Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2020

EC3ET01 / EI3ET01 Artificial Intelligence

Programme: B.Tech. Branch/Specialisation: EC/EI

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which of the following is a proposed means of testing the intelligence of the machine? **1**
a) Turing Test b) Turning Test c)Tuning Test d)None
answer :a

ii. The characteristics of the computer system capable of thinking, reasoning and learning is known is **1**
a)Machine intelligence b)Human intelligence
c)Artificial intelligence d)Virtual intelligence
answer :c

iii. Best-first search, which is a way of combining the advantages of **1**
a) Both A* and Ao* algorithm
b) Both Depth and Breadth First Search
c)Both A*and Depth Frist Search
d) Both A*and Breadth Frist Search
answer :b

iv. The choice of objective function is governed by **1**
a) Parameters b) Data
c) Qualitative aspects d) The nature of problem.
answer :d

v. Among following options which is not a part of AI knowledge cycle : **1**
a) Learning b) Reasoning c) Perception d) Intelligent
answer :d

vi. What does a first order predicate logic contain? **1**
a)Predicate and a subject b)Predicate and a Preposition
c) Subject and an object d)None of the above
answer :a

vii. Which is the most straightforward approach for planning algorithm? **1**
a) Best-first search b) State-space search
c) Depth-first search d) Hill-climbing search
answer :b

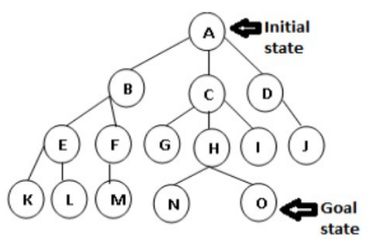
viii. To handle the uncertainty in probabilistic reasoning, we combine **1**
a) Uncertainty with probability theory
b) Logic with uncertainty
c) Probability theory with logic
d) None of above
answer :c

ix. Which value is assigned to alpha and beta in the alpha-beta pruning? **1**
a) Alpha = max b) Beta = min c) Beta = max d) Both a & b
answer :d

x. If b= branch factor and m =depth O= order then time complexity of Min-Max algorithm is **1**
a) $O(b^m)$ b) O(b*m) c)$O(b^{m/2})$ d) O(b(m/2))
answer :a

Q.2 i. Define a Production system and explain types of production system along with example. **5**
1+4

ii. a. Compare Breadth First Search and Depth First Search. **5**
b.Find out optimal path for reaching goal state using DFS and BFS Algorithm **2+3**



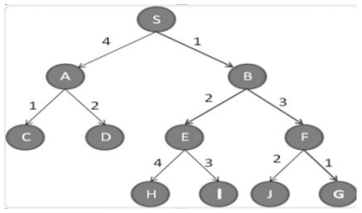
OR iii. Write and explain Depth First Search algorithm along with its performance measure i.e. completeness, optimality, space complexity and time complexity. **5**
1+1*4

Q.3 I Explain the following: **5**

a. Hill climbing Algorithm and its limitations **2.5+2.5**

b. Constraint Satisfaction Problem with example

Ii Solve the following problem with Best first search and A* algorithm and explain each step along with heuristic function used. **5 2.5+2.5**



S: Initial state, G: goal.

Table shows the heuristic estimates:

node	h(n)	node	h(n)	node	h(n)
A	11	**E**	4	**I,J**	3
B	5	**F**	2	**S**	15
C,D	9	**H**	7	**G**	0

OR iii Minimize $f(x) = x_1^2 + x_2 + 1$ range of $-2 < x_1 < 10$ and $-1 < x_2 < 11$ using simulated annealing. **5 2.5+2.5**

Max possible iteration 2

Temperature reduction factor c=0.8

Initial temperature can be calculated from following combination of x_1 and x_2: (2,0),(5,10),(8,10),(10,10)

Q.4 i Explain the following **4**

a. Types of knowledge **2+2**

b. Issues in knowledge Representation

ii Consider the following set of axioms. **6**

1.Sham like easy courses. **3+3**

2.All courses in Arts department are easy

3.All courses in Science department are not easy

4. Physics is a science course.

5. Sketching is an Arts course.

Find using resolution "Which course does Sham like?"

