BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

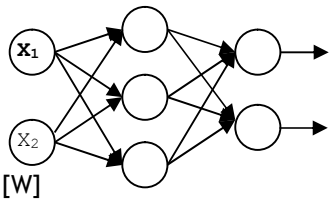
CLASS: ME **SEMESTER : II**
BRANCH: AMS **SESSION : SP/17**

SUBJECT: MPE2005-SOFT COMPUTING IN MANUFACTURING AUTOMATION

TIME: 03:00 **FULL MARKS: 60**

INSTRUCTIONS:
1. **The question paper contains 7 questions each of 12 marks and total 84 marks.**
2. **Candidates may attempt any 5 questions maximum of 60 marks.**
3. **The missing data, if any, may be assumed suitably.**
4. ***Before attempting the question paper, be sure that you have got the correct question paper.***
5. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**
6. **Nothing should be written on front or back of the question paper except tick marking.**

Q.1(a) For the ANN shown in figure, [8]



[V] [W]

Inputs $[X]=\begin{bmatrix} -1.65 \\ 1.9 \end{bmatrix}$ Target Output $[O]=\begin{bmatrix} 3.4 \\ 2.2 \end{bmatrix}$

$[V]=\begin{bmatrix} 0.1 & 0.4 & 0.1 \\ 0.8 & 0.2 & 0.5 \end{bmatrix}$ $[W]=\begin{bmatrix} 0.9 & 0.0 \\ 0.7 & 0.5 \\ 0.2 & 0.8 \end{bmatrix}$

Calculate the error for the given numerical values of [X], [V] and [W] assuming a linear function at input and bipolar tan hyperbolic activation function at hidden and output layers.

(b) What is an artificial neuron? Discuss a model of it with the help of a figure. [4]

Q.2(a) What are the various NN training methods? Write the principle of back propagation training of a neural network. [4]

(b) Give the equivalent biological reasons for assigning weights for each synaptic link between two neurons and use of transfer functions at some neurons. [4]

(c) Why fuzzification of a crisp value is required? Explain the method of fuzzification? [4]

Q.3(a) What is a fuzzy relation? Cite an example with its potential practical application. [2]

(b) Briefly explain all the methods to defuzzify a fuzzy set. [4]

(c) How the max-min composition is found between two fuzzy relations? [6]

Q.4(a) [6]

If $\widetilde{A}=\{(y_1,0.5),(y_2,0.6),(y_3,0.2)\}$, $\widetilde{B}=\{(y_1,0.2),(y_2,0.8),(y_3,1)\}$ and $\widetilde{C}=\{(y_1,0.1),(y_2,0.4),(y_3,1)\}$

Prove the associativity property over intersection and find the disjunctive sum of $\widetilde{B}$ and $\widetilde{C}$ fuzzy sets.

(b) Why and how to convert a minimization problem into a maximization one during GA? [3]

(c) What is a permutation string and for what kind of problems it can be used? [3]

Q.5(a) Give some examples of different chromosomes as used during the encoding in genetic algorithm. [6]

(b) Compare the Roulette wheel and tournament selection operators used in GA along with their selective pressure and population diversity capabilities. [6]

Q.6(a) Apply both order cross-over and partially mapped cross-over using any randomly selected sites for the following parent chromosomes: [4]

P1: 3 1 6 5 7 2 89 4

P2:54 8 6 9 31 7 2

(b) Seven products are clustered into three families as given here. Develop a suitable representation for GA encoding. (2) [2]

Products	Family
2, 4, 5	1
1, 3	2
6, 7	3

PTO

(c) A travelling sales man problem of 4 cities with intercity distances are given here. Write the steps to solve the problem using GA. Distance between cities A & B=45, B & C=30, C & D=25, A & D=50, A & C=45 and B & D=20. [6]

Q.7 Briefly write about the following: [12]
(i) How the 'fuzzy rules' are formed
(ii) Reproduction operators in GA
(iii) Stopping criteria in GA
(iv) Hybrid soft computing

*******01/05/17******E**