Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering
End Sem Examination Dec-2023
CS3EA10 Artificial Intelligence

Programme: B.Tech. Branch/Specialisation: CSE All

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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which is true regarding BFS (Breadth First Search)? **1**

(a) BFS will get trapped exploring a single path
(b) The entire tree so far been generated must be stored in BFS
(c) BFS is not guaranteed to find a solution, if exists
(d) BFS is nothing but Binary First Search

ii. What is Artificial intelligence? **1**

(a) Putting your intelligence into Computer
(b) Programming with your own intelligence
(c) Making a Machine intelligent
(d) Playing a Game

iii. Best-First search can be implemented using the following data structure. **1**

(a) Queue (b) Stack
(c) Priority Queue (d) Circular Queue

iv. Heuristic function h(n) is- **1**

(a) Lowest path cost
(b) Cheapest path from root to goal node
(c) Estimated cost of cheapest path from root to goal node
(d) Average path cost

v. Knowledge may be- **1**

I. Declarative II. Procedural III. Non-procedural

(a) Only I above (b) Only II above
(c) Only III above (d) Both I and II above

vi. Translate the given statement into First-order logic. **1**
"For every a, if a is a poet, then a is a writer"
(a) ∃ a poet (a). writer (a). (b) ∀ a poet (a). writer (a).
(c) All of these (d) None of these

vii. Primitive in probabilistic reason are: **1**
(a) Nominal variable (b) Random variable
(c) Continuous variable (d) Discrete variable

viii. Bayes' theorem can be derived- **1**
(a) Calculate the value of P(B|A) with the knowledge of P(B)
(b) The Marginal probability
(c) The conditional probability
(d) Using product rule and conditional probability of event A with known event B

ix. Which of the following is the general algorithm that can be applied on a game tree for deciding win or lose? **1**
(a) DFS/BFS Search Algorithms
(b) MIN/MAX Algorithms
(c) Greedy Search Algorithms
(d) Heuristic Search Algorithms

x. The initial value of alpha is? **1**
(a) Negative Infinity (b) 0
(c) Positive Infinity (d) 1

Q.2 i. Discuss production systems. **2**
ii. Write down the steps of problem solving by searching. **3**
iii. Discuss the characteristics of AI problem. Can Towers of Hanoi problem be considered as AI problem? Justify your answer with suitable example. **5**
OR iv. Illustrate the working of Breadth First Search. **5**

Q.3 i. Define heuristic function. Give an example. **2**
ii. What is Greedy Best First Search? Explain with an example the different stages of Greedy Best First search. **8**
OR iii. What is A* search? Explain various stages of A* search with an example. **8**

Q.4 i. Difference between predicate and propositional logic. **4**
ii. Illustrate the use of first order logic to represent knowledge. **6**
OR iii. Explain in detail about forward & backward chaining algorithm with example. **6**

Q.5 i. State the Baye's rule equation. **2**
ii. Differentiate between following: **2**
(a) Forward vs Backward Reasoning
(b) Monotonic and Non-Monotonic Reasoning
iii. What is entropy? What is its significance in the decision tree learning? Explain decision tree learning algorithm. **6**
OR iv. Define uncertain knowledge, prior probability and conditional probability. How it is useful for decision making under uncertainty about knowledge? Explain the method of performing exact inference in Bayesian networks briefly. **6**

Q.6 Attempt any two:
i. Explain with algorithm and example: **5**
(a) Minimax algorithm
(b) Alpha-Beta Pruning
ii. Explain how the problem of 8-puzzle can be solved with the help of heuristics. **5**
iii. Define the term robotics. Write down the hardware component of robot and its path planning algorithms in certain and uncertain domain. **5**

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Marking Scheme
Artificial Intelligence(T)-CS3EA10(T)

Q.1	i)	(C) BFS is not guaranteed to find a solution, if exists		**1**
	ii)	(C) Making a Machine intelligent		**1**
	iii)	(C) Priority Queue		**1**
	iv)	(A) Lowest path cost		**1**
	v)	(D) Both (I) and (II) above		**1**
	vi)	(B) ∀ a poet ((A). writer ((A).		**1**
	vii)	(A) True		**1**
	viii)	(D) using product rule and conditional probability of event A with known event B.		**1**
	ix)	(B) MIN/MAX Algorithms		**1**
	x)	(A) Negative Infinity		**1**
Q.2	i.	Production systems definition	1 Mark	**2**
		Diagram and examples-	1 Mark	
	ii.	Steps of Problem Solving -	2 Marks	**3**
		Name of any searching-	1 Marks	
	iii.	Characteristics	2 Marks	**5**
		Justification	2 Marks	
		Example-	1 Marks	
OR	iv.	BFS Definition	2 Marks	**5**
		Steps-	2 Marks	
		Example-	1 Mark	
Q.3	i.	Definition-	1 Mark	**2**
		Example-	1 Mark	
	ii.	Definition	3 Marks	**8**
		Stages	3 Marks	
		Example	2 Marks	
OR	iii.	Definition	3 Marks	**8**
		Stages	3 Marks	
		Example	2 Marks	
Q.4	i.	Predicate	2 Marks	**4**
		Propositional	2 Marks	
	ii.	Knowledge Represention-	2 Marks	**6**
		First Order Logic-	2 Marks	
		Illustration-	2 Marks	
OR	iii.	Forward Chaining	2 Marks	**6**
		Example-	1 Mark	
		Backward Chaining-	2 Marks	
		Example	1 Mark	
Q.5	i.	State the Baye's rule equation	1 Mark	**2**
		Equation-2	1 Mark	
	ii.	(i) Forward vs Backward Reasoning. -	1 Mark	**2**
		(ii) Monotonic and Non-Monotonic Reasoning.-	1 Mark	
	iii.	Entropy-	1 Mark	**6**
		Significance-	2 Marks	
		Algorithm-	3 Marks	
OR	iv.	Uncertain		**6**
		Prior Probability-	1 Mark	
		Conditional Probability-	1 Mark	
		How to use-	1 Mark	
		Method-	2 Marks	
Q.6	i.	(i). Minimax algorithm -	3 Marks	**6**
		(ii). Alpha-Beta Pruning -	3 Marks	
	ii.	8-Puzzle Problem-	2 Marks	**4**
		Steps-	2 Marks	
OR	iii.	Definition-	1 Marks	**4**
		H/w Component-	1 Marks	
		Path Planning-2		

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