

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

Ph.D.-I Semester (CSE)

COURSE CODE (CREDITS): 22P1WMA231 (03)

MAX. MARKS: 25

COURSE NAME: APPLIED SOFT COMPUTING TECHNIQUES

COURSE INSTRUCTORS: ARV*

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	(a) Differentiate between crisp logic and fuzzy logic with one example. (b) What are linguistic variables in fuzzy logic? Give one practical application.	1	6
Q2	(a) Explain the process of fuzzification and defuzzification in a fuzzy inference system. (b) Describe the Mamdani fuzzy inference model with a neat block diagram. (c) Discuss the advantages and limitations of fuzzy logic in handling uncertainty.	1	9
Q3	Given fuzzy sets $A = \{(1,0.2), (2,0.4), (3,0.6), (4,0.8)\}$ and $B = \{(1,0.5), (2,0.7), (3,0.3), (4,0.1)\}$. Compute $A \cup B$, $A \cap B$ and A^c (Compliment of A).	2	3
Q4	For the fuzzy relation $R(X, Y)$ and $S(Y, Z)$ given below, compute the max-min composition $R \circ S$. $R = [[0.1, 0.5, 0.8], [0.3, 0.7, 0.6]]$ $S = [[0.4, 0.9], [0.5, 0.7], [0.6, 0.5]]$	2	3
Q5	A fuzzy rule base for controlling room temperature is: - IF temperature is cold THEN heater is high. - IF temperature is warm THEN heater is medium. - IF temperature is hot THEN heater is low. For a temperature value with membership degrees $\mu_{cold}(x)=0.2$, $\mu_{warm}(x)=0.5$, $\mu_{hot}(x)=0.3$, determine the output fuzzy set for the heater control. Calculate the weighted average (normalized) defuzzified output.	2	4