



1st Term 2014/2015

Final Exam
MC357 Database
2 Hours - 50 Points

Mathematics Dept.
Faculty of Science
Assiut University

Answer the following questions: (12.5 points for each)

Q1. Answer only three items

- a) Define the data model and the database state.
- b) Define the foreign key and the primary key.
- c) What are the kinds of relationships? Give an example for each relationship.
- d) What is the difference between the composite and the simple (atomic) attributes?

Q2. Answer only three items (including a)

- a) Draw a simple **ER model** that describes the relationship between students and the courses.
- b) Convert the previous ER model in the previous item (question **Q2a**) to SQL tables.
- c) State the data types and their sizes in MySQL.
- d) How to insert person's picture into a MySQL table.

Q3.

Assume the following table **T** contains only three fields: Name, PDate, and PAmount. Write SQL statements to:

- a) Insert the record ('Ahmed', 01-01-2015, 100) into the table **T**.
- b) Display the total payment (summation of PAmount) for each person. *For example, SQL display 3500 for Ali*
- c) delete all records for **Ahmed** from the table **T**.

Name	PDate	PAmount
Ahmed	10-10-2012	1400
Ali	19-10-2012	2000
Ali	1-1-2013	1500

Q4.

- a) Assume that you have a table **S** containing two fields: **Name** and **Salary**. Write a **trigger before insert** to check for the **Salary** value, where, the trigger replaces the inserted negative value of **Salary** to zero. *For example, the trigger stores the new record ('Ahmed', -100) as ('Ahmed', 0).*
- b) Write a MySQL function *myFun* to compute

$$myFun(x) = \begin{cases} 0.1x, & x \geq 100 \\ 0.05x, & 50 \leq x < 100 \\ 0, & x < 50, \end{cases}$$

where x is a float number. For examples, $myFun(90.0) = 4.5$ and $myFun(40.7) = 0$.

Best Wishes



Answer the following Questions:

Question One: (10 point)

Choose the correct answer for **10 items only** from the following:

- A certain algorithm A has been shown to have running time $\sum_{i=1}^n x^i, x < 1$. Which of the following represents the order of growth of algorithm A ?
 a) $\Theta(1)$ b) $\Theta(n)$ c) $\Theta(n^x)$ d) $\Theta(x^n)$
- Which of the following is true for an algorithm A of running time $\Omega(N^{2.5})$? N is the input size.
 a) For all N , there may be some inputs for which the running time is more than $N^{2.6}$ seconds.
 b) For all N , there may be some inputs for which the running time is less than $N^{2.6}$ seconds.
 c) For all N , there may be some inputs for which the running time is more than $N^{2.4}$ seconds.
 d) For all N , there may be some inputs for which the running time is less than $N^{2.4}$ seconds.
- Let $T(n)$ be defined by $T(n) = 3n + 2T(n/4)$, for all integers $n \geq 1$. Which of the following represents the order of growth of $T(n)$ as a function of n ?
 a) $O(n)$ b) $O(n \log n)$ c) $O(n^2)$ d) $O(n^2 \log n)$
- The algorithm with the running time $T(n) = O(n \log n)$ is slower than the algorithm with the running time ____.
 a) $O(n)$ b) $O(n^2)$ c) $O(n^2 \log n)$ d) All of them
- The running time of the new multiplication algorithm based on the *Divide-and-Conquer* methodology and using Gauss's trick is ____.
 a) $O(n^{1.5})$ b) $O(n^2)$ c) $O(n \log n)$ d) $O(n^{\log_2 3})$
- A problem is called an easy problem if there exists a/an ____ time algorithm to solve it.
 1) polynomial 2) exponential 3) factorial 4) None of them
- In the complexity theory, P stands for ____.
 a) deterministic polynomial b) nondeterministic polynomial c) deterministic nonpolynomial d) nondeterministic non-polynomial
- In the Depth First Search tree, the ____ edge leads from a node to its ancestor.
 a) Tree b) Forward c) Back d) Cross
- The gcd(588, 210) is ____.
 a) 42 b) 24 c) 21 d) 12
- The inverse of 17 mod 186 is ____.
 a) 23 b) 1/17 c) 11 d) None of them
- For undirected graphs, the adjacency matrix is a/an ____ matrix.
 a) symmetric b) unsymmetric c) diagonal d) tridiagonal

