

Enrollment No.....



Faculty of Engineering  
End Sem Examination May-2024  
EC3ET01 Artificial Intelligence

Programme: B.Tech.

Branch/Specialisation: EC

**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 one of the following is NOT an element of a production system? **1**  
 (a) Global database (b) A set of production rules  
 (c) Training (d) Control system
- ii. \_\_\_\_\_ is a component of AI. **1**  
 (a) Learning (b) Designing (c) Training (d) Puzzling
- iii. A \_\_\_\_\_ is a function that will rank all the possible alternatives at any branching step in the search algorithm based on the available information. **1**  
 (a) Kernel function (b) Heuristic function  
 (c) Softmax function (d) Activation function
- iv. The AO\* method divides any given difficult problem into a smaller group of problems that are then resolved using the \_\_\_\_\_ graph concept. **1**  
 (a) AND-OR (b) OR-OR  
 (c) AND-NOR (d) AND-AND
- v. Which one of the following is one of the types of knowledge representation techniques? **1**  
 (a) Semantic network (b) Regressive network  
 (c) Adaptive networks (d) Open network
- vi. Procedural domain knowledge in a rule-based system is classified in the form of \_\_\_\_\_. **1**  
 (a) Control rules (b) Production rules  
 (c) Meta rules (d) None of these

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- vii. Knowledge and reasoning also play a crucial role in dealing with \_\_\_\_\_ environment. **1**  
 (a) Completely observable  
 (b) Partially observable  
 (c) Neither completely nor partially observable  
 (d) Only completely and partially observable
- viii. Inference algorithm is complete only if \_\_\_\_\_. **1**  
 (a) It can derive any sentence  
 (b) It can derive any sentence that is an entailed version  
 (c) It is truth preserving  
 (d) It can derive any sentence that is an entailed version & It is truth preserving
- ix. Which search is equal to minimax search but eliminates the branches that can't influence the final decision? **1**  
 (a) Depth-first search (b) Breadth-first search  
 (c) Alpha-beta pruning (d) None of these
- x. Which values are independent in minimax search algorithm? **1**  
 (a) Pruned leaves x and y (b) All states are dependant  
 (c) Root is independent (d) None of these

- Q.2 Attempt any two:  
 i. What are the various types of production system? Explain in detail. **5**  
 ii. Discuss breadth first search technique in AI with suitable examples. **5**  
 iii. Explain the components of production system in AI. **5**

- Q.3 Attempt any two:  
 i. What is the hill-climbing technique? Which algorithm is used in hill-climbing? **5**  
 ii. Explain the AND-OR graph concept used in AO\* algorithms in AI. **5**  
 iii. Discuss various types of heuristic function. **5**

- Q.4 Attempt any two:  
 i. Explain the knowledge representation and its significance in artificial intelligence. **5**  
 ii. How is predicate logic used in AI? Explain with suitable example. **5**  
 iii. A knowledge base contains the following statements: **5**  
 (a) Everyone loves Mary  
 (b) John does not love anyone  
 Convert these statements into FOL.

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- Q.5 Attempt any two:  
 i. Compare forward and backward reasoning in AI in detail. **5**  
 ii. How do you calculate the entropy of children nodes in decision tree algorithm after the split based on a feature? **5**  
 iii. It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain brand of software claims that it can detect 99% of spam emails, and the probability for a false positive (a non-spam email detected as spam) is 5%. Now if an email is detected as spam, then what is the probability that it is in fact a non-spam email? **5**
- Q.6 Attempt any two:  
 i. What is minimax procedure for game playing? **5**  
 ii. What is ALPHA-BETA cutoff in game playing? **5**  
 iii. Explain the game playing technique in artificial intelligence. **5**

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## Marking Scheme EC3ET01 Artificial Intelligence

Q.1	i)	c) Training		<b>1</b>
	ii)	a) Learning		<b>1</b>
	iii)	b) heuristic function		<b>1</b>
	iv)	a) AND-OR		<b>1</b>
	v)	a) Semantic Network		<b>1</b>
	vi)	b) Production Rules		<b>1</b>
	vii)	b) Partially Observable		<b>1</b>
	viii)	d) It can derive any sentence that is an entailed version & it is truth preserving		<b>1</b>
	ix)	c) Alpha-beta pruning		<b>1</b>
	x)	a) Pruned leaves x and y		<b>1</b>
Q.2	i.	For types of production system.	3 Mark	<b>5</b>
		For description.	2 Marks	
	ii.	1 mark for each meaningful point	(1 Mark*5)	<b>5</b>
	OR	iii.	1 mark for each meaningful point	(1 Mark*5) <b>5</b>
	iv.	1 mark for each meaningful point	(1 Mark*5)	<b>5</b>
Q.3	i.	1 mark for each meaningful point	(1 Mark*5)	<b>5</b>
	ii.	1 mark for each meaningful point	(1 Mark*5)	<b>5</b>
	OR	iii.	1 mark for each meaningful point	(1 Mark*5) <b>5</b>
	iv.	Steepest gradient: 1 mark for each meaningful point	(1 Mark*5)	<b>5</b>
Q.4	i.	1 mark for each meaningful point.	(1 Mark*5)	<b>5</b>
	OR	ii.	for predicate logic	3 Marks <b>5</b>
		for example.	2 Marks	
	iii.	A knowledge .... FOL.	(As per explanation)	<b>10</b>
Q.5	i.	1 Mark for each meaningful point.		<b>5</b>
	ii.	1 mark for each meaningful point		<b>5</b>
	OR	iii.	It is estimated..... email	(As per explanation) <b>10</b>

Q.6	Attempt any two:		
	i.	1 mark for each meaningful point	<b>5</b>
	ii.	1 mark for each meaningful point	<b>5</b>
	iii.	1 mark for each meaningful point	<b>5</b>

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