

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)	Tautology	
	ii)	Informed search	
	iii)	Version space	
	iv)	Artificial Intelligence (AI)	
	b)	Differentiate between:	3x4=12
	i)	Propositional logic and Predicate logic	
	ii)	Inductive inference and Deductive inference	
	iii)	CNF and DNF	
	iv)	Existential quantifier and Universal quantifier	
2.	a)	Express the sentence in predicate logic: "Many people like to drink Pepsi".	5
	b)	Briefly explain the importance of AI systems in the context of the present scenario. Also mention five fields where AI is mostly used nowadays.	5+5=10
	c)	Express the sentence in propositional logic: "If it rains play will be delayed".	5
3.	a)	How many ways can you learn? Briefly explain the components of the general learning model with a suitable diagram.	5+10=15
	b)	Prove that $P \vee \sim Q$ is not a tautology.	5
4.	a)	Define resolution.	5
	b)	What is a heuristic function? What is the heuristic function for best first search?	3+2=5

c)	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 border="1"><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>5</td><td>7</td><td>3</td><td>5</td><td>12</td><td>0</td></tr></table> <p>Note that, S is the parent of A&amp;B, A is the parent of C&amp;D, B is the parent of E&amp;F, E is the parent of H&amp;I and H is the parent of G.</p> <p>Apply the best first search algorithm and show the iterative steps of the closed and the open lists to find the path of the solution.</p>										Node	A	B	C	D	E	F	H	I	S	G	H(n)	10	9	7	6	5	7	3	5	12	0	10																																												
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5.	Write short notes on any four of the followings: <table border="1"><tr><td>a)</td><td colspan="10">Expert system</td></tr><tr><td>b)</td><td colspan="10">A* algorithm</td></tr><tr><td>c)</td><td colspan="10">Breadth first search</td></tr><tr><td>d)</td><td colspan="10">PROLOG</td></tr><tr><td>e)</td><td colspan="10">Genetic algorithm</td></tr><tr><td>f)</td><td colspan="10">Rule based system</td></tr></table>										a)	Expert system										b)	A* algorithm										c)	Breadth first search										d)	PROLOG										e)	Genetic algorithm										f)	Rule based system										5x4=20
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6.	a) Draw a graph of ten(10) nodes and apply depth first search in the graph.										4+6=10																																																																		
	b) Apply candidate elimination method to the following training examples. <table border="1"><tr><td>Sky</td><td>Temperature</td><td>Humid</td><td>Wind</td><td>Water</td><td>Forest</td><td>Output</td></tr><tr><td>sunny</td><td>warm</td><td>normal</td><td>strong</td><td>warm</td><td>same</td><td>yes</td></tr><tr><td>sunny</td><td>warm</td><td>high</td><td>strong</td><td>warm</td><td>same</td><td>yes</td></tr><tr><td>rainy</td><td>cold</td><td>high</td><td>strong</td><td>warm</td><td>change</td><td>no</td></tr><tr><td>sunny</td><td>warm</td><td>high</td><td>strong</td><td>cool</td><td>change</td><td>yes</td></tr></table>										Sky	Temperature	Humid	Wind	Water	Forest	Output	sunny	warm	normal	strong	warm	same	yes	sunny	warm	high	strong	warm	same	yes	rainy	cold	high	strong	warm	change	no	sunny	warm	high	strong	cool	change	yes	10																															
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