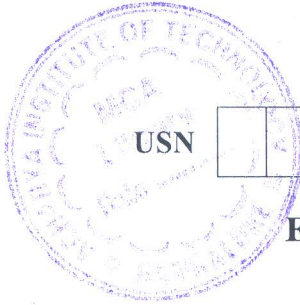


CBCS SCHEME



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18AI822

Eighth Semester B.E. Degree Examination, June/July 2024 Soft and Evolutionary Computing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the application scope of Neural Networks. (10 Marks)
- b. Explain the two major problem solving technologies with a neat diagram. (10 Marks)

OR

- 2 a. Discuss the operations of crisp sets. Consider set $X = [2, 4, 6, 8, 10]$. Find its power set, cardinality and cardinality of power set. (10 Marks)
- b. Given the two fuzzy sets,

$$B_1 = \left\{ \frac{1}{1.0} + \frac{0.75}{1.5} + \frac{0.3}{2.0} + \frac{0.15}{2.5} + \frac{0}{3.0} \right\}$$

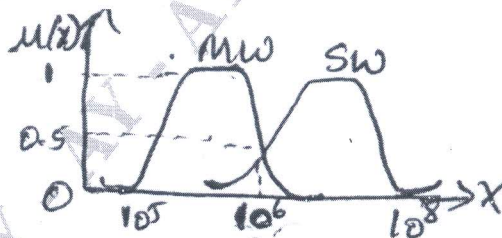
$$B_2 = \left\{ \frac{1}{1.0} + \frac{0.6}{1.5} + \frac{0.2}{2.0} + \frac{0.1}{2.5} + \frac{0}{3.0} \right\}$$

Find the following :

- | | | | |
|--------------------------------|--------------------------------|---------------------------------|----------------------------------|
| (i) $B_1 \cup B_2$ | (ii) $B_1 \cap B_2$ | (iii) $\overline{B_1}$ | (iv) $\overline{B_2}$ |
| (v) $B_1 B_2$ | (vi) $\overline{B_1 \cup B_2}$ | (vii) $\overline{B_1 \cap B_2}$ | (viii) $B_1 \cap \overline{B_1}$ |
| (ix) $B_1 \cup \overline{B_1}$ | (x) $B_2 \cap \overline{B_2}$ | (xi) $B_2 \cup \overline{B_2}$ | (10 Marks) |

Module-2

- 3 a. Define membership function and state its importance in fuzzy logic. Explain the features of membership functions. (10 Marks)
- b. Using the inference approach, find the membership values for the triangular shapes I, R, E, IR and T for a triangle with angles 45° , 55° and 80° .



Membership function for frequency range of receivers

Fig. Q3 (b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. List the various methods employed for the membership value assignment. Using your own intuition and definitions of the universe of discourse plot fuzzy membership functions for "Weight of People". (10 Marks)
- b. Consider two fuzzy sets \tilde{A} and \tilde{B} , both defined on X , given as follows :

$\mu(x_i, X)$	x_1	x_2	x_3	x_4	x_5
\tilde{A}	0.2	0.3	0.4	0.7	0.1
\tilde{B}	0.4	0.5	0.6	0.8	0.9

Express the following A-cut sets using Zadeh's notation :

- (i) $(\tilde{A})_{0.7}$ (ii) $(\tilde{B})_{0.2}$ (iii) $(\tilde{A} \cup \tilde{B})_{0.6}$ (iv) $(\tilde{A} \cap \tilde{B})_{0.5}$
 (v) $(\tilde{A} \cup \tilde{A})_{0.7}$ (vi) $(\tilde{B} \cap \tilde{B})_{0.3}$ (vii) $(\overline{\tilde{A} \cap \tilde{B}})_{0.6}$ (viii) $(\overline{\tilde{A} \cup \tilde{B}})_{0.8}$
- (10 Marks)

Module-3

- 5 a. What are Genetic algorithms? Explain the terminologies involved in the biological background of species. (10 Marks)
- b. Explain Two-point crossover and Precedence Preservative crossover. (10 Marks)

OR

- 6 a. Explain evolution and optimization. How do genetic algorithm differ from traditional algorithms. (10 Marks)
- b. Explain the steps of General Genetic Algorithm with a flow chart. (10 Marks)

Module-4

- 7 a. What is Swarm intelligence? List the swarm intelligent systems and explain its concepts. (10 Marks)
- b. Explain Serial Ant System Model with Elitist Ants with flow chart. (10 Marks)

OR

- 8 a. Explain the Biological Ant Colony System with neat diagram of how real ants find the shortest path. (10 Marks)
- b. Explain the working of an Ant Colony system and Probabilistic Transition Rule. (10 Marks)

Module-5

- 9 a. Describe the various Parameters in PSO. (10 Marks)
- b. Explain Artificial Bee colony System with a neat diagram. (10 Marks)

OR

- 10 a. List the steps in working of ABC and explain Cuckoo search algorithm in brief. (10 Marks)
- b. What are the characteristic features of PSO? Also compare PSO with other EC Techniques. (10 Marks)
