Hall Ticket Number:

Code No. : 14267 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July-2023

Machine Learning

(Common to CSE & AIML)

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.	Consider set of hypotheses H1 and H2, Find among them which is more general than the other hypothesis. H1 = {'?','Normal','?', '+'} H2 = {'Warm', 'Normal','?', '+'}	2	1	1	1,2
2.	Find the Hypothesis which best fits the given set of samples using FIND-S algorithm.	2	3	1	1,2,3
3.	Calculate the output y of a three-input neuron with bias. The input featurevector is (x1, x2, x3) = (0.8,0.6,0.4) and weight values are [w1,w2,w3, b]=[0.2, 0.1, -0.3, 0.35]. Use binary Sigmoid function as activation function.	2	3	2	1,2,3
4.	Consider the following set of training examples: (a) What is the entropy of this collection of training examples with respect to the target function classification?	2	1	2	1,2
5.	Let there be 5 hypothesis h1 through h5. The MAP hypothesis suggests the robot should go forward (F).What does the Bayes optimal procedure suggest?	2	3	3	1,2,4

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

Instance	Classification	a_1	a_2
1	+	T	T
2	+	T	T
3	−	T	F
4	+	F	F
5	−	F	T
6	−	F	T

$P(h_i \mid D)$	$P(F \mid h_i)$	$P(L \mid h_i)$	$P(R \mid h_i)$
0.4	1	0	0
0.2	0	1	0
0.1	0	0	1
0.1	0	1	0
0.2	0	1	0

Contd... 2

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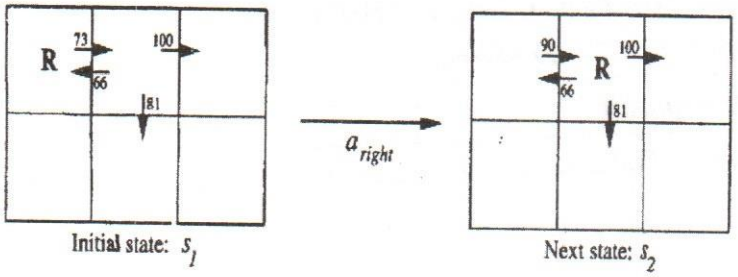
6.	Define Vapnik Chervoniks (VC) dimension. How VC dimension is related with no of trainingexamples used for learning.	2	2	3	1,2
7.	Write the steps to find a Maximum A Posterior (MAP) hypothesis using Brute-force method.	2	2	4	1,2
8.	 Initial state: s_1 Next state: s_2 Find the Q(s1,aright) ?	2	3	4	1,2,4
9.	Consider a string before a crossover s1 ` = 111**1010**101 s2 ` = 1110110101 Compute the offspring's after the crossover	2	3	5	1,2,3
10.	Find the output dimension of Conv layer 1 if the input image is 228*228 and kernel size is 5*5 with zero padding and stride is 2.	2	3	5	1,2,4

Part-B (5×8 = 40 Marks)

11. a)	Explain the issues that need to be considered while designing the machine learning algorithm.	4	1	1	1,2
b)	Consider the training data in the following table where Play is a classattribute. In the table, the Humidity attribute has values "L" (for low) or"H" (for high), Sunny has values "Y" (for yes) or "N" (for no), Wind hasvalues "S" (for strong) or "W" (for weak), and Play has values "Yes" or"No".	4	3	1	1,2,3

