

## Introduction to Soft Computing

### Practice Sheet : GA-01

#### Optimization problems, GA operators - Encoding and Selection

1) An optimization problem is stated as follows:

$$\text{maximize } f(x, y) = \frac{x^2}{2} + \frac{125}{y^2} \text{ where } x, y \in R^+$$

The above optimization problem comes under the category of

- (a) Unconstrained optimization problem.
- (b) Linear optimization problem.
- (c) Integer value optimization problem.
- (d) Real value optimization problem.

2) Which of the following(s) is/are the pre-requisite(s) when Genetic Algorithms are applied to solve problems?

- (i) Encoding of solutions.
- (ii) Well-understood search space.
- (iii) Method of evaluating the suitability of the solutions.
- (iv) Contain only one optimal solution.

- (a) i & ii only.
- (b) ii & iii only.
- (c) i & iii only.
- (d) iii & iv only.

3) Which of the following(s) is/are found in Genetic Algorithms?

- (i) Evolution.
- (ii) Selection.
- (iii) Reproduction.
- (iv) Mutation.

- (a) i & ii only.
- (b) i, ii & iii only.
- (c) ii, iii & iv only.

(d) All of the above.

4) Suppose, all steps in both SGA and SSGA remain same, except instead of selecting two individuals from the current population of size  $N$ ,  $N_p$  ( $N_p \ll N$ ) individuals as in SGA are selected. Then,

- (a) Generation gap of SGA will be more than that of SSGA.
- (b) Generation gap of SSGA will be more than that of SGA.
- (c) Generation gap in both algorithms remains same.
- (d) Nothing can be said precisely.

5) Which GA operation is computationally most expensive?

- (a) Initial population creation.
- (b) Selection of sub-population for mating.
- (c) Reproduction to produce next generation.
- (d) Convergence testing.

6) Which of the following is not true for Genetic algorithms?

- (a) It is a probabilistic search algorithm.
- (b) It is guaranteed to give global optimum solutions.
- (c) If an optimization problem has more than one solution, then it will return all the solutions.
- (d) It is an iterative process suitable for parallel programming.

7) The purpose of the fitness evaluation operation is

- (a) To check whether all individual satisfies the constraints given in the problem.
- (b) To decide the termination point.
- (c) To select the best individuals.
- (d) To identify the individual with worst cost function.

8) Which one of the following is not necessarily be considered as GA parameters?

- (a)  $N$ , the population size.
- (b)  $\epsilon$ , the obtainable accuracy.
- (c)  $\mu_p$ , the mutation probability.
- (d)  $\bar{f}$ , the average fitness score.

9) Which of the following optimization problem(s) can be better solved with Order GA?

- (a) 0-1 Knapsack problem.
- (b) Travelling salesman problem.
- (c) Job shop scheduling problem.
- (d) Optimal binary search tree construction problem.

10) Which of the following is not a valid chromosome in Order GA?

(a)

1	3	5	7	2	4	6	8
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(b)

A	B	D	E	A	F	H	G
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(c)

1	0	0	1	1	0	0	1
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(d)

14.6	-23.4	177.23
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11) Roulette wheel selection scheme is preferable when

- (a) Fitness values are uniformly distributed.
- (b) Fitness values are non-uniformly distributed.
- (c) Needs low selection pressure.
- (d) Needs high population diversity.

12) What GA encoding scheme suffers from Hamming cliff problem?

- (a) Binary coded GA.
- (b) Real coded GA.
- (c) Order GA.
- (d) Tree coded GA.