



# امتحان نهاية الفصل الدراسي الأول ٢٠٢٤/٢٠٢٥

المستوى: الرابع برنامج علوم حاسب

المادة: موضوعات مختارة في الخوارزميات كود المقرر: ٤٠٧

التاريخ: ٢٠٢٥/١/١٢ الزمن: ساعتين الميعاد ٢:١٢ الدرجة الكلية: ٩٠ درجة



كلية العلوم  
قسم الرياضيات

## Answer the following questions:

Q1:

(15 Marks)

- Define the following: Problem reduction, Problem Size, GA, Running Time, EA, SGA and GP
- Compare between different types of Encoding, types of Mutation.

Q2:

(25 Marks)

- Find the Gray Code of the numbers between 17:27.
- Write algorithm of basic steps for Genetic Algorithm.
- Put in prefix notation  $\wedge - / 10 5 1 2$ .

Q3:

(30 Marks)

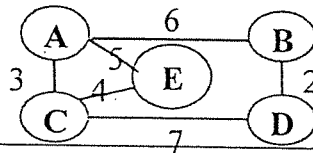
- Consider
  - $\sqrt{\pi} + (x + 5)^3 + \frac{y}{z+3}$
  - $(x > 0) \rightarrow (y \leftrightarrow ((x + 1) \wedge z))$

What is the tree representation of i and ii?

- Extract transactions and functions in the following directive

If  $x > 5$  then  $x = \frac{(x^2+10)}{y-3}$  Else  $y = y^3 + (5x + 3)$

- Find the shortest path from node A to all node



Q4:

(20 Marks)

- Complete the following sentences:

- The individual in genetic algorithm is called.....
- The set of solutions are called.....
- Genetic Algorithm works on two types of spaces alternatively, coding space ..... and solution space .....
- Parameter space to be searched is .....
- Large changes in the parameter vector independent population is .....

- Apply Uniform Crossover

Parent1	10110011
Parent2	00011010
Mask	11010110

- Apply Arithmetic crossover according to the equations:

Offspring1 =  $a * \text{Parent1} + (1 - a) * \text{Parent2}$

Offspring2 =  $(1 - a) * \text{Parent1} + a * \text{Parent2}$  where  $a = 0.5$ , Parent 1 = (0.3) (1.4) (0.2) (7.4), and Parent 2 = (0.5) (4.5) (0.1) (5.6).

*With my Best wishes*

*Dr. Noha M. El-Badry*

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