JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- MARCH-2023

COURSE CODE(CREDITS): 22M11CI211(3) MAX. MARKS: 15

COURSE NAME: Soft Computing

COURSE INSTRUCTOR: Dr. Simran Setia MAX. TIME: 1 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. If two fuzzy sets A and B are given with membership functions $\mu_A(x)$ = {0.2, 0.4, 0.8, 0.5, 0.1} and $\mu_B(x)$= {0.1, 0.3, 0.6, 0.3, 0.2} Then calculate the value of membership functions for the following

a. $A \cap B$
b. $A \cup B$
c. $\bar{A}$ [1+1+1][CO1]

Q2. Consider a fuzzy set A defined on the interval x=[0,10] of integers by the following membership function.

$\mu_A(x) = x / x+ 2$

a. Calculate the support of fuzzy set A.
b. Calculate the core of fuzzy set A.
c. Calculate the crossover points of fuzzy set A
d. Calculate the α cut corresponding to α = 0.5. [1.5+1.5+1.5+1.5][CO1]

Q3. Let R and S be two fuzzy relations defined as follows.

$$R = \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix}$$

$$S = \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.01 & 0.6 & 0.4 \end{bmatrix}$$

Then, Calculate the resulting relation, T, which relates elements of universe x to the elements of universe z using max-min composition. [3 marks][CO1]

Q4. Explain the Mamdani Fuzzy Inference system in detail. [3 marks][CO4]