Faculty of Science Department of Mathematics		قسم الرياضيات كلية العلوم
امتحان نهائي الفصل الدراسي الأول للعام الجامعي ٢٠١٤/ ٢٠١٥ م		
الشعبة: الرياضيات	الفرقة: المستوى الثالث	
الزمن : ساعتان	رقم المقرر: ٣٣١ ر	اسم المقرر: الأسس الرياضيه لميكانيكا الكم والميكانيكا الإحصائية.
التاريخ: ٢٠١٥/١/٣ م		الدرجة الكلية: ٥٠ درجة

أجب عن خمسة أسئلة فقط مما يأتي:-

١- أ) اشرح بالتفصيل الصعوبات التي واجهت الفيزيائيين وكذلك التجارب التي أدت إلى ظهور نظرية الكم . (٥ درجات)

ب) اشرح بالتفصيل النموذج الكوكبي للذره موضحاً أسباب صعوبة تطبيق هذا النموذج . (٥ درجات)

٢- أ) استنتج الصور المختلفه لمعادلة شرودنجر لجسيم يتحرك حركه عامه مع كتابة المعادله المرافقه في كل حاله وعرف كثافة الاحتمال . (٥ درجات)

ب) إذا كان Ψ_m , Ψ_n حلين مختلفين لمعادلة شرودنجر المناظرين للطاقات $\mathcal{E}_m$, $\mathcal{E}_n$ فاثبت أن:

أولاً- هذه الطاقات حقيقه أى أن $\mathcal{E}_n = \mathcal{E}_n^*$.

ثانياً- Ψ_m , Ψ_n دوال متعامده أى أن $\int_{-\infty}^{+\infty} \Psi_m^* \Psi_n dV = 0$ حيث $m \neq n$ أى $\mathcal{E}_n \neq \mathcal{E}_m$. (٥ درجات)

٣- جسيم يتحرك فى بعد واحد بين النقطتين $x = -a$, $x = a$ تحت تأثير جهد $U = \frac{1}{2} \omega^2 x^2$. أدرس هذه الحركه بالتفصيل من وجهة نظر الميكانيكا الموجيه واستنتج مستويات الطاقه المختلفه والدوال الموجيه المناظره . (١٠ درجات)

من فضلك انظر باقى الأسئلة فى الورقه الثانيه

- 4 (a)- For a one gram mole of an ideal gas whose equation of state is given by $PV=RT$ and for an adiabatic process, with constant C_P, C_V prove that

$$PV^\gamma = \text{constant} \quad , \quad \gamma \equiv C_P / C_V \quad (5 \text{ points})$$

- (b) If $\alpha = 3aT^3/V$, $\kappa = b/V$ for a certain gas, where a, b are constants. Obtain the equation of state for such a gas. (5 points)

- 5 (a)-Derive the microcanonical distribution in phase space in the usual form:

$$\rho(\underline{R}) = \delta(E - H) / \Omega(E, a) \quad (5 \text{ points})$$

- (b) Prove Tolman's general equipartition principle, whence prove that:

$$-\overline{(\underline{r} \cdot \underline{F})} = 3 \Theta(E, a) \quad \text{where } \underline{F} \text{ is the conservative force acting on a moving monatomic molecule in 3-dimensional space with position vector } \underline{r} . \quad (5 \text{ points})$$

- 6 (a)- Evaluate the partition function $Z_c(\beta, V)$ for an ideal gas belonging to the canonical ensemble and which is composed of N monatomic molecules each of mass m enclosed in a volume V , whence obtain the equation of state for such a gas. (5 points)

- (b) For a monatomic ideal gas, use the Maxwell-Boltzmann distribution of speeds:

$$D^{(1)}(v) = 4 \pi N \left(\frac{m}{2 \pi k T} \right)^{3/2} v^2 e^{-mv^2 / 2kT}$$

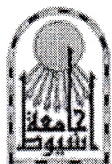
to obtain each of the mean speed $\bar{v}$, the root mean square speed $\sqrt{v^2}$, and the most probable speed v_{mp} for a single molecule ($N=1$).

