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Reg. No. :

Code No. : 30590 E Sub. Code : SEMA 6 B

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2020.

Sixth Semester

Mathematics

Major Elective III – FUZZY MATHEMATICS

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following symbol is used for universal set
 - (a) \forall
 - (b) a
 - (c) A
 - (d) X
2. The range of membership function is
 - (a) {real numbers}
 - (b) $\{A\}$
 - (c) X
 - (d) $[0, 1]$

3. Let $A, B \in \mathfrak{P}(X)$ and $\alpha, \beta \in [0, 1]$ there
 ${}^\alpha(A \cap B) =$ _____.
- (a) ${}^\alpha(A \cup B)$ (b) ${}^\alpha A \cup {}^\alpha B$
(c) ${}^\alpha A \cap {}^\alpha B$ (d) none
4. First decomposition theorem states
- (a) $A = \bigcup_{\alpha \in [0, 1]} A$ (b) $A = {}_\alpha A$
(c) ${}_\alpha A = \bigcup_{\alpha \in [0, 1]} A$ (d) $A = {}_{\alpha+} A$
5. The value of $u(a, 0)$
- (a) 0 (b) a
(c) $u(a)$ (d) $u(0)$
6. If $a, b \in [0, 1]$ and $a \leq b$, then
- (a) $C(b) \geq C(a)$ (b) $C(a) \geq C(b)$
(c) $C(b) = C(a)$ (d) $C(a) < C(b)$
7. If $A \subseteq E$ and $B \subseteq F$ then
- (a) $A/B \subseteq E/F$ (b) $E - F \subseteq A - B$
(c) $E/F \subseteq A/B$ (d) $A - F \subseteq B - F$

8. $MAX(A, A) = A$ is
- (a) identity
 - (b) idempotence
 - (c) absorption
 - (d) associativity
9. Fuzzy decision making was introduced by
- (a) Bellman
 - (b) Blin
 - (c) Whinston
 - (d) Datiz
10. Multi person decision making was introduced
- (a) 1970
 - (b) 1974
 - (c) 1980
 - (d) 1982

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Define the following :
- (i) α -cut
 - (ii) strong α -cut
- Or
- (b) Define the following :
- (i) Interval valued fuzzy sets
 - (ii) L-fuzzy sets.

12. (a) Let $A, B \in \mathfrak{F}(X)$, then for all $\alpha, \beta \in [0, 1]$
 prove that ${}^\alpha(A \cap B) = {}^\alpha A \cap {}^\alpha B$.

Or

- (b) Let $f : X \rightarrow Y$ be an arbitrary crisp function.
 Then for any $A \in \mathfrak{F}(X)$, prove that
 $f(A) = \bigcup_{\alpha \in [0, 1]} f({}_\alpha A)$.

13. (a) Prove that every fuzzy complement has atmost one equilibrium.

Or

- (b) Write the axiom of t -conorms.

14. (a) Explain the arithmetic operations on intervals.

Or

- (b) Write a short note on Fuzzy equations.

15. (a) Explain the fuzzy model group decision.

Or

- (b) Explain the fuzzy linear programming.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions.

16. (a) Explain the crisp set in detail.

Or

- (b) Explain the basic concepts of fuzzy sets.

17. (a) State and prove first decomposition theorem.

Or

- (b) Explain the extension principle for fuzzy sets.

18. (a) If $a, b \in [0, 1]$, then prove that $i_{\min}(a, b) \leq i(a, b) \leq \min(a, b)$.

Or

- (b) State and prove characterization theorem of t -Norms.

19. (a) Let $* \in \{+, -, \cdot, /\}$ and let A, B denote continuous fuzzy numbers. Then prove that the fuzzy set $A * B$ defined by $(A * B)(z) = \sup_{z=x*y} \min[A(x), B(y)]$ is a continuous fuzzy number.

Or

- (b) Explain the lattice of fuzzy numbers.

20. (a) Explain the individual decision making.

Or

(b) Explain the multiperson decision making.
