TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS			
EXAMINATION FOR FRESHMEN (SECOND YEAR) STUDENTS OF MATH.			
COURSE TITLE:	MATHEMATICAL ANALYSIS (2)		COURSE CODE:MA2208
DATE: MAY, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

السؤال الاول :- (الدرجة ٣٨)

ا- اذكر فرضيات بيانو مع توضيح اهميتها . ثم برهن صحة العلاقة $(1+a)^n \ \ge 1+na$. (١٩درجة)

ب- ناقش التقارب المطلق $\sum_{n=0}^{\infty}\frac{(n!)^2\ x^{2n}}{(2n)!}$ مع تحديد فترة وتقارب نصف قطر المتسلسلة . (١٩درجة)

السؤال الثانى:- (الدرجة٣٧)

أ – باستعمال مفهوم نهاية متتابعة اثبت ان $u_n=\frac{2n+1}{4n+5}$ تؤول الى $\frac{1}{2}$. (١٧درجة)

ب-اثبت ان المتسلسلة $\sum_{n=1}^{\infty}\frac{\cos n\pi x}{n^2+x^2}$ تتقارب مطلقا لجميع قيم x الحقيقية . (٢٠درجة)

السؤال الثالث:- اختار الاجابة الصحيحة من بين القوسين (الدرجة ٣٦ موزعة بالتساوى)

أ- المتتابعة الصفرية (كل عناصرها اصفار، صفر فقط ، تؤول الى الصفر ، نهايتها تساوى صفر)

ب- الفئة تكون مغلقة اذا (كانت لها نهاية ، احتوت على نقاط نهايتها ، تحتوى على الواحد الصحيح ونقط النهاية، تحتوى على الحد العلوى والسفلى) .

ت- المتسلسلة تتقاربفقط عند $x=0$ اذا كان (نصف قطر التقارب يؤول الى∞ ، نصف قطر التقارب يؤول الى $\frac{1}{\infty}$،

نهاية المتسلسلة مساويا للصفر ، نصف قطر التقارب $\frac{1}{0}$) .

ث-اذا كانت الفئة A محدودة من اعلى فانة (تكون محدودة ، يوجد لها اكبر حد سفلى ، يوجد لهاحد سفلى ، يوجد لهاحد علوى) .

ج-اذا كانت المتوالية تقاربية فان (نهايتها لانهائية ، نهايتها غير محدودة ، نهايتها محدودة ، نهايتها وحيدة) .

د-المتسلسلة $\sum_{n=2}^{\infty}\frac{1}{n\ln n}$ تكون (متباعدة ، متقاربة ، متقاربة تتقارب شرطيا ، متقاربة تقاربا مطلقا).

السؤال الرابع :- (الدرجة ٣٩)

أ-اذا كانت A, B فئتين وكانت الفئة $A+B$ هى فئة كل العناصر $(a+b)$ حيث $a\in A\ ,\ b\in B$ فاثبت ان (٢٠درجة)

$\sup(A+B)=\sup A+\sup B$

ب-باستخدام متتابعة المجاميع الجزئية ناقش تباعد وتقارب المتسلسلة $\sum_{k=1}^{\infty}\ln\left(1+\frac{1}{k}\right)$. (١٩درجة)

EXAMINERS	PROF. H.K.EL-SAYIED	DR. M. AL-ATAR

	Tanta University **Faculty of Science** **Mathematics Department** **(Computer Science Deviation)**	
	Database Systems Final Term Exam (2nd year)	
2014-2015	Second Term	Time Allowed: 2 Hours

Solve the following questions

Question 1:

a- Define database, database management system?

b- List two common tasks a DBA has to perform?

Question 2:

Design conceptual, logical and physical model for the following relational database that has the following entities Category (categoryid, name, description) - Product (productid, name, description, quantity, price, categoryid) - Customer (customerid, name, address, phone, email) – sales (salesid, date, productid, customerid). Illustrate keys, constraints and data types for each relation also draw relationships between entities.

