K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

July-Aug. 2023
(B.Tech) Program: Scheme II
Supplementary Examination: TY Semester: VI
Course Code: AIC601 and Course Name: Artificial Neural Network
Date of Exam: 07/08/2023 Duration: 2.5 Hours Max. Marks: 60

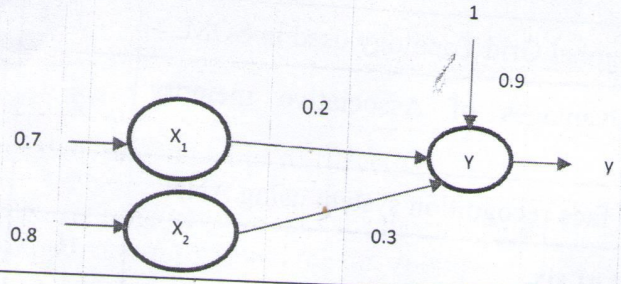
Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	Compare Biological Neuron and Artificial Neuron	2	CO1	U
ii)	Show that the derivative of unipolar sigmoidal function is $f'(x)=\lambda f(x)[1-f(x)]$	2	CO2	Ap
iii)	List different learning rules of neural network.	2	CO2	U
iv)	What is single layer perceptron?	2	CO3	U
v)	Explain similarities and difference between Perceptron and Adaline Network	2	CO3	U
vi)	Explain Rectangular and Hexagonal Grid Topology used in SOM.	2	CO4	U
vii)	Give advantages and disadvantages of Associative memory network	2	CO5	U
viii)	Draw and explain structure of face recognition system using ANN	2	CO6	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	Explain softmax activation function and explain how it solve problem of Multiclass classification?	4	CO1	U
ii)	Write short note on Hebbian Learning rule.	4	CO2	U

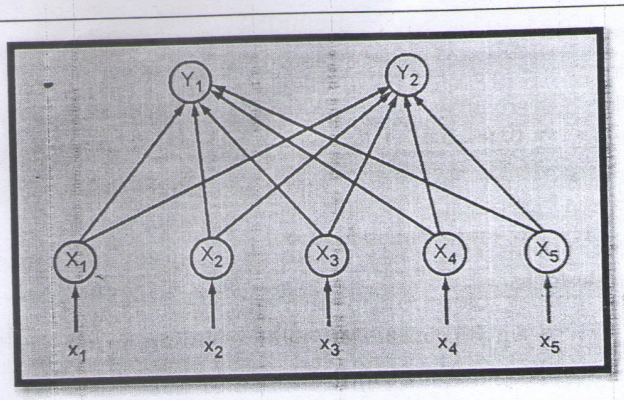
July-Aug. 2023
(B.Tech) Program: Scheme II
Supplementary Examination: TY Semester: VI
Course Code: AIC601 and Course Name: Artificial Neural Network
Date of Exam: 07/08/2023 Duration: 2.5 Hours Max. Marks: 60

iii)	Implement ANDNOT function with bipolar inputs and targets using perceptron training algorithm. Learning rate is 1 and threshold is 0.	4	CO3	Ap
iv)	Write short note on Self Organizing Feature Map	4	CO4	U
v)	Write a note on Auto associative memory network	4	CO5	U
vi)	Explain step by step Handwritten Digit recognition in details	4	CO6	U
Q.3	**Solve any two questions out of three.**	**16**		
i)	a) Explain ELU activation function and limitation of ELU function. b) Calculate the output of neuron Y for the net shown below using binary and bipolar sigmoidal activation.	8	CO1	Ap
ii)	Consider KSO net with two clusters and five input units. The weight vector for the cluster units are given by w1= [1.0 0.9 0.7 0.5 0.3], w2=[0.3 0.5 0.7 0.9 1.0]. Use the square of the Euclidean distance to find the winning cluster unit for the input pattern x=[0.0 0.5 1.0 0.5 0.0]. Using a learning rate of 0.25, find the new weights for the winning unit.	8	CO4	Ap

x_1	x_2	t
1	1	-1
1	-1	1
-1	1	-1
-1	-1	-1



July-Aug. 2023
(B.Tech) Program: Scheme II
Supplementary Examination: TY Semester: VI
Course Code: AIC601 and Course Name: Artificial Neural Network
Date of Exam: 07/08/2023 Duration: 2.5 Hours Max. Marks: 60



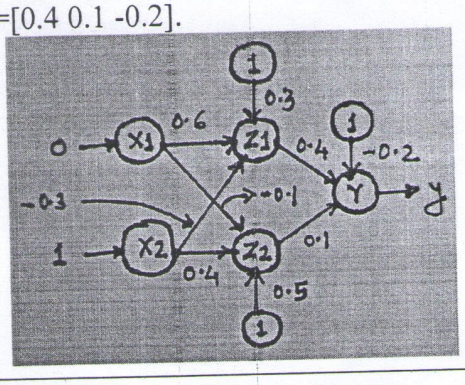
iii) Train the hetroassociative memory network using outer product rule to store input row vector s=(s_1, s_2, s_3, s_4) to the output row vector t=(t_1,t_2). The bipolar vector pairs are as given in the table.

	s_1	s_2	s_3	s_4	t_1	t_2
1st	1	−1	−1	−1	−1	1
2nd	1	1	−1	−1	−1	1
3rd	−1	−1	−1	1	1	−1
4th	−1	−1	1	1	1	−1

8 CO5 Ap

Q.4 Solve any two questions out of three. **16**

i) Using BPN, find the new weights for the net shown. It is presented with the input pattern [0,1] and the target output is 1. Use a learning rate α=0.25 and binary sigmoidal activation function. The initial weights are [v_{11} v_{21} v_{01}]=[0.6 -0.1 0.3], [v_{12} v_{22} v_{02}]=[-0.3 0.4 0.5] and [w_1 w_2 w_3]=[0.4 0.1 -0.2].



8 CO3 Ap

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

July-Aug. 2023
(B.Tech) Program: Scheme II
Supplementary Examination: TY Semester: VI
Course Code: AIC601 and Course Name: Artificial Neural Network
Date of Exam: 07/08/2023 Duration: 2.5 Hours Max. Marks: 60

ii)	Explain how expert system is used for low back pain diagnosis.	8	CO6	U
iii)	Using the Hebb rule, find the weights required to perform the following classifications of the given input patterns "A" and "E". The pattern is shown as 3x3 matrix form in the squares. The "+" symbols represent the value "1" and the empty squares indicate "-1". Consider "A" belongs to the members of class (so has target value 1) and "E" does not belong to the members of class (so has target value -1).	8	CO2	Ap