QP Code: SN22BTECH596 Reg. No | | | | | | | | | | | AR 21

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Seventh Semester - Regular) Examinations, November – 2025

22BECOE47011– Soft Computing

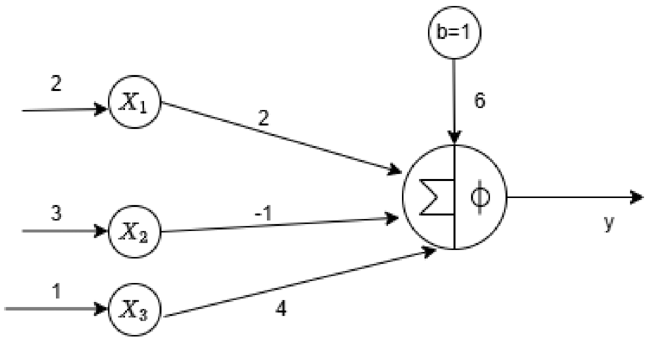
(ECE)

Time: 3 hrs Maximum: 70 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

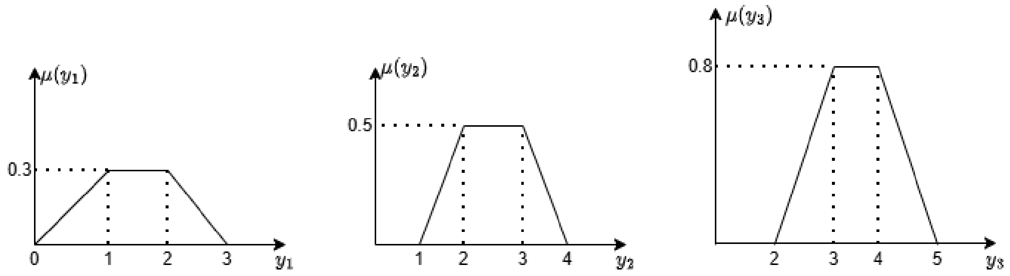
PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	What are the conditions required for operations in between fuzzy sets?	CO2	K1
b.	Explain antecedent and consequence in “if-then” Fuzzy rule base with examples.	CO2	K2
c.	Define the weighted sum and threshold in Artificial Neural Network.	CO3	K1
d.	For the given Neural Network, find the output using unipolar activation function where i) $\theta = 0$ ii) $\theta = 5$ 	CO3	K3
e.	Give a schematic diagram of the flowchart of Genetic Algorithm.	CO4	K1

PART – B **(15 x 4 = 60 Marks)**

Answer ***all*** the questions		Marks	CO #	Blooms Level
2. a.	State and prove De-Morgan’s law	7	CO2	K2
b.	Two fuzzy sets are given as $\underline{A}=\left\{\frac{0.1}{x_1}+\frac{0.5}{x_2}+\frac{0.9}{x_3}\right\}$, $\underline{B}=\left\{\frac{0.9}{x_1}+\frac{0.6}{x_2}+\frac{0.5}{x_3}\right\}$. Find (i) $\underline{A}$ - $\underline{B}$ (ii) $\underline{A}^c - \underline{B}^c$ (iii) $\underline{A} \cup \underline{B}$ (iv) $\underline{A} \cap \underline{B}$	8	CO2	K3
	(OR)			
c.	R= $\begin{bmatrix} 0.5 & 0.3 & 0.8 \\ 1 & 0 & 0.1 \\ 0 & 1 & 0.7 \end{bmatrix}$ S= $\begin{bmatrix} 0.6 & 1 & 1 \\ 0.7 & 0 & 1 \\ 0.5 & 0.8 & 0.3 \end{bmatrix}$ Two relations R and S are given. Find (i) R - S^c (ii) R $\cup$ S (iii) $R^c \cap S$ (iv) DIL (R) (v) CONC (S)	10	CO2	K3
d.	A = $\begin{bmatrix} 0.3 & 0.8 \\ 0.7 & 0.4 \end{bmatrix}$ B= $\begin{bmatrix} 0.6 & 0.7 \\ 0.3 & 0.8 \end{bmatrix}$ Two relations A and B are given. Find (i) MAX-MIN composition (ii) MAX-PROD composition	7	CO2	K3

3.a. 10 CO2 K3



Find the net output by aggregating the given inputs and calculate the defuzzified value by Centroid method.

b. Describe the Sugeno Controller. 5 CO2 K2

(OR)

c. Define Membership function. Explain the increasing, triangular and Gaussian membership function. 8 CO2 K2

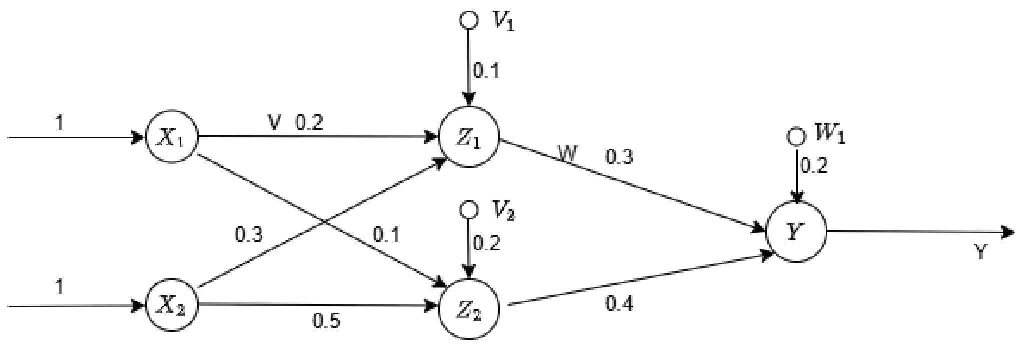
d. Explain the applications of soft computing. Differentiate between soft computing and hard computing. 7 CO1 K2, K4

4.a. Design an X-NOR gate using Mc-Culloch Pitt Neural Network model. 8 CO3 K3

b. Find the weights required to perform the classification using perceptron network. The vectors (1, 1, 1, 1) and (-1, 1, -1, -1) belong to a specific class with target +1. Vectors (1,1,1, -1) and (1,-1, -1, 1) belong to another class with target -1. 7 CO3 K3

(OR)

c. Find the new weights and bias of the given network by using Backpropagation algorithm where learning rate (α) = 0.2 and target is 1. The hidden layer uses bipolar sigmoid activation function and the output layer uses unipolar sigmoid activation function. 10 CO3 K3



d. Describe the Radial Basis Function Neural Network Model. 5 CO3 K2

5.a. Write the algorithm for Kohenen's Self Organizing Feature Map. 7 CO3 K3

b. Construct a KSOFM to cluster 2 given vectors [0 0 1 1] and [1 0 0 0] with learning rate (α) = 0.5. 8 CO3 K3

(OR)

c. Describe the different types of Binary coded cross over. 10 CO4 K2

d. Explain the different type of encoding in initializing population in Genetic Algorithm. 5 CO4 K2

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