

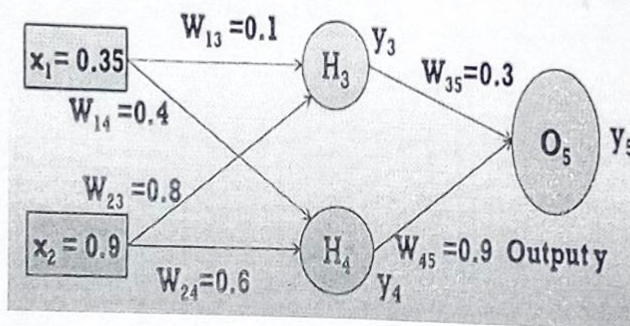


KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions  
(10 X 10 = 100 Marks)

1. In what kinds of real-time applications soft computing is better choice over the other traditional computing methodologies? Explain in detail.
2. Using linear separability concept, obtain the response for NAND function. (Take bipolar inputs and bipolar targets)
3. Using back propagation neural network, find the new weights for the network shown in the figure below. The network is presented with the input pattern as [0.35, 0.9] and the target output as 0.5. Use learning rate as 1 and the binary sigmoid activation function.

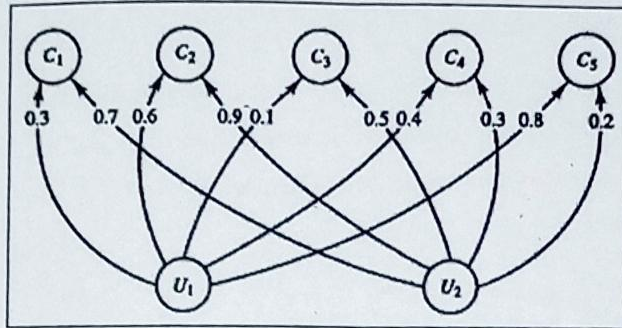
Hint : Binary sigmoid function as  $F(x) = \frac{1}{1+e^{-x}}$



4. Train the hetroassociative memory network using outer product rule to store the input row vectors  $s = (s_1, s_2, s_3, s_4)$  to the output vector  $t = (t_1, t_2)$  as given in the table below.

Input targets	s1	s2	s3	s4	t1	t2
1 <sup>st</sup>	1	0	1	0	1	0
2 <sup>nd</sup>	1	0	0	1	1	0
3 <sup>rd</sup>	1	1	0	0	0	1
4 <sup>th</sup>	0	0	1	1	0	1

5. With neat architecture, explain the training algorithm used in ART-1 network.
6. Given a Kohonen self-organizing map with weights as shown in the following diagram.
- Use the square of the Euclidean distance to find the cluster unit  $C_j$  that is closest to the Input Vector  $(0.5, 0.2)$
  - Using a learning rate of 0.2, find the new weights for unit  $C_j$ .
  - If units  $C_{j-1}$  and  $C_{j+1}$  are also allowed to learn the input pattern, find their new weights.



7. Consider two fuzzy sets

$$A = \left\{ \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$B = \left\{ \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.2}{3} + \frac{1}{4} \right\}$$

Find the algebraic sum, algebraic product, bounded sum and bounded difference of the given fuzzy sets.

- Write a comparison between Mamdani and Sugeno Fuzzy Inference system. [5]
  - Discuss various crossover functions/operations in Genetic Algorithm. [5]
9. Explain the concepts of Genetic Fuzzy Systems.
10. Illustrate the home heating system with fuzzy logic control.

