

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING****Assignment-3****Answer any 10 Questions.**

Semester: 5th	Date: 07/03/2024
Subject Name: Artificial Intelligence and Machine Learning	Subject Code: 21CS54

Q. No.	Questions-Module 4, and 5	Marks	CO	Level																																																																																										
Q1.	Describe decision tree learning model. Discuss the advantages and disadvantages of decision trees.	8	CO3	L2																																																																																										
Q2.	Explain the role of Entropy in uncertainty with an example. Write general decision tree algorithm.	8	CO3	L2																																																																																										
Q3.	Define the following. a. Information Gain b. Gain Ratio c. Gini Index d. Pruning in decision trees	8	CO3	L2																																																																																										
Q4.	Consider dataset in Table 1, construct decision tree using ID3 algorithm. <table border="1"><thead><tr><th>S.No.</th><th>CGPA</th><th>Interactiveness</th><th>Practical Knowledge</th><th>Communication Skills</th><th>Job Offer</th></tr></thead><tbody><tr><td>1.</td><td>≥9</td><td>Yes</td><td>Very good</td><td>Good</td><td>Yes</td></tr><tr><td>2.</td><td>≥8</td><td>No</td><td>Good</td><td>Moderate</td><td>Yes</td></tr><tr><td>3.</td><td>≥9</td><td>No</td><td>Average</td><td>Poor</td><td>No</td></tr><tr><td>4.</td><td><8</td><td>No</td><td>Average</td><td>Good</td><td>No</td></tr><tr><td>5.</td><td>≥8</td><td>Yes</td><td>Good</td><td>Moderate</td><td>Yes</td></tr><tr><td>6.</td><td>≥9</td><td>Yes</td><td>Good</td><td>Moderate</td><td>Yes</td></tr><tr><td>7.</td><td><8</td><td>Yes</td><td>Good</td><td>Poor</td><td>No</td></tr><tr><td>8.</td><td>≥9</td><td>No</td><td>Very good</td><td>Good</td><td>Yes</td></tr><tr><td>9.</td><td>≥8</td><td>Yes</td><td>Good</td><td>Good</td><td>Yes</td></tr><tr><td>10.</td><td>≥8</td><td>Yes</td><td>Average</td><td>Good</td><td>Yes</td></tr></tbody></table> <p style="text-align: center;">Table 1</p>	S.No.	CGPA	Interactiveness	Practical Knowledge	Communication Skills	Job Offer	1.	≥9	Yes	Very good	Good	Yes	2.	≥8	No	Good	Moderate	Yes	3.	≥9	No	Average	Poor	No	4.	<8	No	Average	Good	No	5.	≥8	Yes	Good	Moderate	Yes	6.	≥9	Yes	Good	Moderate	Yes	7.	<8	Yes	Good	Poor	No	8.	≥9	No	Very good	Good	Yes	9.	≥8	Yes	Good	Good	Yes	10.	≥8	Yes	Average	Good	Yes	8	CO3	L3																								
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Q5.	Consider dataset in Table 1, construct decision tree using C4.5 algorithm.	8	CO3	L3																																																																																										
Q6.	Write procedure to construct decision trees using CART	8	CO3	L2																																																																																										
Q7.	Define regression trees and write procedure to construct regression trees.	8	CO3	L2																																																																																										
Q8.	Explain Bayes Theorem and Bayes Classification Model.	8	CO3	L2																																																																																										
Q9.	Apply Naïve Bayes algorithm for the dataset in Table 1 and classify the given test data {CGPA>=9, Instructiveness = YES, Practical Knowledge = Average, Communication skill = Good}.	8	CO3	L3																																																																																										
Q10.	Apply Naïve Bayes algorithm for following dataset and classify the given test data {Outlook=Sunny, Temperature=Cool, Humidity=High, Wind=Strong}.	8	CO3	L3																																																																																										
