TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS
EXAMINATION FOR PROSPECTIVE STUDENTS (THIR D YEAR)

COURSE TITLE: NUMERICAL ANALYSIS			COURSE CODE: MA 3103	
DATE: 29 -12 - 2016	JANUARY 2016- 2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following questions:

1. Graphically, find a real root for the nonlinear equation: $x\log_{10} x = 1$:   (22 M)

2. Find the cubic polynomial which takes the following values: $f(0) = 1$, $f(1) = 0$, $f(2) = 1$, $f(3) = 10$, then find $f(0.5)$.   (20 M.)

3. Prove that: i) $\Delta = E\nabla$,   ii) $\Delta^3(3e^x) = 3(e^{x+3h} - 3e^{x+2h} + 3e^{x+h} - e^x)$.   (20 M.)

4. By the inverse matrix method, solve the following linear system:
$$3x_1 + x_2 + 2x_3 = 3,$$
$$2x_1 - 3x_2 - x_3 = -3,$$
$$x_1 + 2x_2 + x_3 = 4.$$
    (22 M)

5. Find $f'(0.5), f''(0.5)$ and $f'''(0.5)$ from the data: $f(1) = 2, f(0) = -1$ and $f(3) = 14$, for the function $f(x)$.   (22 M.)

6. Evaluate the integral $\int_0^1 \frac{2x}{x^2+1} dx$, using Trapezoidal rule, with $n = 8$.   (22 M.)

7. Solve, using Picard's method, the initial value problem: $y'' - y = 0$, $y(0) = y'(0) = 1$.   (22M.)

EXAMINERS	PROF. DR./ A. EL-NAMOURY	PROF DR/ A. A. HEMEDA
	DR/	DR/

With my best wishes

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TANTA UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

Final Term Exam for the First Semester 2016-2017

Course Title: Combinatorics and Graph Theory	Third Level -Computer science	Course Code: CS3105
Date: 31/12/2016	Total Mark: 150 Marks	Time Allowed: 2 Hours

1969

Combinatorics:

Question 3: (35 marks).

a) How many ways are there to place 12 balls of the same size in five distinct boxes if :

(i) the balls are all of the same color ?

(ii) each ball is of a different color ? **(10 marks)**

b) (i) Find the coefficient of $v^2 \, w^4 \, x \, z$ in the expansion of $(2v + 2w + x + y + z)^8$

(iii) How many distinct terms arise in the above expansion? **(10 marks)**

c) Determine how many integer solutions are to $x_1 + x_2 + x_3 + x_4 = 9$, if :

(i) $0 \le x_i$ for all $1 \le i \le 4$

(ii) $0 \le x_i \le 3$ for all $1 \le i \le 4$

(iii) $0 \le x_1 \le 3, \quad 0 \le x_2 \le 2, \quad 0 \le x_3 \le 3, \quad 0 \le x_4 \le 3$ **(15 marks)**

Question 4: (40 marks).

a) In each case , find the sequence corresponds to the given generating function f (x);

(i) $f(x) = (1+x)^n$

(ii) $f(x) = \dfrac{1}{1-x}$

(iii) $f(x) = \dfrac{x}{(1-x)^2}$ **(15 marks)**

b) using the generating function describe how many ways can we select with repetitions allowed , r objects from n distinct objects. **(15 marks)**

c) Find the coefficient of x in $(1 - 2x)^{-7}$. **(10 marks)**

with our Best Wishes

Examiners	أ.د/ ابراهيم عبد الله يونس
	د/ تهانى محمد الشيخ
	د/ إيمان غـــريب رزق

تابع ورقة ١

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS
EXAMINATION FOR SENIORS (LEVEL FOUR) STUDENTS OF COMPUTER SCIENSE
COURSE TITLE: CONCEPTS OF PROGRAMMING | COURSE CODE: CS3107
DATE: 26-1-2017 | TERM: FIRST | TOTAL ASSESSMENT MARKS: 150 | TIME ALLOWED: 2 HOURS

Answer the Following Questions:

الاختبار من ورقتين

QUESTION 1: [Total marks: 50]

1. Suppose there are two actions A and B. Write the java selection statements (syntax) that enable you to run: (10 marks: 5 points for each)
   a. Action A if some condition is true then runs action B.
   b. Only action A if some condition is true otherwise run only action B.

