20. (a) Explain the form of Fuzzy Linear Programming.

Or

(b) Describe Fuzzy Ranking Methods.

SECTION C — ($3 \times 10 = 30$)

21. Let $F : x \to y$ be an arbitrary crisp function. Then show that for any $A \in f(x)$, fuzzyfied by the extension principle satisfies the equation $f(A) = \bigcup_{\alpha \in [0,1]} f(\alpha_{+}A)$.

22. Describe the axions of fuzzy complements.

23. Describe fuzzy Arithmetic.

24. Define and Explain Fuzzy ordering relations.

25. Explain the details about Individual decision making.

———————

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Mathematics — Elective

FUZZY SET THEORY

Time : Three hours Maximum : 75 marks

SECTION A — (20 marks)

Answer ALL questions.

I. (A) Choose the correct answer. ($5 \times 1 = 5$)

1. What is the fuzzy power set of $[0,1]$.

   (a) $f([0,1])$ (b) $[0,1]$

   (c) $[1,0]$ (d) $[0,-1]$

2. If a complement c has equilibrium e_c then

   (a) $de_c' = e_c$ (b) $de_c = e_c$

   (c) $de_c \neq de$ (d) None of these

3. Define $(A * B)Z$ by the terms?

   (a) $\sup_{z = x * y} \min[A(x), B(y)]$

   (b) $\sup_{z} A(x)$

   (c) $\sup_{z = xy} \max[A(x), B(y)]$

   (d) $\sup_{x \neq y} A(x)$

4. When a fuzzy relation is symmetric?

(a) $R(x,y) = R(y,x)$ (b) $R(x,y) \neq R(y,x)$

(c) $R(x,y) \geq 0$ (d) None of these

5. Which of the following is formula for the domain of x?

(a) $\max\limits_{y \in Y} R(x,y)$ (b) $\min\limits_{y \in Y} R(x,y)$

(c) $\max\limits_{x \in X} R(x,y)$ (d) None of these

(B) Fill in the blanks. (5 × 1 = 5)

6. The property $A \cap \overline{A} = \phi$ is called as ———

7. Bellman is formulated by programming ———

8. A standard fuzzy union is the only ——— t-conorm.

9. A binary relation $R(x,x)$ that is reflexive and symmetric is usually called ———

10. The function p defined as ———

II. Answer the following questions: (5 × 2 = 10)

11. Define crisp set.

12. If C has a continuous fuzzy complement, then C has a unique equilibrium.

13. Describe Arithmetic operation on intervals.

14. Define Anti transitive.

15. Describe Multi person decision making.

SECTION B — (5 × 5 = 25)

Answer ALL questions choosing either (a) or (b).

16. (a) Describe basic types of fuzzy sets.

Or

(b) Show that a fuzzy set A on R is convex iff $A[\lambda x_1 + (1-\lambda)x_2] \geq \min[A(x_1), A(x_2)]$.

17. (a) Let a function $C : [0,1] \to [0,1]$ satisfy Axiom C_2 and C_4. Then show that C also satisfies Axions C_1 and C_3. Moreover C must be bijective function.

Or

(b) Prove that the standard fuzzy intersection is only idempotent t-norm.

18. (a) Define fuzzy numbers.

Or

(b) Describe Arithmetic operation on intervals.

19. (a) Define binary Relations on a single set.

Or

(b) Define fuzzy morphism.