Introduction to Soft Computing

Practice Sheet : GA-2

GA operators – Crossover and Mutation

1) 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.

2) Which selection strategy is susceptible to a high selection pressure and low population diversity?

    (a)   Roulette-wheel selection.
    (b)   Rank based selection.
    (c)   Tournament selection.
    (d)   All the above.

3) Which of the following is not a mutation operation in real coded GA?

    (a)   Flipping.
    (b)   Random mutation.
    (c)   Polynomial mutation.
    (d)   All are mutation operation in real coded GA

4) Two parent chromosomes in Order GA encoding scheme is 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 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

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

(a) N, the population sizes.
(b) ϵ, the obtainable accuracy.
(c) μ_p, the mutation probability.
(d) $\bar{f}$, the average fitness scores.

6) Which GA encoding scheme gives faster execution?

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

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) If crossover between chromosomes in search space does not produce significantly different offspring, what does it imply? (if offspring consist of one half of each parent)

(i)   The crossover operation is not successful.
(ii)   Solution is about to be reached.
(iii)   Diversity is so poor that the parents involved in the crossover operation are similar.
(iv)   The search space of the problem is not ideal for GAs to operate.

(a)   ii, iii & iv only.
(b)   ii & iii only.
(c)   i, iii & iv only.
(d)   All of the above.

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

(a)

1	3	5	7	2	4	6	8

(b)

A	B	D	E	A	F	H	G

(c)

1	0	0	1	1	0	0	1

(d)

14.6	-23.4	177.23

10) In Rank-based selection scheme, which of the following is not correct
(a)   The % area to be occupied by an individual i, is given by $\frac{r_i}{\sum_{i=1}^{N} r_i}$

(b)   Two or more individuals with the same fitness values should have the same rank.
(c)   Individuals are arranged in a descending order of their fitness values.
(d)   The proportionate based selection scheme is followed based on the assigned rank.

11) 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.

12) Tournament Selection has
(a) Low population diversity and moderate selection pressure
(b) High population diversity and Moderate selection pressure
(c) Moderate population diversity and high selection pressure
(d) High population diversity and low selection pressure

13) Which of the following is a fitness scaling approach?
(a) Linear scaling
(b) Sigma scaling
(c) Power law scaling
(d) All of the above

14) If selection pressure is **HIGH,** which one is **FALSE**
(a)   The search focuses only on good individuals (in terms of fitness) at the moment.
(b)   It loses the population diversity.
(c)   Lower rate of convergence.
(d)   Leads to pre-mature convergence of the solution to a sub-optimal solution.

15) Which of the following comparison is true?

(a)   In the event of restricted access to information, GAs win out in that they require much fewer information to operate than other search.
(b)   Under any circumstances, GAs always outperform other algorithms.
(c)   The qualities of solutions offered by GAs for any problems are always better than those provided by other search.
(d)   GAs could be applied to any problem, whereas certain algorithms are applicable to limited domains.