2. Consider the code:

   ```
   switch (letter) {
       case 'd' : System.out.println(letter);
       case 'e' : System.out.println(letter);
       case 'f' : System.out.println(letter);
   ```

   What is the value printed by this code if *letter* is 'd'. Justify your answer and how you can avoid this result. (10 marks)

3. Determine the error and its type in each of the following: (15 marks: 5 points for each)

   a.
   ```
   Public class ProgramError {
       Public static void main(String[] args) {
           x = 20;
           System.out.println(x+10); } }
   ```

   b.
   ```
   Public class ProgramError {
       Public static void main(String[] args) {
           int x = 0, y = 20;
           System.out.println(y/x); } }
   ```

   c.
   ```
   Public class ProgramError {
       Public static void main(String[] args) {
           x = 20;
           y = 20;
           y += x + y;
           System.out.println(" y is " + y); } }
   ```

4. Write the java sentences that do the following tasks: (15 marks: 5 points for each)
   a. Declare, cerate, and initialize an array of 10 real numbers.
   b. Convert the string into a double value.
   c. Obtain input from an input dialog box.

QUESTION 2: [Total marks: 50]

1. Consider the two vectors $X = (x_1, x_2, \ldots, x_{10})$ and $Y = (y_1, y_2, \ldots, y_{10})$. Write a java program that do the following tasks:
   a. Dot product of two vectors; $X \cdot Y = \sum_{i=1}^{n} x_i y_i$. [Use method named **DotProduct** which takes the two vectors and returns the dot product.] (10 marks)
   b. Length of each vector individually; $\|X\| = \sqrt{\sum_{i=1}^{n} x_i^2}$. [Use method named **VectorLength** which takes one vector at a time and returns the length of it.] (10 marks)

انظر خلفه
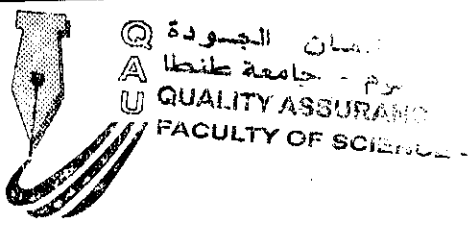
MA3121

| جامعة طنطا | المستوى: الثالث (ش.حاسب آلي) | دور يناير ٢٠١٧ |
| كلية العلوم | المادة: تحليل حقيقي ومقياس | الزمن: ساعتان |

أجب عن الأسئلة التالية:

١) أ. A م.قياسية $\Leftrightarrow$ ☐ $\Leftrightarrow$ ☐ $\Leftrightarrow$ ☐ ، $f(x)$ د.قياسية $\Leftrightarrow$ ☐ $\Leftrightarrow$ ☐ $\Leftrightarrow$ ☐ .

ب. أكمل واثبت : $\|f\| = \sqrt{...}$ حيث $f(x) = \sqrt{\dfrac{2}{(x+1)(x+3)}}$ $\ni$ F $[0,3]$.

---

٢) أ. المقياس μ (A) هو ☐ .... وله أمثلة رياضية هي ....

ب. عرف المجموعة R واذكر ٥ خواص رياضية لها .

---

٣) أ. أكمل واثبت النظرية : μ $(A \cup B) =$ ...... $-$ ...... $+$ ....

ب. أكمل واثبت النظرية: $f(x)$ د.قياسية $\Leftrightarrow$ الأجزاء f^- , f^+ هي ....

---

٤) أ. $\int_0^3 f \, dg =$ ☐ حيث $f(x) = 5$ ، $g(x) = \begin{cases} 0 & 0 \leq x \leq 2 \\ 6 & 2 < x \leq 3 \end{cases}$.

ب. اثبت أن مجال الدالة $f(x) = \sqrt{25 - x^2}$ هو م.مغلقة ــ متراصة ــ قياسية .

---

٥) أ. عرف المجموعة المفتوحة A ــ المغلقة B واذكر أمثلة لها.

