



Date: 21-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

Answer all Questions

PART – A

(10 × 2 = 20)

1. Define Fuzzy sets and give one example.
2. Define complement for the fuzzy subset and find the complement for
 $\tilde{A} = \{(x_1, 1), (x_2, 0.8), (x_3, 0.2), (x_4, 0.8), (x_5, 0.6), (x_6, 0.3), (x_7, 0.5)\}$
3. Define fuzzy relation with an example.
4. Write the symbols used for extrema (maxima & minima).
5. Define similitude relation.
6. Define fuzzy order relations.
7. Define limit cycle and a fixed point.
8. What is the difference between the FCM and the FRM model.
9. Define fuzzy control.
10. Define expert system.

Answer any 5 Questions

PART – B

(8 × 5 = 40)

11. Give the power set of the fuzzy subsets.
 $E = \{x_1, x_2\}, M = \{0, 1/2, 2/3, 1\}$
12. Find the disjunctive sum for the following two fuzzy subsets
 $\tilde{A} = \{(x_1, 1), (x_2, 0.8), (x_3, 0.2), (x_4, 0.8), (x_5, 0.6), (x_6, 0.3), (x_7, 0.5)\}$
 $\tilde{B} = \{(x_1, 0.8), (x_2, 0.3), (x_3, 0.6), (x_4, 0.5), (x_5, 0.4), (x_6, 0.7), (x_7, 0.6)\}$
13. State and prove the decomposition theorem on fuzzy relations.
14. Considering the fuzzy similitude relation, \tilde{R} and choosing three quantities a, b, and c as the following : $a = \mu_{\tilde{R}}(x, y) = \mu_{\tilde{R}}(y, x); b = \mu_{\tilde{R}}(y, z) = \mu_{\tilde{R}}(z, y);$
 $c = \mu_{\tilde{R}}(z, x) = \mu_{\tilde{R}}(x, z)$. Prove that $c \geq a = b$ or $a \geq c$ or $b \geq c = a$
15. Explain the following with an example.
 - a. Fuzzy order relation
 - b. Fuzzy relation of total order
 - c. Partially ordered fuzzy relations
16. Explain the concept used in FRM by taking a suitable example.
17. Using FCM analyze a social issue and give the conclusion
18. Explain the process of fuzzy control.

19. Let $\tilde{A} = \{(x_1, 1), (x_2, 0.8), (x_3, 0.2), (x_4, 0.8), (x_5, 0.6), (x_6, 0.3), (x_7, 0.5)\}$
 $\tilde{B} = \{(x_1, 0.8), (x_2, 0.3), (x_3, 0.6), (x_4, 0.5), (x_5, 0.4), (x_6, 0.7), (x_7, 0.8)\}$
 $\tilde{C} = \{(x_1, 0), (x_2, 0.5), (x_3, 0.2), (x_4, 0.7), (x_5, 0.6), (x_6, 0.9), (x_7, 0.1)\}$

Calculate

- i) $(\tilde{A} \cup \tilde{B}) \cap \tilde{C}$ ii) $(\tilde{A} \cap \tilde{B}) \cup \tilde{C}$ iii) $(\overline{\tilde{A} \cap \tilde{B}}) \cup \tilde{C}$ iv) $\tilde{A} \cdot \tilde{B} \cdot \tilde{C}$
 v) $\hat{\tilde{A}} + \hat{\tilde{B}} + \hat{\tilde{C}}$

20. a). Find $\tilde{R}_1 \circ \tilde{R}_2 \circ \tilde{R}_3$, where \circ is the max-min composition

\tilde{R}_1	Y_1	Y_2	Y_3	Y_4	Y_5
X_1	0.2	0.3	0.8	0.6	0.1
X_2	0.3	0.8	0.6	0.6	1
X_3	0.2	1	0.4	0.1	0

\tilde{R}_2	Z_1	Z_2	Z_3	Z_4
Y_1	1	0.2	0.3	0.4
Y_2	0.4	1	0.1	0.2
Y_3	0.3	0.4	1	0.1
Y_4	0.2	0.3	0.4	1
Y_5	1	0.2	0.3	0.4

\tilde{R}_3	T_1	T_2	T_3	T_4	T_5
Z_1	0.9	0	0.3	0.4	0.5
Z_2	0.9	0.6	0.4	0.7	0.6
Z_3	0	0.8	0.9	0.3	0.7
Z_4	0.3	1	0.1	0.4	1

(12 Marks)

- b). Consider the relation R given by

\tilde{R}	A	B	C
A	1	0.1	0.8
B	0.1	1	0
C	0.8	0	1

- i). Show that R is a resemblance relation
 ii). Find the min-max distance in the resemblance relation.

(8 Marks)

21. Use FAM model to study the social economic problem of women with HIA/AIDS and give the prediction.

22. a). Write the characteristics attributes of an expert system.

(10 Marks)

- b). Explain the structure of an expert system.

(10 Marks)