Question 3:

Given the "CUSTOMERS" table which contains the following data:

	CustomerId	CustomerNumber	LastName	FirstName	AreaCode	Address	Phone
1	1	1000	Smith	John	12	California	11111111
2	2	1001	Jackson	Smith	45	London	22222222
3	3	1002	Johnsen	John	32	London	33333333

Answer the following questions:

a. Write SQL statement which gets all the columns in the table ordered by first name.

b. Write SQL statement which gets all records belongs to the following condition: "AreaCode < 40" and First names starts with letter "J".

c. Write SQL statement which returns the number of records in CUSTOMERS table.

d. Write SQL statement which returns first name and Maximum of area code for all customers.

Good luck

DEPARTMENT OF MATHEMATICS TANTA UNIVE RSITY FACULTY OF SCIENCE (Computer Science Division)				
EXAMINATION FOR PROSPECTIVE STUDENTS (2ND YEAR)				
COURSE TITLE: برمجة الأشياء		COURSE CODE: CS2208		
DATE:	JUNE 2015	TERM: 2	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Question 1: (50 Marks)

- What is the definition of class, write its form, how to deal with its members and how you call them inside the main function?
- What is the definition of structure, write its form? What is the deference between structure and class members? What is the difference between structure and Union? Give an example for that?
- Define the Friend function, what is the deference between friend function and the original function?

Question 2: (50 Marks)

- How to write a program using project, describe in detail how to do that the two methods?
- How to use files in C++ and how to include them? Write example for input and output file?
- Describe the three main component of any Function? Can you describe the differences between void and return value functions? Write an example?
- What is the difference between, private, protected and public member of the class? Define all kinds of the inheritance? What does it mean the multi inheritance? Give an example?

Question 3: (50 Marks)

- Write the declaration of switch branch with example? Define the arrays of structures with an example? Write a program that create an array of structure ?
- Write a structure with int and float members; and names with 10 characters? How to use the member of structure inside the main function give example?
- How to describe the two dimensional array, Give an example? How to initialize the two dimension array by characters?
- Write a program for Multiplying two dimensional array?

EXAMINERS	PROF. DR./ ATLAM ELSAYED	DR/ MOSAAD WAGEEH

With my best wishes

انتهت الأسئلة...مع أطيب الأماني والتوفيق

DEPARTMENT OF MATHEMATICS TANTA UNIVE RSITY FACULTY OF SCIENCE (Computer Science Division)		
EXAMINATION FOR PROSPECTIVE STUDENTS (2ND YEAR)		
COURSE TITLE: هيكلة بيانات	COURSE CODE: CS2204	

DATE:	JUNE 2015	TERM: 2	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Question 1: (50 Marks)

- Write the Pseudo-code and the time complexity (Algorithm Analysis) for insertion Sorting?
- Write the postfix of the infix: 8*((9+(5+6)*7)+4)
- Write the Algorithm for inserting the infix expression to stack?
- Write the pseudo code for Towers of Hanoi with explanation example of towers of Hanoi to Move 4 disks from pole A to pole C using pole B?

Question 2: (50 Marks)

- What is queue? Describe the Operation of Queue with their definitions?
- Write a pseudo-code to calculate the submission of the first 100 normal numbers?
- Write two examples of Algorithms for same problem showing the better one of their Asymptotic Analysis?
- What is sorting? Write the two types of Sorting with the two Primary Sorts Big-Oh?

Question 3: (50 Marks)

- What is the advantage of using Data structure?
- Write the two Measuring Running time methods? Describe the limitation of the first one?
- Write the Stack Operations implemented by the Array and Linked list of size 3? Write the advantage and disadvantage of both cases?
- Write by using C, the push(), pop() and display() functions of the stack?

EXAMINERS	PROF. DR./ ATLAM ELSAYED	DR/ MOSAD WAGEEH

With my best wishes

انتهت الأسئلة...مع أطيب الأماني والتوفيق

مطلوب

Tanta University, Faculty of Science

SUBJECT: **Digital Logic & Algorithms**

CODE: CS2202

TIME DURATION: 2h

LEVEL 2 (Computer)

SEMESTER 2, 2014-2015

Answer the following questions

QUESTION 1:

(i) What does analyzing algorithms mean? Write the INSERTION-SORT procedure to sort into nondecreasing order and then compute its best-case and worst-case running time.