(5 points)

With Best Wishes

M. Boghdadi

M. Boghdadi



- Important remarks**
- Two Pages & 3 Questions
 - Answer each question in separate pages

PLEASE, ANSWER THE FOLLOWING QUESTIONS

Question 1: (20 Marks)

Write the number of the question and the letter of the most correct answer only.

1) Which of the following relationships represents the dual of the Boolean property $x + x' = 1$?	a) $x' \cdot x = 1$	b) $x \cdot x' = 1$	c) $x + x' = 0$	d) $x * x' = 0$
2) Simplification of the Boolean expression $(A+B+C)(D+E)' + (A+B+C)(D+E)$ yields	a) $A + B + C$	b) $D + E$	c) $A'B'C'$	d) $D'E'$
3) Simplification of the Boolean expression $AB + A(BC)'$ yields	a) A	b) BC	c) B	d) AB
4) Which of the following canonical expressions is generated by 3-input NOR gate?	a) m_0	b) M_0	c) m_7	d) M_7
5) Converting $(0111011.100)_2$ to base 16 yields	a) 73.8	b) 3C.4	c) 3B.8	d) 3B.4
6) $(m_i)' + M_i = \dots$ (Note: m_i is a minterm and M_i is a maxterm.)	a) 1	b) 0	c) m_i	d) M_i
7) A circuit which gates one input of data line to one of 2^n output lines is defined as a	a) MUX	b) DeMUX	c) Encoder	d) Decoder
8) The expression $((AB)' + C)'$ using DeMorgan's theorems is equivalent to	a) $(AB)C'$	b) $(AB)' + C$	c) $(A+B)C$	d) $AB + C'$
9) Minterm m_{31} must be represented by at least how many literals?	a) 6	b) 31	c) 5	d) NONE
10) ... flip-flop sets its output to 1, resets its output to 0, or complements its output.	a) T	b) D	c) J-K	d) ALL
11) Which of the following Boolean expressions are false?	a) $(x+y)(x+z)=x+yz$	b) $xy+x'=x'+y$	c) $(x+y)(x'+z)=x'y+xz$	d) NONE
12) In ... counter, the flip-flop's output transition triggers other flip-flops.	a) ripple	b) synchronous	c) either a or b	d) NONE
13) The content of a 4-bit register is 1010. If the register is left shifted 3 times with serial input 101011, it will be	a) 1010	b) 0111	c) 0101	d) 1011
14) The state of gate is logic 1, logic 0, or high-impedance.	a) NOR	a) NAND	a) Tri-state	a) NONE
15) 11110100 is the two's complement representation of	a) -11	b) -12	c) -20	d) NONE
16) Simplification of the Boolean expression $AB + ABC + ABCD + ABCDE + ABCDEF$ yields	a) ABCDEF	b) $AB + CD + EF$	c) AB	d) NONE
17) Which of the following expressions is the only correct canonical representation for $F(x,y,z) = y$?	a) $\sum(0,1,4,5)$	b) $\sum(2,3,6,7)$	c) $\sum(4,5,6,7)$	d) $\sum(1,3,5,7)$
18) Storage elements those controlled by a clock transition are	a) latches	b) flip-flops	c) either a or b	d) NONE
19) A group of flip-flops and gates that goes through a pre-determined sequence of states is a	a) counter	b) register	c) either a or b	d) NONE
20) Serial operations require and are than parallel operations.	a) less devices, faster	b) less devices, slower	c) more devices, faster	d) more devices, slower

Question 2:

(16 Marks)

- I. (8 Marks) Simplify $F(A,B,C,D) = A'B'C + AC' + ACD + ACD' + A'B'D'$ using K-map then implement it by using both
- two-level NAND gates and
 - two-level NOR gates.