	<table border="1"><thead><tr><th>Day</th><th>Outlook</th><th>Temperature</th><th>Humidity</th><th>Wind</th><th>PlayTennis</th></tr></thead><tbody><tr><td>D1</td><td>Sunny</td><td>Hot</td><td>High</td><td>Weak</td><td>No</td></tr><tr><td>D2</td><td>Sunny</td><td>Hot</td><td>High</td><td>Strong</td><td>No</td></tr><tr><td>D3</td><td>Overcast</td><td>Hot</td><td>High</td><td>Weak</td><td>Yes</td></tr><tr><td>D4</td><td>Rain</td><td>Mild</td><td>High</td><td>Weak</td><td>Yes</td></tr><tr><td>D5</td><td>Rain</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D6</td><td>Rain</td><td>Cool</td><td>Normal</td><td>Strong</td><td>No</td></tr><tr><td>D7</td><td>Overcast</td><td>Cool</td><td>Normal</td><td>Strong</td><td>Yes</td></tr><tr><td>D8</td><td>Sunny</td><td>Mild</td><td>High</td><td>Weak</td><td>No</td></tr><tr><td>D9</td><td>Sunny</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D10</td><td>Rain</td><td>Mild</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D11</td><td>Sunny</td><td>Mild</td><td>Normal</td><td>Strong</td><td>Yes</td></tr><tr><td>D12</td><td>Overcast</td><td>Mild</td><td>High</td><td>Strong</td><td>Yes</td></tr><tr><td>D13</td><td>Overcast</td><td>Hot</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D14</td><td>Rain</td><td>Mild</td><td>High</td><td>Strong</td><td>No</td></tr></tbody></table>	Day	Outlook	Temperature	Humidity	Wind	PlayTennis	D1	Sunny	Hot	High	Weak	No	D2	Sunny	Hot	High	Strong	No	D3	Overcast	Hot	High	Weak	Yes	D4	Rain	Mild	High	Weak	Yes	D5	Rain	Cool	Normal	Weak	Yes	D6	Rain	Cool	Normal	Strong	No	D7	Overcast	Cool	Normal	Strong	Yes	D8	Sunny	Mild	High	Weak	No	D9	Sunny	Cool	Normal	Weak	Yes	D10	Rain	Mild	Normal	Weak	Yes	D11	Sunny	Mild	Normal	Strong	Yes	D12	Overcast	Mild	High	Strong	Yes	D13	Overcast	Hot	Normal	Weak	Yes	D14	Rain	Mild	High	Strong	No			
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D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Q11.	Explain following with examples a. Zero probability error b. Bayes Optimal Classifier	8	CO3	L2																		
Q12.	Define Clustering. Differentiate between Clustering and Classification	8	CO5	L2																		
Q13.	Mention the properties of distance measures. Calculate the distance for the following objects with attribute values (0, 3, 5) and (5, 8, 4) using Euclidean, City block and Chebyshev Distance formulae.	8	CO5	L2																		
Q14.	Explain distance measures, Simple Matching Coefficient (SMC), Jaccard Coefficient and Hamming distance, of binary attributes with examples.	8	CO5	L2																		
Q15.	Consider the array of points as shown in the following table, apply single linkage algorithm for clustering and draw dendrogram. <table><tr><th>Objects</th><th>X</th><th>Y</th></tr><tr><td>0</td><td>1</td><td>4</td></tr><tr><td>1</td><td>2</td><td>8</td></tr><tr><td>2</td><td>5</td><td>10</td></tr><tr><td>3</td><td>12</td><td>18</td></tr><tr><td>4</td><td>14</td><td>28</td></tr></table>	Objects	X	Y	0	1	4	1	2	8	2	5	10	3	12	18	4	14	28	8	CO5	L3
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Q16.	Apply K-means clustering with initial values of object 2 and 5 as initial seeds. <table><tr><th>Objects</th><th>X</th><th>Y</th></tr><tr><td>1</td><td>2</td><td>4</td></tr><tr><td>2</td><td>4</td><td>6</td></tr><tr><td>3</td><td>6</td><td>8</td></tr><tr><td>4</td><td>10</td><td>4</td></tr><tr><td>5</td><td>12</td><td>4</td></tr></table>	Objects	X	Y	1	2	4	2	4	6	3	6	8	4	10	4	5	12	4	8	CO5	L3
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Q17.	Write a note on a. Density based clustering b. Grid based clustering	8	CO5	L2																		
Q18.	Describe perceptron model and write perceptron algorithm.	8	CO4	L2																		
Q19.	Discuss about the types of Artificial Neural Network (ANN).	8	CO4	L2																		
Q20.	Discuss on advantages, disadvantages and Challenges in ANN	8	CO4	L2																		

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