



امتحان نهائي دور يناير
الفصل الدراسي الاول ٢٠٢٢/٢٠٢٣

المستوى: الرابع برنامج علوم حاسب

المادة: موضوعات مختارة في الخوارزميات كود

المقرر: ٤٠٧



التاريخ: ١٤ / ١ / ٢٠٢٣ الزمن: ساعتين الميعاد: ١٢:١٠ الدرجة الكلية: 90 درجة

قسم الرياضيات

Answer the following questions:

الامتحان في ورقتين

Q1:

(15 Marks)

- Define the following: GA, Reproduction, Selection, Crossover, and Mutation.
- Compare between P, NP, NP-complete, and NP-hard.
- Mention Application of genetic Algorithm.

Q2:

(25 Marks)

- Complete the population by calculating the value of x , and find the largest value of $f(x)$.

Chromosome	x	$f(x) = x^2$	Rank	Probability = Rank/sum	expected Count = n/p
0 1 1					
1 0 0					
1 1 1					
0 0 1					
1 0 1					
1 0 1					
0 1 0					
1 0 0					

- Mention types of Crossover, Encoding and types of Mutation.
- Show pros and cons of GA

Q3:

(35 Marks)

- Consider

i) $\sqrt{\pi} + (x + 5)^3 + \frac{y}{z+3}$

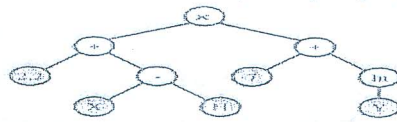
ii) $(x \wedge \text{true}) \rightarrow ((x \vee y) \vee (z \leftrightarrow (x \wedge y)))$

iii) $i = 1; \text{ while } (i < 5) \{ i = i + 1; \}$

What is the tree representation of i, ii, and iii?

- Extract transactions and functions in the following directive:

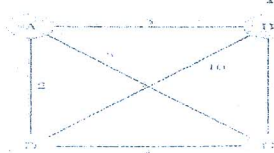
i) If $x > 0$ then $X = (x + 3) * (4 - y)$ Else $Y = x + (y - 1)$



ii)

- But in prefix notation $* + - 2 1 4 9$.

- Find the shortest path from node A to all node



من فضلك انظر خلفه

Q4: Choose the correct answer:

(15 Marks)

- 1) Genetic algorithms involve which of the following phenomena?
 - a) Mutation
 - b) Cross over
 - c) Selection
 - d) All of the above
- 2) Which of the following is **not true** about fitness functions?
 - a) They perform similar role to an objective function
 - b) Maximization of sum of squared residuals is an example of fitness function
 - c) They help in optimization
 - d) All of the above
- 3) Parameter space to be searched
 - a) Chromosomes
 - b) Population
 - c) Generation
 - d) Colony
- 4) Large changes in the parameter vector independent of other parameter vectors
 - a) Mutation
 - b) Crossover
 - c) Selection
 - d) Population
- 5) The Fitness Function in Genetic Algorithms is
 - a) A method to measure how fit a candidate solution is in solving the problem.
 - b) the objective function for the optimization problem being solved.
 - c) a substitute to approximate the survival abilities of individuals in nature.
 - d) a least squares approximation for a polynomial.
- 6) An optimization problem is stated as follows: maximize $f(x, y) = \frac{x^2}{2} + \frac{125}{y^2}$,
where, $x, y \in \mathbb{R}^2$
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.

With my Best wishes

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