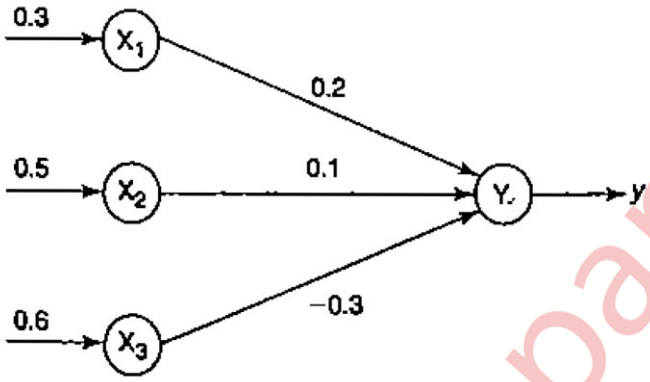
(2 Hours) **Total Marks: 50**

Note: • **Question number Q1 is compulsory** • **Attempt any two questions out of Q2 to Q5**			**Marks**	**Course Outcome**	**Bloom's Level**
				CO	**BL**
Q1	**Answer the following**				
	a.	For the network shown in following figure ,calculate the net input to the output neuron  	**[05]**	**CO2**	**BL3**
	b.	What the various types of crossover and mutation techniques?	**[05]**	**CO4**	**BL4**
	c.	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	**[05]**	**CO3**	**BL3**
	d.	Explain the Comparison Between Hard Computing Vs Soft Computing	**[05]**	**CO1**	**BL2**
Q2	**a.**	Let X = (1,2,3,4,5,6) be the universe of discourse. Consider the following three fuzzy sets defined on the above universe A = $\left\{\frac{0.6}{2}+\frac{1}{3}+\frac{0.2}{4}\right\}$ B = $\left\{\frac{0.4}{2}+\frac{1}{3}+\frac{0.8}{4}+\frac{0.3}{5}\right\}$ C = $\left\{\frac{0.3}{1}+\frac{0.5}{2}+\frac{0.6}{3}+\frac{0.6}{4}+\frac{0.5}{5}+\frac{0.3}{6}\right\}$	**[08]**	**CO3**	**BL3**

		Determine the following implication relation a) "if x is A then y is B" (A x B) ∪ ($\bar{A}$ x Y) b) "if x is A then y is B else y is C" " (A x B) ∪ ($\bar{A}$ x C)			
	b.	What is Genetic Neuro-Hybrid systems explain the Properties of Genetic Neuro-Hybrid Systems.	**[07]**	**CO5**	**BL2**
Q3	**a.**	For aircraft simulator data the determination of certain changes in its operating conditions is made on the basis of hard break points in the match region. We define two fuzzy sets A and B representing the condition of "neat" a match number of 0.65 and the "in the region" of a match number of 0.65 ,respectively ,as follows. A = near match 0.65 $= \left\{\frac{0}{0.64} + \frac{0.75}{0.645} + \frac{1}{0.65} + \frac{0.5}{0.655} + \frac{0}{0.66}\right\}$ B = in the region of match 0.65 $= \left\{\frac{0}{0.64} + \frac{0.25}{0.645} + \frac{0.75}{0.65} + \frac{1}{0.655} + \frac{0.5}{0.66}\right\}$ For the two sets find the following a)A U B b) A ∩ B c) $\bar{A}$ d)$\bar{B}$ e) $\overline{A \cup B}$ f)$\overline{A \cap B}$	**[08]**	**CO3**	**BL3**
	b.	Construct and test the hamming network to cluster four vectors. Given the exemplar vectors e(1) = [1 -1 -1 -1] e(2) = [-1 -1 -1 1] the bipolar input vectors are x_1= [-1 -1 1 -1], x_2=[-1 -1 1 1], x_3 = [-1 -1 -1 1] and x_4 =[1 1 -1 -1]	**[07]**	**CO2**	**BL3**
Q4	**a.**	With neat flowchart, explain the operation of a simple genetic algorithm	**[08]**	**CO4**	**BL4**
	b.	Determine the crisp λ-cut relation when λ = 0.1, 0^+, 0.3 and 0.9 for the following relation R: $R = \begin{bmatrix} 0 & 0.2 & 0.4 \\ 0.3 & 0.7 & 0.1 \\ 0.8 & 0.9 & 1.0 \end{bmatrix}$	**[07]**	**CO3**	**BL3**

Q5	**a.**	Consider a universe of aircraft speed near the speed of sound as X = {0.72,0.725,0.75,0.775,0.78} and fuzzy set on this universe for the speed "near match 0.75" = M Where M = $\left\{\frac{0}{0.72}+\frac{0.8}{0.725}+\frac{1}{0.75}+\frac{0.8}{0.775}+\frac{0}{0.78}\right\}$ Define a universe of altitude fuzzy set "approximately 24,000 feet" = N. Where N = $\left\{\frac{0}{20k}+\frac{0.2}{22k}+\frac{0.7}{23k}+\frac{1}{24k}+\frac{0.7}{25k}+\frac{0.2}{26k}+\frac{0}{27k}\right\}$ a) Construct a relation R = M x N b) For another aircraft speed say M_1 , "in the region of match 0.75" Where M_1 = = $\left\{\frac{0}{0.72}+\frac{0.8}{0.725}+\frac{1}{0.75}+\frac{0.6}{0.775}+\frac{0}{0.78}\right\}$ Find relation S = M_1 ° R using max-min composition	**[08]**	**CO3**	**BL3**
	b.	Explain the applications of soft computing.	**[07]**	**CO1**	**BL2**

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