(ii) Write the MERGE procedure; then illustrate the operation of the procedure in the call $\mathrm{MERGE}(A, 9, 12, 16)$, when the subarray $A[9..16]$ contains the sequence $\langle 2,4,5,7,1,2,3,6 \rangle$.

QUESTION 2:

(i) Draw the recursion tree for $T(n) = 2T(\lfloor n/2 \rfloor) + n$, and provide a tight asymptotic bound on its solution. Verify your bound using both the substitution method and the master theorem.

(ii) Using the substitution method, prove that $T(n) = T(\lfloor n/2 \rfloor) + T(\lceil n/2 \rceil) + 5$ is in $O(n)$.

QUESTION 3:

(i) Define the asymptotic notations O and Ω for a given function and then prove that

$$f(n) = O(g(n)) \text{ if and only if } g(n) = \Omega(f(n)).$$

(ii) Define the ω-notation and then prove that $\frac{n^2}{2} \neq \omega(n^2)$.

(iii) Define (polynomially and polylogarithmically) bounded functions. Deduce the relations between the growth of exponentials, polynomials, and polylogarithms.

(iv) Define the iterated logarithm function, and then determine the value of $\lg^*(2^{65536})$.

(v) Argue that the solution to the recurrence $T(n) = T(n/3) + T(2n/3) + cn$, where c is a constant, is $\Theta(n \lg n)$ by appealing to a recursion tree.

(vi) Use the master method, if it can be applied, to give a tight asymptotic bound for the recurrence:

$$T(n) = 4T(n/3) + n \lg n.$$

With my best wishes

EXAMINERS	PROF. DR./ ATLAM ELSAYED, DR. OMER ABO ALULA	DR/ MOSAD WAGEEH

TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS			
EXAMINATION FOR SOPHOMORES (SECOND YEAR) STUDENTS OF COMPUTER SCIENCES			
COURSE TITLE:	الجبر الخطي و هندسة المجسمات		COURSE CODE: MA2220
DATE: 27/ 5/ 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following questions

Question 1 (35 Marks)

1) Let $V = R^3$ be the three dimensional space. Show that $W = \{(a, b, 0): , a, b \in R\}$ is a Subspace of V. (10 Marks)

2) Let $T: R^2 \longrightarrow R^2$ given by $T(x_1, x_2) = (-x_2, x_1)$. (25 Marks)
   (i) Prove that T is a linear transformation (ii) Find Ker T
   (iii) Find the matrix of T relative to the standard basis $B = \{(1,0), (0,1)\}$.

Question 2 (40 Marks)

1) By forming the augmented matrix and row reducing determine the solutions of the following system (20 Marks)

$$\begin{aligned} 2x - y + 3z &= 4 \\ 3x + 2z &= 5 \\ -2x + y + 4z &= 6 \end{aligned}$$

2) Find the Eigen values and the corresponding Eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 \\ -2 & 4 \end{bmatrix}$. Show that A satisfies its characteristic equation. (20 Marks)

السؤال الثالث (35 درجة)

١. أوجد مساحة متوازى الأضلاع الذى رؤوسه النقاط $A(4,2,1), B(2,-3,0), C(1,-1,-2),$ $D(3,4,-1)$. (15 درجة)

٢. أوجد معادلة مستوى التماس عند النقطة $(6,2,4)$ للكرة التى مركزها النقطة $C(-1,1,2)$. (٢٠درجة)

السؤال الرابع (٤٠ درجة)

١. أوجد إحداثيات نقط تقاطع المستوى الذى معادلته $3x + 4y + 6z - 12 = 0$ مع محاور الإحداثيات. (15 درجة)

٢. إستنتج الصور المختلفة لمعادلة الخط المستقيم L المار بالنقطة p (غير مار بنقطة الأصل) وفى إتجاه المتجه $\vec{A}$. (15درجة)

٣. اوجد جيب تمام الزاوية بين المستويين $4x + 3y + 5 = 0$, $-2x + 2y + z = -1$ (10 درجات)

