Menoufia University Faculty of Engineering, Shebin El-Kom, Basic Engineering science Department Postgraduate Examination, 2016-2017 Date of Exam: 27/5/2017



Subject: Algorithms Code: BES 704 Year: Postgraduate students Time Allowed: 3 hours Total Marks: 100 marks

Answer the following questions

- 1) Define what is meant by an algorithm and then show the characteristics of an algorithm.
- 2) Discuss the required steps that involved in designing and analyzing an algorithm.
- 3) State the different ways for specifying an algorithm, then give an example to perform the addition of two numbers.
- 4) Write the steps of the Euclid's algorithm for computing the greatest common divisor (GCD) of two nonnegative integers *m* and n, and also describe these steps by pseudocode.
- 5) State the difference between O-big oh, Ω -big omega and Θ -big theta nations.
- 6) Prove that

i)
$$100n + 5 \in O(n^2)$$
 ii) $\frac{1}{2}n(n-1) \in \Theta(n^2)$

- 7) Compute the factorial function f(n) = n! for an arbitrary nonnegative integer *n*, then write a Matlab code for computing this factorial.
- 8) State the difference between the worst case and best case efficiencies.
- 9) What are the ways which can be used to analysis the algorithm efficiency.
- 10) Discuss the general plan for analyzing the time efficiency of recursive algorithm
- 11) Differentiate between recursive Algorithms and non-recursive Algorithms
- 12) Write an algorithm for linear search.
- find the satisfactory solution of the following Multi-objective linear programming through using fuzzy approach

$$\begin{array}{l} \textit{Max} \ f_1 = -x_1 + 2x_2 \\ \textit{Max} \ f_2 = 2x_1 + x_2 \\ \textit{s.t.}: \\ & -x_1 + 3x_2 \leq 21 \\ & x_1 + 3x_2 \leq 27 \\ & 4x_1 + 3x_2 \leq 45 \\ & 3x_1 + x_2 \leq 30 \\ & x_1, x_2 \geq 0. \end{array}$$

With my best wishes

Dr. Eng. Rizk Masoud