

Assignment-2
Soft Computing
(BCSE-0103)

Maximum Marks-15

Attempt all questions:

03 Marks Each

Q:1 Suppose, $R(x, y)$ and $S(x, y)$ are the two relations define over two crisp sets $x \in A$ and $y \in B$

$$R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \text{ and } S = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} ;$$

Find the following:

- ① $R \cup S$
- ② $R \cap S$
- ③ \bar{R}

Q:2 Two fuzzy sets P and Q are defined on x as follows.

$\mu(x)$	x_1	x_2	x_3	x_4	x_5
P	0.1	0.2	0.7	0.5	0.4
Q	0.9	0.6	0.3	0.2	0.8

Find the following :

(a) $P_{0.2}, Q_{0.3}$ (c) $(P \cup \bar{P})_{0.8}$

(b) $(P \cup Q)_{0.6}$ (d) $(P \cap Q)_{0.4}$

Q:3 Name and describe the main features of genetic algorithm.

Q:4 Suppose a genetic algorithm uses chromosomes of the form $x = abcdefgh$ with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as:

$$f(x) = (a + b) - (c + d) + (e + f) - (g + h) ,$$

and let the initial population consist of four individuals with the following chromosomes:

$$x_1 = 65413532$$

$$x_2 = 87126601$$

$$x_3 = 23921285$$

$$x_4 = 41852094$$

- a) Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last.
- b) Perform the following crossover operations:
 - i) Cross the fittest two individuals using one-point crossover at the middle point.

O:5	Differentiate classical algorithm & genetic algorithm. Write a short note on selection operator.
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