- II. (8 Marks) Using the following methods implement a full adder circuit:

$$S = x \oplus y \oplus z,$$

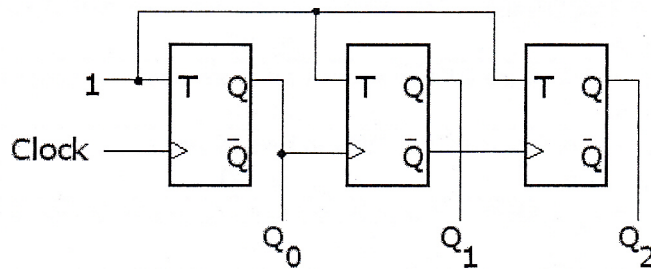
$$C = xy + xz + yz$$

- 3 – to - 8 line Decoder
- 4 x 1 Multiplexers.

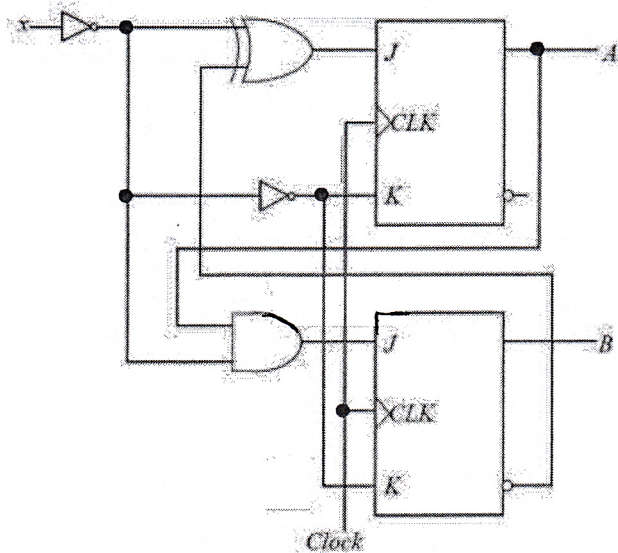
Question 3:

(14 Marks)

- I. (4 Marks) Analyze the circuit shown to determine the output sequence ($Q_2Q_1Q_0$) for the circuit shown after 8 clock cycles, assuming the initial states are (000).



- II. (10 Marks) Analyze the sequential circuit shown to derive its state table and its state diagram.



END of Questions

Best wishes, Dr. Asem Ali + Committee

Assiut University
Faculty of Science
Mathematics Department
Term Exam

Computer Networks
Third Level (MC354)
Time: 2 hours
January 2015 (2014-2015)

Answer the following questions: (50 Marks)

Question 1: Answer the following points (10 Marks)

- 1- Explain the internet "nuts and bolts"?
- 2- Define and explain traffic intensity?

Question 2: Answer the following points (10 Marks)

- 1- Explain the Internet protocol stack?
- 2- Explain the application client-server architecture?

Question 3: Answer the following points (10 Marks)

- 1- Compare between persistent HTTP and non-persistent HTTP?
- 2- Compare between multiplexing and demultiplexing? Support your answer with a diagram?

Question 4: Answer the following points (10 Marks)

- 1- Define and explain the use of ACKs and NAKs?
- 2- What is the purpose of the router switching fabrics? What are the types of switching fabrics? Support your answer with a diagram?

Question 5: Answer the following points (10 Marks)

- 1- When does router input port queuing happen? Define and explain HOL? Support your answer with a diagram?
- 2- What is the goal of DHCP? Explain how does DHCP work? Support your answer with a diagram?

Dr. Tarik M. A. Ibrahim

الزمن: ثلاث ساعات
المادة : موضوعات مختارة في
الرياضيات ١ (٣١٥)
اليوم: الخميس
التاريخ: ٢٠١٥/١/٨ م

امتحان النهائي لطلاب كلية العلوم

المستوي الثالث

شعبة الرياضيات

المادة : موضوعات مختارة في الرياضيات ١ (٣١٥)

كلية العلوم
قسم الرياضيات
الفصل الدراسي الاول
٢٠١٤ / ٢٠١٥ م

أجب عن جميع الاسئلة الاتيه علما بان الدرجة من ٥٠ درجة

السؤال الاول:

(١٢,٥ درجة)

$$\int_0^{\infty} \frac{u^{n-1}}{1+u} dy = \frac{\pi}{\sin \pi u}, \quad 0 < n < 1$$

