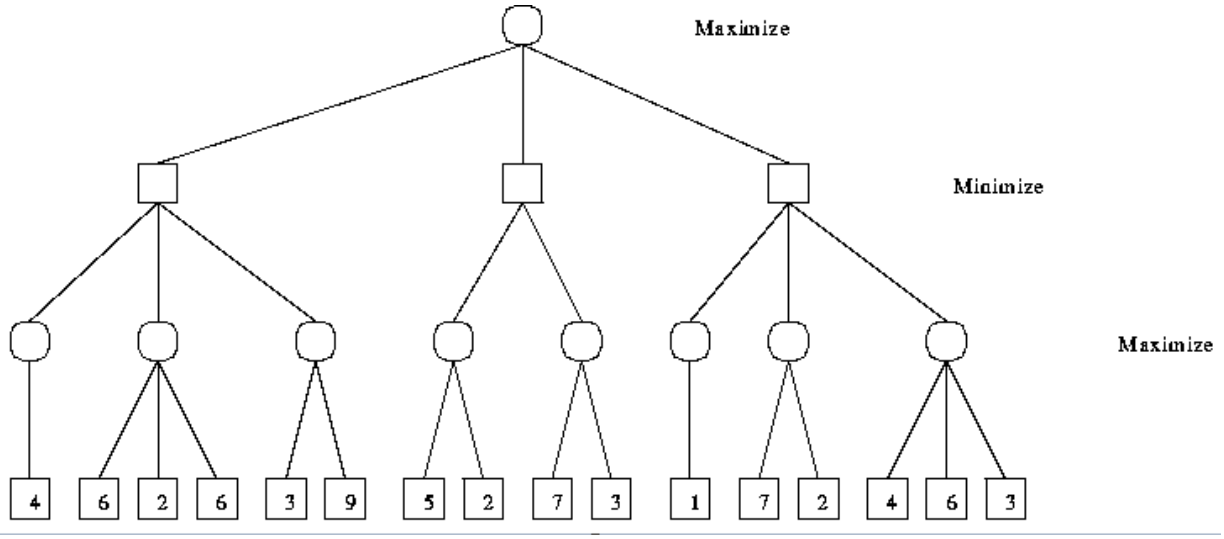
SECTION-II

Answer 5 out of 7 questions.

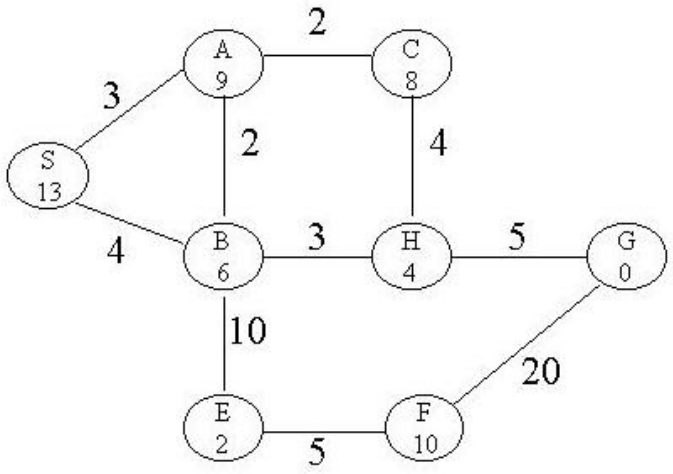
21 (A) Consider the following AO graph: Which is the best node toexpand next by AO* algorithm? Consider the Edge cost given in thefigure and perform calculations accordingly [2] (5)



(B) Consider the following minimax game tree search. What willbe the value propagated at root? [3]



22 Perform the A* Algorithm on the following figure. Explicitly writedown the queue at each step. Find a path between S and G in thefollowing graph. The number attached to each edge in the graphrepresents the COST of traversing the edge. The number inside eachnode represents a heuristic under-estimate of the distance of thenode to the goal G. (5)



23 Solve the following 8-puzzle problem using hill climbing algorithm. (5)

The heuristic function to be used is set-up as h (n) = thenumber of misplaced tiles (excluding the blank tile).

1) Show all possible moves at each iteration of hill climbingalgorithm.

2) Show the best move after each iteration of hill climbingalgorithm.

3) State number of steps required to solve the puzzle (i.e.reaching global minimum)

4	3	
6	7	2
8	1	5

(Initial state)

	1	2
3	4	5
6	7	8

(Goal state)

24 Explain non-monotonic reasoning in detail. (5)

25 Explain Semantic and Syntactic analysis in NLP. (5)

26 Draw Partitioned Semantic Net for following statements.

a) Every kid likes candy.

b) Every school going kid likes candy. (5)

27 Describe Following Facts into Predicate Logic

1) Every child loves Santa.

2) Everyone who loves Santa loves anyreindeer.

3) Rudolph is a reindeer and Rudolph has a rednose.

4) Anything which has a red nose is weird or is aclown.

5) No reindeer is a clown.

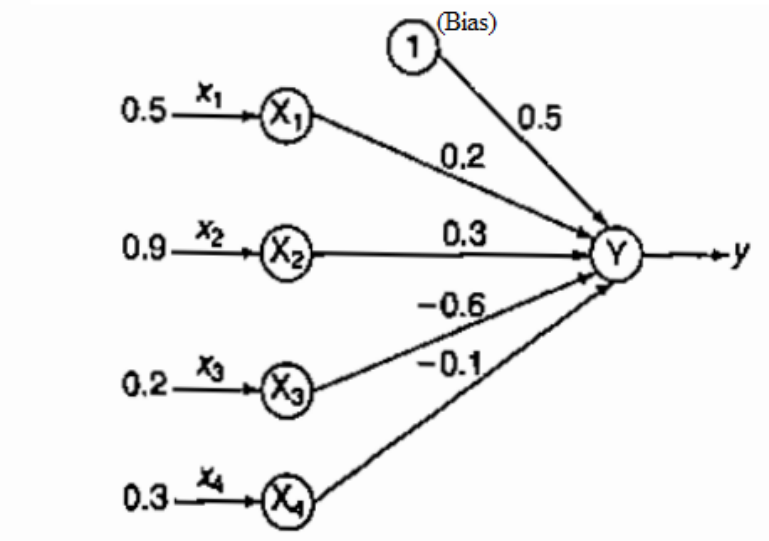
6) Scrooge does not love anything which isweird. (5)

SECTION-III

Answer 5 out of 7 questions.

28 Explain Bayes' Theorem. What is the significance ofit in Naïve Bayesian Classification and Bayesian BeliefNetwork? (5)

29 For the network shown in figure calculate the net input to theoutput neuron. (5)



Use Binary and Bipolar Sigmoidal Activation Function.

30 Consider two given fuzzy sets given below. (5)

$\tilde{A} = \{(x_1,1), (x_2,0.3), (x_3,0.5), (x_4,0.2)\}$

$\tilde{B} = \{(x_1,0.5), (x_2,0.4), (x_3,0.1), (x_4,1)\}$

Perform Union, Intersection, Complement, Product of two fuzzysets, Equality, Product of a fuzzy set with a crisp number a=0.3,Power of a fuzzy set, Difference and Disjunctive Sum.

31 What is an expert system? Explain Architecture of anExpert system. (5)

32 Discuss the different approaches to knowledgerepresentation (5)

33 Explain Backpropagation Network. (5)

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    P O T A T O
+   T O M A T O
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P U M P K I N
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(5)

Solve the above crypt arithmetic problem using constraintsatisfaction procedure.

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