Humidity	Sunny	Wind	Play
L	N	S	No
H	N	W	Yes
H	Y	S	Yes
H	N	W	Yes
L	Y	S	No

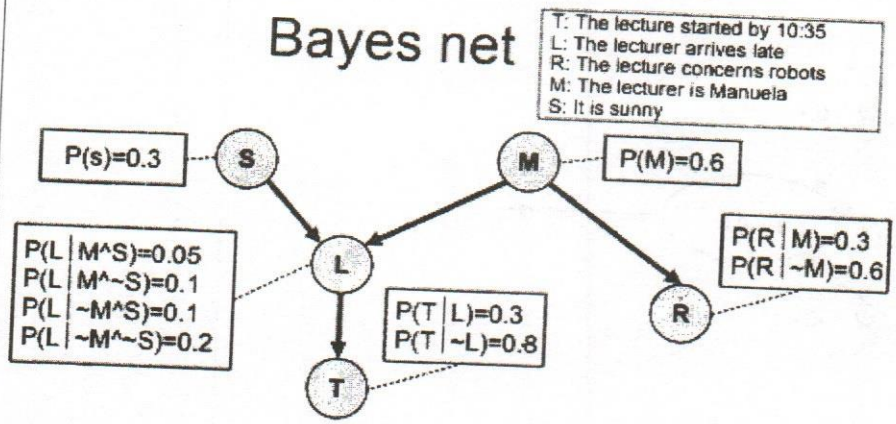
What is class label Play for the following day (Humidity=L, Sunny=N, Wind=W), according to Candidate elimination algorithm?

12. a)	Explain the backpropagation learning to update the weights of an output layer in a multilayer neural network.	4	2	2	1,2

Contd... 3

b)	Identify the first splitting attribute for decision tree by using ID3 algorithm withthe following dataset.	4	3	2	1,2,3

Major	Experience	Tie	Hired?
CS	programming	pretty	NO
CS	programming	pretty	NO
CS	management	pretty	YES
CS	management	ugly	YES
business	programming	pretty	YES
business	programming	ugly	YES
business	management	pretty	NO
business	management	pretty	NO

13. a)	Illustrate Expectation Maximization clustering algorithm.	4	2	3	1,2
b)	 Find the value of P (S ^ ~M ^ L ~R ^ T)?	4	3	3	1,2,3
14. a)	Discuss the significance of locally weighted regression.	4	2	4	1,2
b)		4	3	4	1,2,3

ID	Height	Age	Weight
1	5	45	77
2	5.11	26	47
3	5.6	30	55
4	5.9	34	59
5	4.8	40	72
6	5.8	36	60
7	5.3	19	40
8	5.8	28	60
9	5.5	23	45
10	5.6	32	58
11	5.5	38	?

Consider the Height and Age attributes of 10 persons given above. Find the weight of the 11th person by using Simple KNN with k=5.

15. a)	What is Genetic Algorithm (GA). Explain GA with 8 queens' problem and derive the updated population from the randomly selected population.	4	3	5	1,2,4

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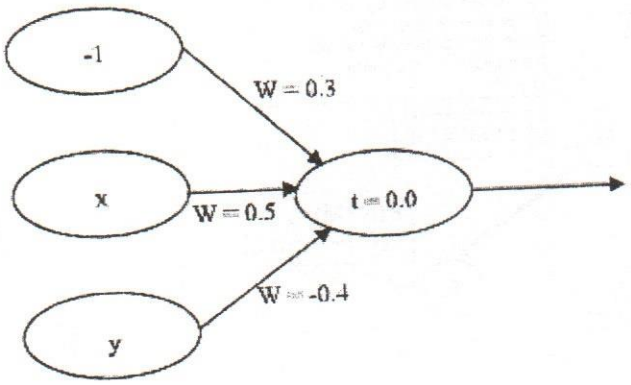
b)	What is Deep learning? Explain the Recurrent Neural Network (RNN) architecture and training steps involved while constructing RNN Model.	4	2	5	1,2
16. a)	What is an Inductive Bias? Explain the List then Eliminate Algorithm.	4	1	1	1,2
b)	What is Artificial Neural Network? Calculate the output where the threshold t=0.0 and take four combinations of inputs for x and y where bias=-1. 1 0, 0 1, 0 0, 1 1.  	4	3	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	What is Ɛ -exhaustive? What are the true error and training error in version space? Give with an example.	4	1	3	1,2
b)	Explain the following Instance-based learning techniques. i. Case-based Reasoning ii. Radial basis networks	4	2	4	1,2
c)	Consider the CNN Image below with filter values. Compute the output of convolution 1 with zero padding and stride 1.And mention the outcome after applying ReLu Function. **Input Image** **Filter**	4	3	5	1,2,3

			3	8	
			8	4	
			8	4	
2	8	7	2	7	
5	4	4	5	4	

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1	0	-1
1	0	-1
1	0	-1

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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