(أ) أثبت أن :

(ب) أحسب قيمة التكاملات الاتية:

$$i) \int_0^{\frac{\pi}{4}} \sqrt{\sec 2\theta} d\theta$$

$$ii) \int_0^{\frac{\pi}{2}} \tan^2 x dx$$

(١٢,٥ درجة)

السؤال الثاني:

(أ) أستخدم الصيغة التكاملية لدوال بسل في حساب قيمة التكامل:

$$I = \int_0^{\infty} e^{-ax} J_0(bx) dx$$

$$J_{\frac{1}{2}} = \sqrt{\frac{2}{\pi}} \frac{\sin x}{\sqrt{x}} \quad (ب) \text{ أثبت ان :}$$

$$L_n(x) = \frac{1}{2\pi i} \oint \frac{e^{-xt/(1-t)}}{(1-t)t^{n+1}} dt \quad (ت) \text{ أثبت صحة الصيغة التكاملية لكثيرات حدود لاجير}$$

(١٢,٥ درجة)

السؤال الثالث:

(أ) برهن علي ان كثيرات حدود تشبيشيف تحقق العلاقات الاتية:

$$i) T_{n+1}(x) + \sqrt{1-x^2} U_n(x) = x T_n(x)$$

$$ii) 2[T_n(x)]^2 = 1 + T_{2n}(x)$$

(ب) بين أن كثيرات حدود لاجير تحقق شرط التعامد.

(١٢,٥ درجة)

السؤال الرابع:

$$P_x(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} [(x^2 - 1)^n] \quad (أ) \text{ أثبت صيغة رودرنج لكثيرات لجندر :}$$

$$\int_0^{\frac{\pi}{2}} \cos^{2n+1} \theta d\theta = 2^{2n} \frac{(n!)^2}{(2n+1)!} \quad (ب) \text{ أثبت ان :}$$

مع التمنيات لكم بالتوفيق

أستاذ دكتور / احمد ماهر عبدالباسط



1st Term 2014/2015

Final Exam for Level 3
Subject: Mathematical and Statistical
Packages, MC300

Time: 2 Hours

Mathematics Dept.
Faculty of Science
Assiut University

Answer the Following Questions(50 marks)

1. Write the MATLAB commands used to: a. Declare the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 4 & 3 & 1 \end{pmatrix}$ b. Compute the determinant of A c. Change the elements of the last column in A to 5 d. Compute the mean and median of first row in A	(10 marks)										
2. Choose the correct answer 1. rand(1)=..... a)3 b) 2 c)0.566 d) -1 2. inv(x)=..... a) e^x b) $\frac{1}{x}$ c) $x.x$ d) x^2 3. What is the value of <u>b</u> where $x=[1 \ 2 \ 3 \ 4]$; $b=x>2$ $b=.....$ a) $b=[3 \ 4]$ b) $b=[1 \ 2]$ c) $b=[0 \ 0 \ 1 \ 1]$ d) $[1 \ 1 \ 0 \ 0]$ 4. The command used to put value in edit box is..... a) textread b) str2num c) set d) get 5. The command used to convert the color image to binary image is a) rgb2bw b) imresize c) bw2rgb d) im2bw	(10 marks)										
3. Write the MATLAB commands used to: a) Solve the differential equation $y' + x y = 1$. b) Convert the string to number c) Compute the average of each column in matrix d) Fit the next data as quadric polynomial, where $Y=f(X)$. <table border="1"><tr><td>X</td><td>0</td><td>0.5</td><td>1</td><td>2</td></tr><tr><td>Y</td><td>0</td><td>0.25</td><td>1.1</td><td>3.8</td></tr></table>	X	0	0.5	1	2	Y	0	0.25	1.1	3.8	(10 marks)
X	0	0.5	1	2							
Y	0	0.25	1.1	3.8							

cc /

4. In SPSS

(10 marks)

Name	Income	Age
Ahmad	1000	58
Emad	1050	28
Ali	1300	35
Maha	1450	43
Alaa	1300	55
Nor	1500	41
Hany	1000	33

