2017/ODD/08/24/MCS–903 (C)/
MS–303 (C)/133

PG Odd Semester (CBCS) Exam., December—2017

COMPUTER SCIENCE

(9th Semester / 3rd Semester)

Course No. : MCS–903 (C)/MS–303 (C)

(Neural Network)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Write short answers of the following : 1×5=5

(i) What is perceptron?

(ii) What is XOR problem?

(iii) What is the use of ADALINE?

(iv) Who is the writer of *Organisation of Behavior*?

(v) Define weight decay.

(b) Explain McCulloch-Pitts neural network. 4

(c) Compare between supervised and unsupervised learning. 3

(d) Explain delta rule. 3

2. *(a)* Differentiate between biological neurons and artificial neurons. 2

(b) What is threshold? Why is step function considered as a threshold function as well as digitizer? 2

(c) Solve the XOR problem using a single-layer perceptron where bias = – 2, learning rate = 0·8 and initial weights w_1 w_2 0. 6

(d) Write short notes on the following : 2½+2½=5

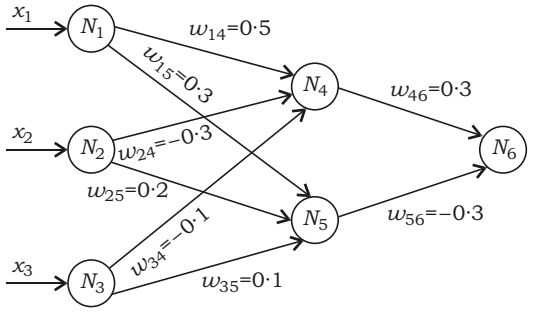
(i) Generalised delta rule

(ii) MADALINE

UNIT—II

3. *(a)* "Back propagation is an error-correction technique." Justify. 3

(b) Update weights of the following neural network using back propagation, if x_1 0, x_2 0 and x_3 1 : 10



(c) Differentiate between MLP and RBF. 2

4. *(a)* State Cover's theorem. 1

(b) What is the main objective of radial basis function? Solve XOR problem using RBF neural network. 1+5=6

(c) Consider a first-order correlator (auto) stores the pattern A_1 (1, 1, 1, 1) and the connection matrix is

$$T \begin{vmatrix} 3 & 1 & 3 & 3 \\ 1 & 3 & 1 & 1 \\ 3 & 1 & 3 & 3 \\ 3 & 1 & 3 & 3 \end{vmatrix}$$

Recognise a noisy pattern A (1, 1,1, 1) which is very near to a stored pattern using HAM. 8

UNIT—III

5. *(a)* Define adaptive resonance. 2

(b) What is vigilance parameter? What is the role of this parameter in improving network performance? Explain with example. 3

(c) Consider the number of inputs n 4 and number of output nodes m 2 and four training samples

i_1 = (1, 1, 0, 0)

i_2 = (0, 0, 0, 1)

i_3 = (1, 0, 0, 0)

i_4 = (0, 0, 1, 1)

Use Kohonen's SOM to cluster the pattern. 10

6. *(a)* What do you mean by counter propagation? Who proposed it? 2

(b) Compare between the following : 2+2=4

(i) CPN and feed forward neural network

(ii) ART and CPN

(c) The patterns of two families are

A (Father$_1$, Mother$_1$, Son) = (1, 0, 1)

B (Father$_2$, Mother$_2$, Daughter) = (1, 0, 1)

Explain how to establish ART in this case. 5

(d) Explain Boltzmann machine. 4

UNIT—IV

7. *(a)* Explain fuzzyness and fuzzification. 1½+1½=3

(b) Establish a relation of fuzzy mathematics and neural network by example. 5

(c) Let $\tilde{A}$ and $\tilde{B}$ be fuzzy subsets of a universal set X. Show that

$$|\tilde{A} \quad \tilde{B}| \quad |\tilde{A}| \quad |\tilde{B}| \quad |\tilde{A} \quad \tilde{B}|$$ 5

(d) What do you mean by defuzzification? 2

8. *(a)* If $\tilde{P}$: Ram is honest

$\tilde{Q}$: Shyam is honest

and $T(\tilde{P}) = 0{\cdot}9$

$T(\tilde{Q}) = 0{\cdot}8$

Find out $\overline{\tilde{P}}$, $\tilde{P} \quad \tilde{Q}$, $\tilde{P} \quad \tilde{Q}$ and $\tilde{P} \quad \tilde{Q}$. 4

(b) Draw the fuzzy logic system and explain. 3

(c) In a class of 10 students (universal set), 3 students speak Sanskrit to some degree :

Name	*Degree*
Nabanita	0·7
Tanushree	1·0
Mithun	0·4

What is the size of the subset A of Sanskrit speaking students in the class? 3

(d) Explain fuzzy cruise control system. 5

UNIT—V

9. Write short notes on the following : 5×3=15

(a) Fuzzy-Neuro Controller

(b) Fuzzy Expert System

(c) Pattern Recognition

10. *(a)* Describe fuzzy-neuro hybrid systems. 8

(b) Explain fuzzy associative memory. 7

★ ★ ★

2017/ODD/08/24/MCS–903 (C)/
MS–303 (C)/133