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Code No. : 16635

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (I.T.) VI-Semester Main Examinations, June-2022

Artificial Intelligence and Machine Learning

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO																										
1.	Define problem characteristics in AI.	2	1	1	1																										
2.	List the various applications of AI.	2	1	1	1																										
3.	What is overfitting? How to avoid overfitting?	2	1	2	1																										
4.	What is bias-variance tradeoff?	2	1	2	1																										
5.	Differentiate between feature selection and feature extraction.	2	2	3	1																										
6.	Why SVM is used in machine learning?	2	1	3	1																										
7.	Define Multilayer perceptron. Write the applications of Multilayer perceptron.	2	1	4	1																										
8.	State Bayes theorem.	2	1	4	1																										
9.	Define Unsupervised learning. How it is different from supervised learning?	2	1	5	1																										
10.	Differentiate between core, border, and noise points.	2	2	5	1																										
Part-B (5 × 8 = 40 Marks)																															
11. a)	You are given a 5 gallon jug and a 2 gallon jug. Initially the 5 gallon jug is full and the 2 gallon jug is empty. Your goal is to fill the 2 gallon jug with exactly 1 gallon of water. There is no water faucet to fill the jugs with water (Initially you have only 5 gallons of water). Write the production rules to solve this problem and show the solution path.	4	4	1	3																										
b)	Explain about Iterative-Deepening A* algorithm with an example.	4	2	1	2																										
12. a)	A study was conducted to understand the effect of number of hours the students spent studying to their performance in the final exams. You are given the following samples from the study. Find the equation of the best fit line for this data, for the prediction of a student's final exam score based on the number of hours spent studying.	4	3	2	3																										
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of hours spent studying (X)</th> <th>Score in the final exam (0-100) (y)</th> </tr> </thead> <tbody> <tr><td>10</td><td>92</td></tr> <tr><td>9</td><td>80</td></tr> <tr><td>2</td><td>10</td></tr> <tr><td>15</td><td>50</td></tr> <tr><td>10</td><td>45</td></tr> <tr><td>16</td><td>98</td></tr> <tr><td>11</td><td>38</td></tr> <tr><td>16</td><td>93</td></tr> <tr><td>14</td><td>52</td></tr> <tr><td>12</td><td>76</td></tr> <tr><td>8</td><td>75</td></tr> <tr><td>13</td><td>82</td></tr> </tbody> </table>						Number of hours spent studying (X)	Score in the final exam (0-100) (y)	10	92	9	80	2	10	15	50	10	45	16	98	11	38	16	93	14	52	12	76	8	75	13	82
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	b)	Write the limitations of propositional logic for knowledge representation. Describe with suitable examples.	4	2	2	2
13.	a)	What is linear SVM model? Discuss the mathematical functioning of linear SVM model.	4	2	3	2
	b)	Apply the K-Nearest Neighbor algorithm for classification on the given data. Predict the class for the point $(X_1, X_2) = (12, 5)$. $(X_1, X_2, \text{class}) = \{ (34, 12, 0), (12, 11, 0), (2, 3, 1), (3, 2, 1), (5, 45, 0), (21, 6, 0), (6, 8, 1), (8, 9, 1) \}$. (Assume that $k=4$.)	4	4	3	3
14.	a)	Explain backpropagation learning to update the weights of an output layer in a multi-layer neural network.	4	4	4	3
	b)	Discuss the working of Naïve Bayes Classifier with an example.	4	4	4	3
15.	a)	Explain the working of Random Forest Algorithm.	4	2	5	2
	b)	Apply K-mean clustering algorithm to generate 3 clusters for the given dataset. You can assume the distance measure as Euclidian distance method. Data : $(X_1, X_2) : \{ (5, 9), (2, 10), (8, 24), (23, 56), (4, 23), (76, 55), (21, 34), (4, 9), (8, 10) \}$	4	4	5	3
16.	a)	Discuss about Heuristic search techniques in AI.	4	2	1	2
	b)	Explain about Reinforcement learning and how it differs from supervised learning.	4	2	2	2
17.		Answer any <i>two</i> of the following:				
	a)	How does linear SVM kernel differs from other kernel functions. Discuss with an example.	4	4	3	3
	b)	Design the AND Gate and OR Gate using the perceptron learning model.	4	3	4	3
	c)	Define clustering. Explain about different types of clustering	4	2	5	2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20
ii)	Blooms Taxonomy Level - 2	40
iii)	Blooms Taxonomy Level - 3 & 4	40

17