OR ii a. Discuss Semantic Network Representation and **6**

i Frame Representation along with their advantages and disadvantages. **3+3**

b. Convert the following to its FOL form

i. Every student in the class has visited Indore or Bhopal

ii. Some boys in the class are taller than all the girls

iii. Nobody liked by everyone

Q.5 i What do you understand by reasoning? Compare Forward and backward reasoning with example? **5 2+3**

ii Consider following table for decision tree and find out the following : **5 2+2+1**

a. Entropy of the current state

b. Information Gain of all the attribute

c. Find out which attribute is decision node

Day	Weather	Temperature	Humidity	Wind	Play?
1	Sunny	Hot	High	Weak	No
2	Cloudy	Hot	High	Weak	Yes
3	Sunny	Mild	Normal	Strong	Yes
4	Cloudy	Mild	High	Strong	Yes
5	Rainy	Mild	High	Strong	No
6	Rainy	Cool	Normal	Strong	No
7	Rainy	Mild	High	Weak	Yes
8	Sunny	Hot	High	Strong	No
9	Cloudy	Hot	Normal	Weak	Yes
10	Rainy	Mild	High	Strong	No

OR Iii a. Name at least five types of planning techniques which can be used in artificial intelligence and explain any two? **5 3+2**

b. Write the block state of following block i.e. initial and goal

Q.6 I Explain Mini-Max algorithm using following game tree which is played between two player called Maximizer and Minimizer : **5**

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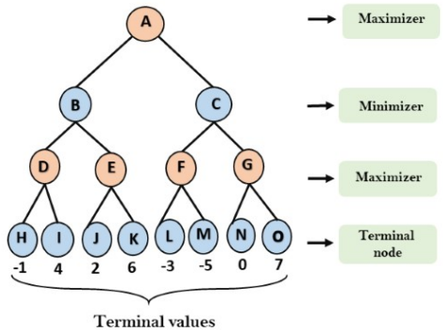

OR	Ii	What is alpha – beta cutoffs? Explain with example how alpha –beta cutoffs improve the performance in minmax search procedure?	**5** **2+3**
	Iii	Explain the following ways to improve the performance of minmax: a. Waiting for quiescence b. Iterative deepening	**5** **2.5+2.5**

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Marking Scheme

EC3ET01 / EI3ET01 Artificial Intelligence

Q.1	i.	Which of the following is a proposed means of testing the intelligence of the machine? a) Turing Test	**1**
	ii.	The characteristics of the computer system capable of thinking, reasoning and learning is known is c)Artificial intelligence	**1**
	iii.	Best-first search, which is a way of combining the advantages of b) Both Depth and Breadth First Search	**1**
	iv.	The choice of objective function is governed by d) The nature of problem.	**1**
	v.	Among following options which is not a part of AI knowledge cycle : d) Intelligent	**1**
	vi.	What does a first order predicate logic contain? a)Predicate and a subject	**1**
	vii.	Which is the most straightforward approach for planning algorithm? b) State-space search	**1**
	viii.	To handle the uncertainty in probabilistic reasoning, we combine c) Probability theory with logic	**1**
	ix.	Which value is assigned to alpha and beta in the alpha-beta pruning? d) Both a & b	**1**
	x.	If b= branch factor and m =depth O= order then time complexity of Min-Max algorithm is a) $O(b^m)$	**1**
Q.2	i.	Define a Production system 1 Mark explain types of production system along with example. 4 Marks	**5**
	ii.	Compare Breadth First Search and Depth First Search. 2 Marks Find out optimal path for reaching goal state. 3 Marks	**5**
OR	iii.	Write Depth First Search algorithm 1 Mark Explain Depth First Search algorithm (1 Mark*4)	**5**
Q.3	I	a. Hill climbing Algorithm and its limitations 2.5 Marks b. Constraint Satisfaction Problem with example 2.5 Marks	**5**
	Ii	Problem with Best first search and A* algorithm 2.5 Marks Explain each step along with heuristic. 2.5 Marks	**5**
OR	iii	Max possible iteration 2 2.5 Marks Temperature reduction factor c=0.8 2.5 Marks	**5**
Q.4	i	a. Types of knowledge 2 Marks b. Issues in knowledge Representation 2 Marks	**4**
	ii	Find using resolution (3 Marks+3 Marks)	**6**
OR	iii	a. Discuss Semantic Network Representation 3 Marks. Every student in the class 1 Mark Some boys in the class 1 Mark Nobody liked by everyone 1 Mark	**6**
Q.5	i	What do you understand by reasoning 2 Marks Compare Forward and backward 3 Marks	**5**
	ii	Consider following table for decision tree and find out the following : a. Entropy of the current state 2 Marks b. Information Gain of all the attribute 2 Marks c. Find out which attribute is decision node 1 Mark	**5**
OR	Iii	Name at least five types of planning techniques 3 Marks The block state of following block 2 Marks	**5**
Q.6	I	Explain Mini-Max (As per explanation)	**5**
OR	Ii	What is alpha – beta cutoffs 2 Marks Alpha –beta cutoffs improve 3 Marks	**5**
	Iii	a. Waiting for quiescence 2.5 Marks	**5**

b. Iterative deepening 2.5 Marks

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