Introduction to Soft Computing
Assignment 5
TYPE OF QUESTION: MCQ

Number of questions: 10   Total mark: $10 \times 1 = 10$

QUESTION 1:

When the value of spread factor (α) in a simulated binary crossover is equal to 1, it is called

    a. Contracting crossover
    b. Stationary crossover
    c. Expanding crossover
    d. None of the above

Correct Answer: b

Explanation: If spread factor = 1, the spread of children is same as the parents, so it is called stationary crossover. The detailed description can be found Week 5 Lecture material – Page no 16.

QUESTION 2:

Suppose the gene value of a chromosome is represented as follows:

                    *

C: | 1 | 0 | 0 | 0 | 0 | 1 | 0 |

What will be the muted chromosome sequence when the reverse mutation is applied, and the *-marked (0*) is considered as the random position for the method?

    a. 1 0 0 0 1 1 0
    b. 1 0 0 1 0 1 0
    c. 1 0 0 1 1 0 1
    d. 0 1 1 0 0 1 1

Correct Answer: a

Explanation: In reverse mutation, the bit next to the random position is changed. The detailed description can be found Week 5 Lecture material – Page no 59

QUESTION 3:

In which mutation operation perturbation factor is used?

a. Random mutation.
b. Flipping.
c. Polynomial mutation.
d. Reversing.

Correct Answer: c

Explanation: The detailed description can be found Week 5 Lecture material – Page no 62.

QUESTION 4:

What is the responsibility of mutation in Genetic Algorithms?

a. To select the best individual.
b. To produce a large number of child chromosomes.
c. To increase genetic diversity.
d. To increase convergence rate.

Correct Answer: c

Explanation: The detailed description can be found in Week 5 Lecture material – Page no. 54.

QUESTION 5:

The edge table used in the edge recombination order crossover scheme provides

a. Order information.
b. Connectivity information.
c. Both order and connectivity information.
d. None of the above.

Correct Answer: b

Explanation: The detailed description can be found Week 5 Lecture material – Page no 44.

QUESTION 6:

Z^{nadir} is?

   a. Upper bound with respect to Pareto optimal front.
   b. Lower bound with respect to Pareto optimal front.
   c. Both (a) and (b) are true.
   d. None of the above is true.

Correct Answer: a
Explanation: The detailed description can be found in Week 5 Lecture material – Page no. 107.

QUESTION 7:

Which of the following is not a reason behind the increased complexity while solving a Multi-objective optimization problem (MOOP), when compared to a single-objective optimization problem?

   a. Optimizing each of the objectives does not necessarily give the global optimum solution

   b. Sometimes MOOPs are provided with conflicting objectives.

   c. A possible candidate solution may best optimize one of the objective functions but performs worst for the other objective functions that are present in the given MOOP.

   d. None of the above.

Correct Answer: d
Explanation: All the above-mentioned reasons pose an issue to solve MOOP when compared to single objective problems and consequently the complexity of the MOEA algorithm is increased. The detailed description can be found in Week 5 Lecture 4 video materials.

QUESTION 8:

A solution x_i is said to dominate other solution x_j, if

 a. x_i is worse than x_j in all objectives.
 b. x_i is no worse than x_j in all objectives and x_i is strictly better than x_j in one objective.
 c. x_j is worse than x_i in one objective and x_i is strictly better than x_j in one objective.
 d. x_j is better than x_i in all objectives.

Correct Answer: b
Explanation: The detailed description can be found in Week 5 Lecture material – Page no. 111

QUESTION 9:

The number of objective functions present in a multi-objective optimization problem (MOOP) is

 a. Equal to 1.
 b. Less than or equal to 2.
 c. Greater than or equal to 2.
 d. Must be more than 3.

Correct Answer: c
Explanation: The number of objective functions in MOOP is greater than or equal to 2.

QUESTION 10:

Two parent chromosomes in an Order GA encoding scheme are given as follows:

*

1	2	3	4	5	6	7	8	9	10

*

10	9	8	7	6	5	4	3	2	1

A $K - point$ is selected at 4th location according to the single point crossover technique. Which of the following off-spring is not possible?

a.

1	2	3	4	10	9	8	7	6	5

b.

7	8	9	10	6	5	4	3	2	1

c.

10	9	8	7	1	2	3	4	5	6

d.

5	6	7	8	9	10	1	2	3	4

Correct Answer: d

Detailed Solution: As the split point is in the 4th location, till 4 it can be ordered either in ascending or descending combination of 1,2,3,4 or 10, 9, 8, 7. But in the case of (d) it is not possible as it is not a part of the original string of chromosomes till 4th location.

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