

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Artificial Neural Network and Applications	Semester: II
Program: M. Tech. CSE with AI	Time: 03 hrs.
Course Code: CSAI7005	Max. Marks: 100

Instructions:

SECTION A

Q. No.	Question	Marks	CO
Q. 1.	Discuss the Perceptron model. How this model is different from an Adaline model?	4	CO1
Q. 2.	Relate the significance of the initial values of weights and the learning rate parameter in the seven basic learning laws.	4	CO2
Q. 3.	Explain K-Means clustering algorithm in Radial Basis Function (RBF) network.	4	CO2
Q. 4.	Describe on-center, off-surround feedback network.	4	CO3
Q. 5.	Differentiate between Training set and Test set.	4	CO4

SECTION B

Q. 6.	Describe McCulloch-Pitts Model for a neuron. Illustrate the significance of Activation function, Ramp function, Gaussian function and Sigmoid function in context to MP model.	10	CO1
Q. 7.	A two-layer network is to have four inputs and six outputs. The range of the outputs is to be continuous between 0 and 1. a) Develop the network architecture. b) Evaluate the number of neurons required in each layer. c) Show the dimensions of the first-layer and second layer weight matrices? (Hidden layer neurons are 5)	10	CO2
Q. 8.	Explain the two phases (storage and retrieval) of discrete Hopfield model used for pattern storage.	10	CO3
Q. 9.	Demonstrate that unsupervised learning can be implemented in an on-line or off-line fashion. Also, discuss its physical implications. <p style="text-align: center;">OR</p> Justify that Recognition of Handwriting is a pattern classification problem.	10	CO4

SECTION C

Q. 10.	a) Construct a MP-Neuron Model for the following logical relations: i. AND ii. OR b) Justify that XOR problem cannot be solved by a single layer perceptron. Demonstrate how a Multilayer Perceptron solves it.	14+6	CO1, CO2
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Q. 11.

Draw the architecture of Hopfield Auto-associative memory. Also, explain electronic circuit interpretation of additive dynamic structure of Hopfield network.

OR

Forecast monthly sales by studying the relationship between the monthly e-commerce sales and online advertising cost given in table below. Also, conduct the goodness of fit to justify your predictions.

Monthly Sales	Advertising Cost
200	0.5
900	5.0
450	1.9
680	3.2
490	2.0
300	1.0

20

CO3

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SECTION A

Q. No.	Question	Marks	CO
Q. 1.	Discuss the MP model in brief. How this model is different from Perceptron model?	4	CO1
Q. 2.	Differentiate between basic learning laws.	4	CO2
Q. 3.	Define Backpropagation learning for determining linear weights.	4	CO2
Q. 4.	Elaborate the Hebb's Postulate and its modeling in ANN.	4	CO3
Q. 5.	Explain overfitting problem with the help of suitable example.	4	CO4

SECTION B

Q. 6.	Elaborate Artificial neuron with the help of suitable example. Describe the features of a biological neuron, which makes it superior to an artificial neuron.	10	CO1
Q. 7.	Discuss the Back Propagation of error signal in the backward pass of the BP algorithm. Also, demonstrate the activation functions commonly used in BP Algorithm with the help of suitable example.	10	CO2
Q. 8.	Explain the electronic circuit interpretation of additive dynamic structure of Hopfield network with the help of suitable example.	10	CO3
Q. 9.	Illustrate Local Maxima problem using suitable example. OR Demonstrate how over-training of a network can be avoided.	10	CO4

SECTION C

Q. 10.	Construct a MP-Neuron Model for the following logical relations: a) AND-NOT b) NOR	20	CO1, CO2
Q. 11.	The weight matrix of a Hopfield network is given by, $W = \frac{1}{3} \begin{bmatrix} 0 & -2 & +2 \\ -2 & 0 & -2 \\ +2 & -2 & 0 \end{bmatrix}$ Test the following states of the system whether stable or not (Assume Bias is Zero): i. (1,-1,1) ^T ii. (1,1,1) ^T iii. (-1,1,-1) ^T	20	CO3

OR

Predict distance travelled by a car when only the speed of the car is known. Establish a mathematical equation for distance as a function of speed.

Car #	Speed	Distance
1	4	2
2	4	10
3	7	4
4	7	22
5	8	16
6	9	10
7	10	18
8	10	26
9	10	34
10	11	17
11	11	28
12	12	14
13	12	20
14	12	24
15	12	28