ب. اثبت أن $S = \{ \dfrac{n}{n+1} : n \in N \}$ مجموعة محدودة وقابلة للعد.

مع أطيب التمنيات بالنجاح .. د .سعيد أحمد أبوالعلا واللجنة

Answer the following questions

QUESTION 1:

(i) Write the HIRE-ASSISTANT procedure and then calculate the expected hiring cost associated with this procedure.

(ii) Write the PERMUTE-BY-SORTING procedure and show that the procedure computes a uniform random permutation.

(iii) Write the ON-LINE-MAXIMUM procedure. Why might not the best candidate be hired?

QUESTION 2:

(i) Define (rooted, binary, and complete k-ary) trees. Define binary heaps and then show that an n-element heap has height $\lfloor \lg n \rfloor$.

(ii) Write the MAX-HEAPIFY and BUILD-MAX-HEAP procedures and then compute their running time.

(iii) Write the HEAPSORT procedure and compute its running time. Using a figure, illustrate how this procedure works for the array $A = \langle 5, 13, 2, 25, 7, 17, 20, 8, 4 \rangle$.

QUESTION 3:

(i) Write the QUICKSORT procedure and give an illustrative example showing that the running time of quicksort is $O(n \lg n)$ whenever the split has constant proportionality. Why does randomization of quicksort stop any specific type of array from causing worst-case behavior?

(ii) Write the PARTITION procedure and demonstrate the operation of the procedure on the array $B = \langle 2, 8, 7, 1, 3, 5, 6, 4 \rangle$. What value of q does PATRITION return and what is the running time of QUICKSORT when all elements in the array $A[p..r]$ have the same value?

With my best wishes

	Mathematics Department , Faculty of Science ,Tanta University	
	Branch: Math. Dept.	Sub-branch : Mathematics
	Examination for : Level three	Term: first Term 2016-2017
	Course Title: Mathematical Logic and Boolean Algebra	Course Code: MA3113
1969	Date: 9/1/2017 Total Mark: 100	Time Allowed: 2 Hours

Answer the following questions:

First: Mathematical Logic.

Question 1 (30 marks):
a) Show that $(\neg(A \to (B \vee C))) \to (A \wedge (\neg B \wedge \neg C))$ is a wff.   **(10 marks)**

b) Is $(((P \to Q) \to P) \to P)$ a tautology?

Define σ_k recursively as follows: $\sigma_0 = P \to Q$ and $\sigma_{k+1} = (\sigma_k \to P)$. For which values of k is σ_k is a tautology?   **(10 marks)**

c) Let G be the following three-place Boolean function:

$$G(F,F,F) = F, \quad G(T,F,F) = T, \quad G(F,F,T) = T, \quad G(T,F,T) = F,$$
$$G(F,T,F) = T, \quad G(T,T,F) = F, \quad G(F,T,T) = F, \quad G(T,T,T) = F.$$

Find a wff, using at most the connectives $\vee$, $\wedge$, and $\neg$ that realizes G. **(10 marks)**

Question 2 (20 marks):

a) In the first-order logic language, define the following:

the terms,   an atomic formula,   the well -formed formula.   **(9 marks)**

b) Rewrite the following wff in a way which explicitly lists each symbol in actual order. Say which variable occur free in the wff:

$$\forall v_1 A v_1 \wedge B v_1 \to \exists v_2 \neg C v_2 \vee D v_2. \qquad \textbf{(6 marks)}$$

c) In the language of elementary number theory, translate the following sentence in a more formal way:

" Any nonzero natural number is the successor some number".   **(5 marks)**

Second: Boolean Algebra.
Question 3 (20 marks):
a) Let $f(x,y,z)$ be the Boolean function represented by Table (1), then:

(i) Find $f(x,y,z)$.   **(2 marks)**

(ii) Represent $f(x,y,z)$ by logic and series-parallel circuits and then find the differences between the two circuit types.   **(5 marks)**

← **Please turn the page over**

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1969

Answer the following questions:

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Question 1 (30 marks):
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b) Is $(((P \to Q) \to P) \to P)$ a tautology?

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