

RV COLLEGE OF ENGINEERING®
 (An Autonomous Institution affiliated to VTU, Belagavi)
I Semester Master of Technology (Computer Science and Engineering)
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Time: 03 Hours

Maximum Marks: 100

Instructions to candidates:

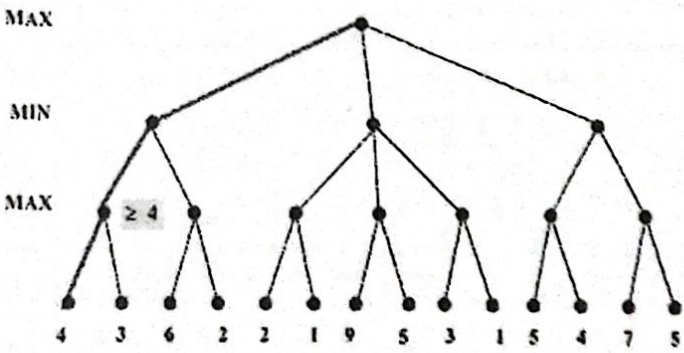
1. Answer FIVE full questions selecting one from each unit.
2. Each unit consisting of two questions of 20 marks each.

UNIT-1

M BT CO

1	a	Differentiate Model-based reflex agents and Goal-based agents with pseudocodes and diagrams.	10	3	2
	b	List the properties of task environments and explain.	10	2	2
OR					
2	a	Identify the task environments that can be categorized along with the appropriate agent design and applicability for agent implementation.	10	2	3
	b	Agent programs are described as components, whose function is to answer questions, illustrate the working of agent programs.	10	2	3

UNIT-2

3	a	Perform the alpha-beta pruning for the fig 3a tree. Demonstrate the step-by step result.			
		 <p style="text-align: center;">Fig 3a</p>	10	3	3
	b	Discuss the working of A* algorithm used in path finding and graph traversals.	10	2	2
		OR			
4	a	With a neat diagram, describe the conceptual components of a learning agent.	10	2	2
	b	Discuss the Minimum description length principle and Maximum likelihood Estimation methods with suitable examples.	10	2	2

UNIT-3

5	a	Draw a Decision Tree for the following data shown in table 1 using Information gain. Training set: 3 features and 2 classes (l, ll represent classes). Estimate the information gain in the following cases			
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	<div><div>i) Split on features x ii) Split on features y iii) Split on features z</div><table><tr><td>X</td><td>Y</td><td>Z</td><td>C</td></tr><tr><td>1</td><td>1</td><td>1</td><td>I</td></tr><tr><td>1</td><td>1</td><td>0</td><td>I</td></tr><tr><td>0</td><td>0</td><td>1</td><td>II</td></tr><tr><td>1</td><td>0</td><td>0</td><td>II</td></tr></table><div>Table 1</div></div>	X	Y	Z	C	1	1	1	I	1	1	0	I	0	0	1	II	1	0	0	II			
X	Y	Z	C																					
1	1	1	I																					
1	1	0	I																					
0	0	1	II																					
1	0	0	II																					
b	Compare both decision tree classification with logistic regression in Machine learning.	10	3	4																				
	OR	10	3	4																				
6	a																							
	Discuss the implementation steps used in ID3 algorithm with an example.	10	3	4																				
	b																							
	Discuss the issues and challenges in concept learning.	10	2	2																				

UNIT – 4

7	a	Consider the given data in table 2, apply Naïve Baye's algorithm and predict fruit has the following properties then which type of the fruit it is $Fruit = \{Yellow, Sweet, Long\}$ <div>Frequency Table<table><tr><td><i>Fruit</i></td><td><i>Yellow</i></td><td><i>Sweet</i></td><td><i>Long</i></td><td><i>Total</i></td></tr><tr><td><i>Mango</i></td><td>350</td><td>450</td><td>0</td><td>650</td></tr><tr><td><i>Banana</i></td><td>400</td><td>300</td><td>350</td><td>400</td></tr><tr><td><i>Others</i></td><td>50</td><td>100</td><td>50</td><td>150</td></tr><tr><td><i>Total</i></td><td>800</td><td>850</td><td>400</td><td>1200</td></tr></table></div> <div>Table 2</div>	<i>Fruit</i>	<i>Yellow</i>	<i>Sweet</i>	<i>Long</i>	<i>Total</i>	<i>Mango</i>	350	450	0	650	<i>Banana</i>	400	300	350	400	<i>Others</i>	50	100	50	150	<i>Total</i>	800	850	400	1200			
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	b	Illustrate bayes theorem and also discuss its usage in Bayes classifiers.	10	4	4																									
		OR	10	3	4																									
8	a	Illustrate Bayesian belief network with an example.	10	3	3																									
	b	Discuss the salient features of <i>EM</i> – algorithm with a schematic and applications.	10	3	3																									

UNIT – 5

9	a	Write and discuss the k-Nearest Neighbor algorithm for approximating a discrete – valued function. $F: K^n \rightarrow V$	10	3	3
	b	Discuss the role of re-enforcement learning. Also give the working principle of Q-learning with an example.	10	2	2
		OR			
10	a	Write an algorithm for learning Q. Discuss in detail Temporal difference learning.	10	2	2
	b	Discuss the concept of instant based learning with an example.	10	2	2