EXAMINERS	PROF. DR. ELSSAD AMAR	DR. ABD EL-MOHSEN BADAWY
	DR. MERVAT ELZAWY	

	Tanta University Faculty of Science Department of Mathematics	
	Final term exam for the second semester 2014-2015	
Course title:	Optimal Control	**Course code: MA3210**
1969 **Date:26** /5/2015	Total Marks: 150	**Time allowed: 2** Hours

Answer all the following questions:

First question: (40 Marks)

(a) Find a necessary condition for a function to be an extremal for the functional

$$J(x)=\int_{t_0}^{t_f} F\left(x(t),\dot{x}(t),t\right)dt$$

where $t_0, x(t_0), x(t_f)$ and t_f are specified.

(b) In seeking an extremal $J(x)=\int_{t_0}^{t_f} F\left(x(t),\dot{x}(t),t\right)dt$

Show that:

(i) Euler's equation can also be expressed as $\frac{d}{dt}\left(F-\dot{x}\frac{\partial F}{\partial \dot{x}}\right)-\frac{\partial F}{\partial t}=0$.

(ii) If F is not an explicit of t, then $F-\dot{x}\frac{\partial F}{\partial \dot{x}}=c$.

(c) Optimize $J(x)=\int_0^1 \left(13t-3\dot{x}^2+36xt\right)dt$, Subject to $x(0)=2,\quad x(1)=4$

(d) Find the increment of the functional $J=\int_{t_0}^{t_f}\left[2x^2+1\right]dt$.

Second question: (40 Marks)

(a) State and prove the Bellman Jacobi equation?

(b) Show that the Bellman Jacobi equation is equivalent to Hamiltonian relations for optimal control.

(c) Show that the Bellman Jacobi equation is equivalent to Hamiltonian maximum relations for optimal control.

Third question: (30 Marks)

(a) By using Hamiltonian method, find the optimal control and optimal state which minimizes

$$J=\frac{1}{2}\int_0^2 u^2(t)\,dt \;\; s.t. \quad \dot{x}_1(t)=x_2(t),\dot{x}_2(t)=u(t),x(0)=[1\quad 2]^T, x(2)=[1\quad 0]^T$$

(b) Solve the problem: $\min\int_0^1\left(x^2+\dot{x}^2\right)dt$, $x(0)=1,\quad x(1)$ free .

P.T.O.

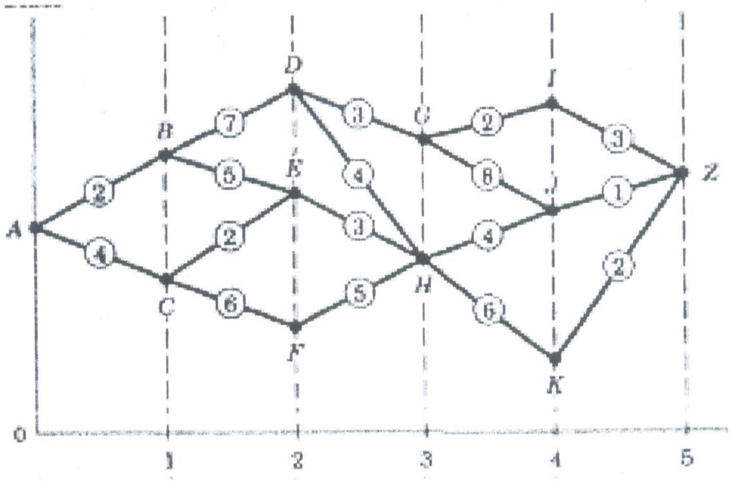
Fourth question: (40 Marks)

(a) Using Lagrange multipliers method to Minimize the performance index

$$J = \int_0^{t_f} \left[\frac{1}{2} x_1^2 + \frac{1}{2} x_2^2 \right] dt$$ such that $\dot{x}_1(t) = x_2(t)$ and $x_1(0) = 0, \quad x_2(0) = 1$.

(c) State the principle of optimality in Dynamic Programming.

(d) Find the optimal path of the following figure



Examiners:	1- Prof. Dr. A. El-Namoury	2- Dr. N. El-Kholy