Paper / Subject Code: 33506 / Elective-I Advance Soft Computing

(3 hours)   Total Marks: 80

N.B. 1. Question **No. 1** is compulsory
2. Attempt any **three** out of remaining
3. Assume suitable data if **necessary** and justify the assumptions
4. Figures to the **right** indicate full marks

Q1 A Differentiate Hard Computing Techniques with soft computing.   05
B Briefly discuss three classes of deep learning network.   05
C Identify key difference following unsupervised learning techniques: ART and SOM,   05

D Determine the similarities and differences between MLP model with RBFN.   05

Q2 A For a given Information System I(U,A),
Assume B={Age, LEMS}, Determine w.r.t
Rough sets W={y| can walk(y)= Yes}

	Age	LEMS	Can Walk
x1	16-30	50	yes
x2	16-30	0	no
x3	31-45	1-25	no
x4	31-45	1-25	yes
x5	46-60	26-49	no
x6	16-30	26-49	yes
x7	46-60	26-49	no

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1. INDAge(U) and INDLems(U)
2. B=lower Approximation=W:BW
3. B-upper approximation= BW
4. B-boundary region = BNB(W)
5. B-outside region =U=BW

B Differentiate Self Organizing MAP and Learning Vector Quantization algorithm.   08

Q3 A Design a Fuzzy Controller for the following Control Process.   20
It is required to control Boiler Water Level based on the values of two input sensors namely Temperature and Vapor Pressure.
Assume three descriptors for each input parameter and five for control variable.
Assume the range of Temperature 0-100oC and the range of Vapor Pressure is 0-100kPascal.
Note that Required water level is inversely proportional to vapor pressure and is directly proportional to temperature.
Define all membership functions for each descriptor, Create Rule-base in Cross-tab form.
For following Crisp input for Vapor Pressure 65 kPascal and the temperature is 45^{0}C, how much water level is required to be maintained.

Q4 A Show iterations of perceptron learning for AND gate implementation, assume bias   10
input $X_0 = 1$ with initial weight vector as W= [0   0   0] Use binary bi polar input
for the truth table.

B Discuss Principles of Adaptive Resonance theory.   10

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Q5 A   For following Fuzzy set,   10
        A={0.5/p + 0.8/q }, B= {0.3/a + 0.8/b + 0.9/c}, C={07/m + 0.4/n}, Find:
        A X B,   b. B X C   c. A o C

    B   Show one iteration of Kohanan's SOM to cluster the following data into two clusters .   10
        P1t=[0.2 0.8], P2 t =[1   0.1], P3 t =[0.1   1.0], P4 t = [0.9   0.2]
        Initial weight vectors are W_1^t = [0.1   -0.1], W_2^t =[-0.1   -0.1]
        Show the architecture of SOM (i.e. input and output neurons required in each layer)
        Assume neighborhood= 1.

Q6   Solve any **two**.
    A   Explain Generalized Modens Ponens used in Fuzzy System with examples.   10
    B   Explain Error back propagation algorithm with neat diagram and show clearly the   10
        mathematical formulae for weight adjustment at each layer.
    C   Describe Automobile Fuel Efficiency using ANFIS   10