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) $\in$, 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?

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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.