JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

M.Tech-II Semester (CSE)

COURSE CODE (CREDITS): 22M11CI211 (03) MAX. MARKS: 15

COURSE NAME: Soft Computing

COURSE INSTRUCTOR: ARV MAX. TIME: 1 Hour

***Note:*** *(a) All questions are compulsory.*

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

*(c) Use of calculators is allowed*



| Q.No | Question | CO | Marks |
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| Q1 | A crisp set A is defined over the universe of discourse<br>X= {1,2,3,5,7}.<br>The crisp set<br>A= {1,3,7}<br>represents the **core** of a fuzzy set F.<br>(a) Define the *core* of a fuzzy set.<br>(b) Determine the equivalent fuzzy set F corresponding to the given core. | 1 | 3 |
| Q2 | Given two fuzzy sets A and B defined over the universes of discourse X and Y respectively. Let<br>X= {10,15,20,25,30,35,40,45,50}<br>Y= {1,2,3,4}<br>The fuzzy sets are defined as follows:<br>A= {(20,0.2), (25,0.4), (30,0.6), (35,0.6), (40,0.7), (45,0.8), (50,0.8)}<br>B= {(1,0.8), (2,0.8), (3,0.6), (4,0.4)}<br>(a) Draw the membership function of the fuzzy set A over the universe X.<br>(b) Draw the membership function of the fuzzy set B: Y→ [0,1]<br>(c) Consider the fuzzy rule:<br>**If x is A then y is B.**<br>Using Mamdani implication, determine the inferred fuzzy output set when x=40. | 1 | 3 |
| Q3 | Given fuzzy sets<br>A= {(1,0.3), (2,0.6), (3,0.9)}<br>B= {(10,0.4), (20,0.7), (30,1.0)}<br>and the rule:<br>**If x is A then y is B,**<br>(a) Construct the fuzzy relation using Mamdani implication.<br>(b) Given the observation y is **not B**, use Fuzzy Modus Tollens to infer the fuzzy set **not A**. | 1 | 3 |



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| Q4 | How you can obtain the crisp value of a fuzzy set whose membership function is defined as $1/(1+x^2)$? | 1 | 3 |
| Q5 | Consider the following fuzzy rules:<br>$R_1$: If temperature is High then fan speed is Fast<br>$R_2$: If temperature is Medium then fan speed is Moderate<br>Given the fuzzy input temperature = 35°C, explain how the final crisp output is obtained using Mamdani inference and centroid defuzzification. | 1 | 3 |