UG/PG Even Semester Examination, 2025

COMPUTER SCIENCE

(10th / 4th Semester)

Course No.: MCS-1002/MS-402

(Fuzzy Set Theory and Applications)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

The figures in the right margin indicate full marks for the question.
Answer any five questions selecting one from each unit.

UNIT-I

1. (a) Define alpha cut, strong alpha cut sets and level sets of a give fuzzy set. 5

   (b) Derive cardinality and relative cardinality of a fuzzy set. 5

   (c) Compare fuzzy sets and crisp sets. 4

2. (a) Obtain the Euclidian distance and union of thefollowing fuzzy sets. 6

A = 0.1/0.1 + 0.2/0.2 + 0.3/0.3 + 0.4/0.4 + 0.5/0.5

B = 0.2/0.1 + 0.2/0.2 + 0.4/0.3 + 0.4/0.4 + 0.6/0.5

   (b) Write the properties of alpha cuts of a fuzzy set. 4

   (c) Explain the importance of equality measures in fuzzy sets. 4

UNIT-II

3. (a) Define Reflexivity and symmetry of a binary fuzzy relation on a single set. 6

   (b) What are fuzzy propositions? 5

   (c) Define linguistic variables. 3

4. (a) Explain a fuzzification method. 5

   (b) List the advantages fuzzy logic control systems. 5

   (c) What are fuzzy singleton rules? 4

UNIT-III

6. (a) Check if the given relation is anti-similarity relation or not. 5

$$\bar{R} = \begin{bmatrix} 1 & 0.1 & 0.7 \\ 0.1 & 1 & 0.7 \\ 0.7 & 0.7 & 1 \end{bmatrix}$$

   (b) What do you mean by fuzzy morphism? Give an example. 5

   (c) Why is max-min approximation method very useful to forecasting any factor? Explain the method by taking an example of any commodity from a local market. 4

UNIT-IV

7. (a) What are the primitives of Lukasiewicz multi-valued logic? 3

   (b) Differentiate Kleene and Priest Logics. What is indeterminate value in n-valued logic? 4

   (c) What is fuzzy quantifier? Explain various types of fuzzy quantifiers. 4

   (d) Write any two properties of fuzzy measures. 3

8. (a) Compare possibility theory and probability theory with examples. 5

   (b) What are the fuzzy propositions? How are they work, give example? 3

   (c) What is the fuzzy inference? Draw the diagram of inference system. 2

   (d) What is fuzzy concept in linguistics? Explain the advantages of linguistic hedge with appropriate justifications. 4

UNIT-V

9. (a) Define hard partition and soft partition in fuzzy clustering. 4

   (b) Explain fuzzy C-means algorithm with its applications. 5

   (c) Explain deterministic fuzzy automata. 5

10. Write short notes on: (a) Fuzzy Pattern Recognition 4+5+5

    (b) Fuzzy Expert System

    (c) Fuzzy based Machine Learning

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