Prof :- Aparna Mehra
Uploaded By- Rahul & Saurabh

MTL717: Minor 2 on 23/03/2023

Max Marks: 15 Max Time: 1 hour

Any unfair means will cancel your exam to award you zero.

1. Let $X = \{-2, -1, 0, 1, 2, 3\}$ and $A = \{-1, 0, 1\}$, $B = \{1, 2\}$ and $C = \{-2, -1, 3\}$ are subsets of X. Learn the binary relation R: If x is A then y is B else y is C in the classical zero-one logic. If a new input $A_{new} = \{-2, 1, 3\}$ is pushed into R then determine the output delivered by it. [3]

2. Let $A = (2, 3, 5)$ and $B = (1, 4, 8)$ be two triangular fuzzy numbers (left to right end with membership value one at the middle points 3 and 4, respectively). Use the alpha-cut approach to completely describe the membership function of the product $A \cdot B$. Show the working details. [4]

3. Consider the symmetric binary fuzzy relation R on a set $A = \{x_1, x_2, x_3, x_4\}$ as follows:

$$\begin{pmatrix} 1 & 0.8 & 0.3 & 0.3 \\ & 1 & 0.5 & 0.5 \\ & & 1 & 0.6 \\ & & & 1 \end{pmatrix}$$

(i) Is R a similarity relation with max-min transitivity? Justify your answer.
(ii) Find the max-min transitive closure R^* of R.
(iii) Find the α-cuts of R^* and hence find the partition tree of R^*. [4]

4. Let $r = (0.8, 0.2, 0.5)$ and $Q = \begin{pmatrix} 0.8 & 0.1 & 0.3 \\ 0.5 & 0.2 & 0.7 \\ 0.3 & 0.4 & 0.6 \end{pmatrix}$.

(a) Solve the fuzzy linear system $p \circ Q = r$ for p.
(b) For all minimal solutions $\check{p}$ in (a), compute $Q^{-1} \circ \check{p}$ by max-min composition. [4]

Scanned with CamScanner