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

CLASS: MTECH   SEMESTER : II
BRANCH: PIE   SESSION : SP/2024

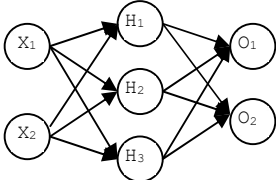**SUBJECT: PE527 SOFT COMPUTING IN MANUFACTURING**

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
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.

			CO	BL

Q.1(a)   Describe the basic characteristics of soft computing tools as compared to hard   [5]   1   2
computation.

Q.1(b)   Cite some examples for transfer functions used in ANN with linear, stepped, non-linear   [5]   1   2
(uni-polar and bipolar) outputs.

Q.2(a)   Referring to the Figure of ANN, find the computed output [O] for the given numerical   [8]   2   4
values of [X], [V] and [W] assuming a linear function at input and bipolar sigmoidal
activation function at hidden and output layers. Also calculate the input to hidden layer
neuron H_2.

X_1= (-0.5), X_2= (0.4)

$$[V]=\begin{bmatrix} 0.2 & 0.4 & 0.1 \\ 0.8 & 0.3 & 0.5 \end{bmatrix} \qquad [W]=\begin{bmatrix} 0.9 & 0.0 \\ 0.7 & 0.3 \\ 0.2 & 0.8 \end{bmatrix}$$

Q.2(b)   Construct a feed-forward neural network of (3-2-2-2) configuration and mention the   [2]   2   3
dimension of weight matrices between the layers.

Q.3(a)   Let set C={C1, C2, C3} of three cities with a set of transport systems T={T1, T2, T3, T4}   [8]   3   3
and the set of convenience associated with these transport systems is E={E1, E2, E3}. If $\tilde{A}$
be the relation on (C×T) and $\tilde{B}$ relation on (T×E) as given below, find the association of the
cities with convenience using max-min composition.

$$\tilde{A} = \begin{bmatrix} 0.2 & 0.4 & 0.1 & 0.3 \\ 0.8 & 0.3 & 0.5 & 0.1 \\ 0.6 & 0.3 & 0.2 & 0.3 \end{bmatrix} \qquad \tilde{B}=\begin{bmatrix} 0.2 & 0.4 & 0.1 \\ 0.8 & 0.3 & 0.5 \\ 0.5 & 0.1 & 0.4 \\ 0.9 & 0.4 & 0.3 \end{bmatrix}$$

Q.3(b)   What are the various fuzzy connectives? Give their definitions in terms of truth values of   [2]   3   2
the propositions

Q.4(a)   A search space is spread between 10 to 70. Use a 6 bit binary chromosome for mapping the   [3]   4   4
search space. Find the real value of a string 101101.

Q.4(b)   A travelling salesman problem of 4 cities with intercity distances are given here. Write the   [7]   4   4
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.

Q.5(a)   Discuss about selective pressure and population diversity capabilities as used in Genetic   [4]   5   2
Algorithm.

Q.5(b)   Discuss the classification of hybrid soft computing systems and their degree of integration   [6]   5   2
with suitable examples.