



### Assignment - II

Q.1. Prove that the following De Morgan law  $\overline{(A \cup B)} = (\bar{A} \cap \bar{B})$  is true for fuzzy sets  $A$  &  $B$ , when using the Zadeh's operators for union, intersection and complement.

Ans.  $\Rightarrow \mu_{A \cup B}(x) = \max(\mu_A(x), \mu_B(x)).$

$$\mu_{A \cap B}(x) = \min(\mu_A(x), \mu_B(x)).$$

$$\mu_{\bar{A}}(x) = 1 - \mu_A(x).$$

$$\overline{(A \cup B)} = \text{L.H.S.}$$

$$\overline{(A \cup B)} = 1 - \max(\mu_A(x), \mu_B(x)).$$

$$\bar{A} \cap \bar{B} = \text{R.H.S.}$$

$$= \min(1 - \mu_A(x), 1 - \mu_B(x))$$

If we consider  $\mu_A(x) > \mu_B(x)$ , then  $\max$

$$\max(\mu_A(x), \mu_B(x)) = \mu_A(x) \text{ and}$$

$$\min(1 - \mu_A(x), 1 - \mu_B(x)) = 1 - \mu_A(x).$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

$$\overline{(A \cup B)} = (\bar{A} \cap \bar{B}).$$

Q.2. If  $A$  and  $B$  are two fuzzy sets with membership functions  $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$  and  $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ , find the value of  $\mu_{A \cap B}$  and  $\mu_{A \cup B}$ .

Ans.  $\Rightarrow \mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}.$$





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Date 06-08-2024, Semester VII, Roll No. 21UC5114, Page No. 02

$$\mu_{A \cap B} = \{0.1, 0.5, 0.2, 0.1, 0.8\}$$

$$\mu_{A \cup B} = \{0.2, 0.5, 0.6, 0.7, 0.9\}$$

Q.3. Consider a fuzzy set A as defined below

$$A = \{(20, 0), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$

Find  $\alpha$ -cut of A for  $\alpha = 0.4$ .

Ans.  $\Rightarrow \mu_{\alpha} = \{x \in X \mid \mu(x) \geq \alpha\}$

$$\alpha = 0.4$$

$$\therefore \mu_{\alpha} = \{(40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$