School of Information Technology
Indian Institute of Technology Kharagpur
IT60108: Soft Computing Applications
Class Test - III

Full Marks: 20   Session $2014 - 2015$ Time: 20 minutes

1. Which of the following statement(s) is(are) not true.

   (a) GA is an optimization technique
   (b) GA is a probabilistic search technique
   (c) GA always gives optimal solution
   (d) For a problem if there is more than one optimal solutions, GA outputs all the solutions

2. GA algorithm is effective to solve only

   (a) single objective optimization problems
   (b) mixed integer programming problem
   (c) optimization problems involved with discrete(integer) variables
   (d) optimization problems involved with continuous (integer/real) variables

3. In Simple GA (SGA), which is/are not allowed.

   (a) Repetition in the individual selected for mating pool
   (b) Population sizes in each generations are to be varied
   (c) Overlapping generations
   (d) Two or more individuals with same fitness value

4. In the context of Simple GA(SGA), the convergence rate will increase, if

   (a) the size of mating pool(N_p) is comparable to that of the population size (N)
   (b) from the mating pool of size (N_p), if we create N offspring to be replaced all individual in the current population
   (c) from the mating pool of size (N_p), if we replace a large number of offspring and only N_p worst individuals in the current population of size N
   (d) select N_p best individuals for mating to produce N individual for the next generation

5. In the context of Steady-State GA (SGA), which of the following statement(s) is/are true.

   (a) Generation gap is small
   (b) Convergence rate is high
   (c) Gives better result than the Simple GA (SGA)
   (d) It is susceptible to stagnation

6. If we compare SGA and SSGA, then

   (a) the time for single iteration in SGA is more than in SSGA
   (b) overall time of termination in SGA is more than in SSGA
   (c) population diversity in SGA is far better than that of SSGA
   (d) selection pressure in SGA is more than that of SSGA

7. Which of the following cannot be considered as a convergence criterion.

   (a) There is no significant change in the average fitness value for an successive generations
   (b) The execution of GA elapsed a pre-specified time T
   (c) p percentage of N (where p is some positive constant and N is the size of the population) individuals are with the same fitness values
   (d) Fitness values of all individuals are above than a certain threshold value

8. Which of the following statement is true.

   (a) Binary coded GAs are faster than the real-coded GAs
   (b) Binary coded GAs are accurate than the real-coded GAs
   (c) All optimization problems can be encoded with binary-coded GA
   (d) All GA parameters, which are applicable to binary-coded GA is also applicable to Order-GA

9. The length of chromosomes in binary-coded GAs, is decided by

   (a) number of design variables
   (b) range of values of design variables
   (c) objective functions
   (d) constraints

10. Which of the following is/are not valid chromosomes in order GA?

(a) | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |

(b) | 1 | 3 | 5 | 7 | 2 | 4 | 6 | 8 |

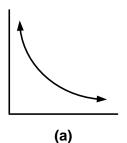(c) | A | B | D | E | A | F | H | G |

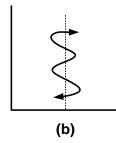(d) | 14.6 | -23.4 | 177.23 |

Answer: (a), (c), (d)

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11. Out of the following crossover techniques, which do(es) not suffer(s) from "end point" problem.

    (a) Single point crossover

    (b) Uniform crossover

    (c) Shuffle crossover

    (d) Multi-point crossover

12. State whether the following statements are true or false.

    (a) The most expensive operation in GA is the selection of individual for mating pool creation

    (b) Mutation operation is not mandatory in any GA-based problem solving

    (c) The number of GA loop will increase if the population size is increased

    (d) Even we can implement Simple GA(SGA) without performing selection operation
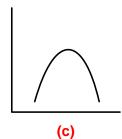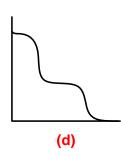
    Answer: (a): FALSE, (b): TRUE, (c): FALSE, (d): TRUE

13. 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

14. Average fitness calculation can be used to

    (a) understand whether the optimal solution(s) has been achieved

    (b) termination of GA execution

    (c) generation gap between two successive GA iteration

    (d) whether the problem has been struck at local optima or not

15. 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

16. Which of the following statement is true in case of Rank-based selection scheme.

    (a) Low population diversity, high selection pressure

    (b) Low population diversity, low selection pressure

    (c) High population diversity, low selection pressure

    (d) High population diversity, high selection pressure

17. High selection pressure is desirable, when we need

    (a) faster termination of the GA
    (b) near optimal solution
    (c) there is no improvement in successive GA iteration
    (d) fitness values are non-uniformly distributed

18. Tournament selection scheme is more preferable when

    (a) population are with very diversified fitness values
    (b) when fitness values are uniformly distributed
    (c) when fitness values are not necessarily uniformly distributed
    (d) under all the above situations

19. To make the G_p (Generation gap) a large value in Steady-state selection strategy, which of the following can be considered

    (a) selection of individual according to their fitness values and replacement at random
    (b) selection of individual at random and replacement according to the inverse of their fitness values
    (c) selection of both parents and replacement according to the inverse values of their fitness values

    (d) all of the above

20. In the following graphs, how an objective function(along y-axis) varies with input parameter(along x-axis) are shown. In which case(s), there is(are) no optimal solution(s) exist(s)?

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