(Time: 2½ hours)

N. B.: (1) **All** questions are **compulsory**. [Total Marks: 60]
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculator is **allowed**.

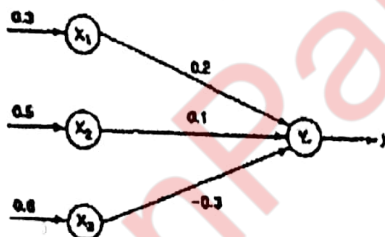**1** **Attempt *any two* of the following:** 12
a. What is soft computing? State its applications.
b. Give comparison between soft and hard computing.
c. Explain the structure of neural network with suitable model.
d. What is probabilistic reasoning? Explain.

2. **Attempt *any two* of the following:** 12
a. Explain perceptron learning rule with suitable example.
b. List and explain different activation functions in neural networks.
c. For the given network calculate the output y neuron, for given inputs and weights.
$[x_1,x_2,x_3] = [0.3,0.5,0.6][w_1,w_2,w_3] = [0.2,0.1,-0.3]$

d. Explain training and testing algorithm for auto associative neural net.

3. **Attempt *any two* of the following:** 12
a. Explain the mechanism for Kohonen self-organizing maps.
b. Give the outline of Adaptive Resonance Theory1 algorithm.
c. Construct a Max net with four neurons and inhibitory weights E=0.25 when given the initial activations. The initial activations are $a_1(0)=0.1$, $a_2(0)=0.3$, $a_3(0)=0.4$, $a_4(0)=0.7$.
d. Explain the Boltzman machine.

4. **Attempt *any two* of the following:** 12
a. Explain classical sets and fuzzy sets with an example.
b. Discuss in detail the operations and properties of fuzzy sets.
c. The elements in two sets A and Bare given as
{2,4} and {a,b,c}. Find the various Cartesian products of these twosets.
d. Explain tolerance and equivalence relation with suitable example.

5. **Attempt *any two* of the following:** 12
a. List and explain basic logic operations over the propositions.
b. What are four modes of approximate reasoning? Explain.
c. Give the outline of genetic algorithm.
d. Explain in detail about various operators involved in genetic algorithm.

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