GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Seventh Semester – Regular) Examinations, November – 2023

BPECS7012 /BPECT7012 – Artificial Neural Networks

(CSE,CST)

Time: 3 hrs   Maximum: 70 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)   (1 x 10 = 10 Marks)

Q.1. Answer *ALL* questions   [CO#]   [PO#]

a. Artificial Neural Network is based on which approach?   CO1   PO2
   (i) Weak Artificial Intelligence approach   (ii) Cognitive Artificial Intelligence approach
   (iii) Strong Artificial Intelligence approach   (iv) Applied Artificial Intelligence approach

b. What is reinforcement learning?   CO1   PO1
   (i) learning is based on evaluative signal   (ii) learning is based o desired output for an input
   (iii) learning is based on both desired output & evaluative signal   (iv) None of the Above

c. What are the requirements of learning laws?   CO2   PO2
   (i) Convergence of weights   (ii) Learning should use only local weights
   (iii) Learning time should be as small as possible   (iv) All of the Above

d. Backpropagation is a learning technique that adjusts weights in the neural network by propagating weight changes   CO2   PO2
   (i) Backward from sink to source   (ii) Forward from source to sink
   (iii) Backward from sink to hidden nodes   (iv) Forward from source to hidden nodes

e. What is asynchronous update in neural networks?   CO3   PO1
   (i) Output units are updated in parallel fashion   (ii) Output units are updated sequentially
   (iii) Can be either sequentially or in parallel fashion   (iv) None of the Above

f. For what purpose, hamming network is suitable?   CO3   PO2
   (i) Association   (ii) Classification
   (iii) Pattern storage   (iv) None of the above

g. What is the purpose of ART?   CO4   PO2
   (i) take care of approximation in a network   (ii) take care of update of weights
   (iii) take care of pattern storage   (iv) None of the above

h. ART is made to tackle?   CO4   PO2
   (i) stability problem   (ii) hard problems
   (iii) storage problems   (iv) All of the Above

i. Feedforward networks are used for?   CO1   PO2
   (i) Pattern mapping   (ii) Pattern association
   (iii) Pattern classification   (iv) All of the Above

j. Who invented perceptron Neural Networks?   CO2   PO2
   (i) Widrow   (ii) Minsky & papert
   (iii) McCullocch-pitts   (iv) Rosenblatt

PART – B: (Short Answer Questions)   (2 x 10 = 20 Marks)

Q.2. Answer *ALL* questions	[CO#]	[PO#]
a. Mention the characteristics of problems suitable for ANNs.	CO1	PO1
b. Give some of the applications of ANN.	CO1	PO3
c. Distinguish between ADALINE & MADALINE.	CO2	PO2
d. What is order of activation? Explain.	CO2	PO2
e. Distinguish between supervised and unsupervised learning.	CO2	PO2
f. Define bias and threshold.	CO3	PO1
g. Define the term "learning". What is Hebbian Learning?	CO3	PO1
h. What the applications of ART network?	CO4	PO2,PO3
i. Define backpropagation and briefly explain its role in training artificial neural networks.	CO1	PO2
j. What do you understand by self-organising maps?	CO4	PO3

PART – C: (Long Answer Questions)   (10 x 4 = 40 Marks)

Answer *ALL* questions	Marks	[CO#]	[PO#]
3. a. What are different Light Sensing organs? Explain in detail.	5	CO1	PO2
b. Construct and test the hamming network to cluster four vectors. Given the exemplar vectors e(1)=[1 -1 -1 -1]; e(2)=[-1 -1 -1 1] the bipolar input vectors are x1=[-1 -1 1 -1], x2=[-1 -1 1 1], x3=[-1 -1 -1 1] and x4=[1 1 -1 -1].	5	CO1	PO1

<center>(OR)</center>

	Marks	[CO#]	[PO#]
c. Explain activation function, Distinguish between binary sigmoid function and bipolar sigmoid functions.	5	CO1	PO2
d. Using the linear separability concept, obtain response for OR function (take bipolar inputs and targets).	5	CO1	PO1
4. a. Using the Hebb rule find the weights required to perform the following classifications. Given that the Vectors (1, 1, 1, 1) & (-1, 1, -1,-1) are the members of the same class (target 1) and vectors (1, 1 ,1, -1) & (1,-1,- 1,1) are the members of another class (target -1).	5	CO2	PO1
b. Derive the decision line of AND gate using Perceptron rule.	5	CO2	PO3

<center>(OR)</center>

	Marks	[CO#]	[PO#]
c. Design a AND gate with Mc Culloch- Pitts neuron.	5	CO2	PO1
d. Using the Hebb rule find the weights required to perform the following classifications. Given that the Vectors (1, 1, 1, 1) & (-1, 1, -1,-1) are the members of the same class (target -1) and vectors (1, 1 ,1, -1) & (1,-1,- 1,1) are the members of another class (target 1).	5	CO2	PO2
5. a. Find the new wieght, using the backpropogation network. The network is presentated with the input pattern [-1, 1] and target output is +1. Use the learning rate α=0.25 and bipolar sigmoial activation function. The initial weight are [v11,	5	CO3	PO2

v21, v01]=[0.6, -0.1, 0.3], [v12, v22, v02]=[-0.3, 0.4, 0.5] and [w1,w2, w0]=[0.4, 0.1, -0.2]

b.	Explain Adaline architecture and algorithm used for pattern classification.	5	CO3	PO1

<div align="center">(OR)</div>

c.	Explain Delta learning rule with an example?	5	CO3	PO3
d.	Find the new wieght, using the backpropogation network. The network is presentated with the input pattern [1, 1] and target output is +1. Use the learning rate α=0.5 and bipolar sigmoial activation function. The initial weight are [v11, v21, v01]=[0.6, -0.1, 0.3], [v12, v22, v02]=[-0.3, 0.4, 0.5] and [w1,w2, w0]=[0.4, 0.1, -0.1].	5	COI3	PO2

6. a.	Consider a kohenen net with two cluster (output) units and five input units. The weight vector for the output unit are W1=[1, 0.8,0.6,0.4,0.2] and W2=[1, 0.5,1,0.5,1]. Use the square of Euclidean distance to find the winning neuron for the input pattern X=[0.5,1,0.5,0,0.5]. Find the new weight for the winning unit. Assume learning rate as 0.2.	5	CO4	PO2
b.	Explain the architectures of popular self-organizing maps. Derive the training algorithm of Kohonen network.	5	CO4	PO2

<div align="center">(OR)</div>

c.	Use adaline network to train ANDNOT function with bipolar inputs and targets. Perform 2 epochs of training.	5	CO4	PO2
d.	Construct a kohonen self organising map (KSOM) to cluster the four given vector [0101], [0001], [0011] and [1000]. The number of clusters to be formed is two. Assume the initial learning rate of 0.4.	5	CO4	PO1

<div align="center">--- End of Paper ---</div>