Total number of printed pages: 2 **D/V/DCSE512**

2024

ARTIFICIAL INTELLIGENCE

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Explain each term briefly:	2 x 4=8
		i) Contradiction	
		ii) Uninformed search	
		iii) Depth first search	
		iv) Artificial intelligence (AI)	
	b)	Differentiate between:	3x4=12
		i) Propositional logic and Predicate logic	
		ii) Breadth first search and Best first search	
		iii) Resolution and Unification	
		iv) Existential and Universal quantifier	
2.	a)	Express the sentence in predicate logic: "Some people like to take coffee".	5
	b)	Briefly explain the importance of AI systems in the context of present situation. Also mention five fields where AI mostly used now a day.	5+5=10
	c)	Express the sentence in propositional logic: "If it rains play will not start".	5
3.	a)	How many ways you can learn? Briefly explain the components of general learning model with a suitable diagram.	5+10=15
	b)	Prove that PV~Q is not a tautology.	5
4.	a)	Define Disjunctive Normal Form.	5
	b)	What is a heuristic function? What is the heuristic function for A* algorithm?	2+3=5

<table>
<tr><td></td><td>c)</td><td>Given that S and G are the source and goal nodes whereas H(n) is the heuristic function estimating the distance of a node from the goal node as follows:
<table><tr><td>Node</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>H</td><td>I</td><td>S</td><td>G</td></tr><tr><td>H(n)</td><td>10</td><td>9</td><td>7</td><td>6</td><td>6</td><td>7</td><td>3</td><td>5</td><td>12</td><td>0</td></tr></table>Note that, S is the parent of A&B, A is the parent of C&D, B is the parent of E&F, E is the parent of H&I and H is the parent of G. Apply best first search algorithm and show the iterative steps of the closed and the open lists to find the path of the solution.</td><td>10</td></tr>
<tr><td>5.</td><td colspan="2">Write short notes on any four of the followings:</td><td>5x4=20</td></tr>
<tr><td></td><td>a)</td><td>Informed search</td><td rowspan="6"></td></tr>
<tr><td></td><td>b)</td><td>Inductive inference</td></tr>
<tr><td></td><td>c)</td><td>Resolution</td></tr>
<tr><td></td><td>d)</td><td>Optimal search algorithm</td></tr>
<tr><td></td><td>e)</td><td>Unification</td></tr>
<tr><td></td><td>f)</td><td>Modus ponens</td></tr>
<tr><td>6.</td><td>a)</td><td>What do you mean by inference?</td><td>4</td></tr>
<tr><td></td><td>b)</td><td>Give a suitable example for deductive inference.</td><td>6</td></tr>
<tr><td></td><td>c)</td><td>Draw a graph consisting of 10 nodes and apply depth first search to the graph using the appropriate data structure.</td><td>4+6=10</td></tr>
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