Paper / Subject Code: 42108 / Elective- II 5)Soft Computing

(3 HOURS) Total Marks: 80

N.B. (1) Question No 1 is compulsory

(2) Attempt any **three** Questions out of the remaining five questions

Q1 (a) What are the differences between Hard computing and Soft Computing 5
(b) How do you distinguish linearly separable for linearly non-separable patterns? 5
(c) Define Extension principle with an example 5
(d) What are the various Selection types used in Genetic Algorithms. Explain Roulette 5
Wheel with an appropriate example

Q2 (a) Compare the learning rules used for supervised and unsupervised and specify how the 10
weight adjustments are done in each case
(b) Use perceptron learning rule for computing weights after **one** iteration for the data 10
given bellow
$X_1=[1 -2 0 -1]^T$; $X_2=[0 1.5 -0.5 -1]^T$;$X_3=[-1 1 0.5 -1]^T$. Initial weight $W^1=[1 -1 0 0.5]$. The
learning constant is given by c=0.1.
The teacher's desired responses for X_1,X_2,X_3 are [-1,-1,1] respectively.

Q3 (a) Design a fuzzy controller for controlling the amount of detergent required in a washing 20
machine. The inputs are dirt and grease on clothes and the output is amount of
detergent required. Use 3 descriptors for inputs and outputs respectively. Prove that
clothes which have less dirt and grease requires less detergent and vice versa. Draw
figures wherever required.

Q4 (a) An engineer is testing the properties, strength and weight of steel. Suppose he has 10
two fuzzy sets, A defined on universe of discourse $\{s_1,s_2,s_3\}$ and B defined on a universe
of discourse $\{w_1,w_2,w_3\}$. The membership of A and B are given by
$\mu_A=\{(s_1,1),(s_2,0.5),(s_3,0.2)\}$and $\mu_B=\{(w_1,1),(w_2,0.5),(w_3,0.3)\}$
   a. Find the Cartesian product of A and B i.e R=A X B
   b. Suppose C=$\{(s_1,0.1),(s_2,0.6),(s_3,1)\}$. Find S=C X B
   c. Find C o R using Max-min composition
   d. Find C • R using max-product composition

(b) How Learning Vector Quantization helps in classifying data samples? Write the 10
algorithm of LVQ?

Q5 (a) With a neat diagram explain the architecture of ANFIS? 8
(b) Explain Steepest Descent Algorithm with a suitable example 8
(c) State the differences between derivative based and derivative free optimization 4

Q6 Write short notes on any **two**:-
(a) Block Diagram of Error Back Propagation Training Algorithm(EBPTA) 10
(b) Different membership functions of fuzzy logic 10
(c) Major components of Genetic Algorithm 10

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