- Compute stander division for age and income.
- Find the minimum and maximum for income.
- Find the significance value, from correlation, between the income and the age values.
- Compute new column $x = \text{income}/10$

5. Write the output of the M-file:

(10 marks)

<pre>A=[1 2;3 4]; X=A.*A; disp(A,X);</pre>	<pre>A=5; while(A<10) S=A/2; A=A+2; disp(A,S); end</pre>	<pre>C=1 for j=5:3:12 C=C*j; end disp(C);</pre>
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Best Wishes



(الدرجة الكلية 50 درجة - كل سؤال من 10 درجات)

أجب عن خمسة فقط من الأسئلة التالية :

(5 درجات)

1- أوجد الحل العام للمعادلة التفاضلية :

$$xy'' - 2(x+1)y' + (x+2)y = (x-2)e^{2x}.$$

(5 درجات)

ب) بالتحويل الى الصورة القياسية أوجد الحل العام للمعادلة التفاضلية :

$$x^2 y'' - 2xy' + (x^2 + 2)y = x^3 \sec x.$$

1-2) بطريقة فروبنيوس أوجد الحل العام، بالقرب من نقطة الأصل، للمعادلة التفاضلية: (6 درجات)

$$(1-x^2)y'' - 2xy' + \frac{4}{9}y = 0.$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 \quad \text{ب) كون المعادلة التفاضلية الجزئية من العلاقة :}$$

(4 درجات)

حيث ϕ, ψ دالتان اختياريتان.1-3) أوجد علي صورة متسلسلة لانهاية حلا يصلح لقيم x الكبيرة للمعادلة التفاضلية:

(5 درجات)

$$2x^2(x-1)y'' + x(3x+1)y' - 2y = 0.$$

(5 درجات)

ب) أوجد الحل العام لمعادلة " لاجرانج " التفاضلية :

$$(z^2 - 2yz - y^2) \frac{\partial z}{\partial x} + (xy + xz) \frac{\partial z}{\partial y} = xy - xz$$

(10 درجات)

4) أوجد الحل العام لكل من المعادلتين التفاضليتين:

$$i) (D_1^2 - 3D_1D_2 + 2D_2^2)z = e^{x+y} + \sin(x-2y),$$

$$ii) (D_1^2 - 6D_1D_2 + 9D_2^2 - 4D_1 + 12D_2 + 4)z = 2e^{2x} \tan(y+3x).$$

$$D_1 \equiv \frac{\partial}{\partial x}, \quad D_2 \equiv \frac{\partial}{\partial y} \quad \text{حيث}$$

باقى الأسئلة في الخلف

(5 درجات)

5-1) أثبت أن المعادلة التفاضلية

$$yz(y+z)dx + xz(x+z)dy + xy(x+y)dz = 0$$

قابلة للتكامل، ثم أوجد أصلها التام.

ب) عين الحل الكامل والحل المفرد - إن وجد - للمعادلة التفاضلية الجزئية غير الخطية :

$$(5 \text{ درجات}) \quad \text{حيث} \quad p = \frac{\partial z}{\partial x}, \quad q = \frac{\partial z}{\partial y} \quad (px + qy - z)(p^2 + q^2) = pq$$

(10 درجات)

6- أوجد الحل العام لكل من المعادلتين التفاضليتين:

$$i) \frac{\partial^2 z}{\partial x^2} + x \frac{\partial^2 z}{\partial x \partial y} - 6x^2 \frac{\partial^2 z}{\partial y^2} = \frac{1}{x} \frac{\partial z}{\partial x},$$

$$ii) y \frac{\partial^2 z}{\partial x \partial y} - 2x \frac{\partial^2 z}{\partial x^2} - 2 \frac{\partial z}{\partial x} = 6xy.$$

مع أخلص التمنيات بالتوفيق

انتهت الأسئلة

لجنة الممتحنين: ا.د. عبد الرحيم صادق + د. محمد عبدالله عبدالرازق



أجب عن خمسة اسئلة فقط مما يأتي (١-أ) إذا كانت $2^n - 1$ عدد أولي فأثبت أن $2^{n-1}(2^n - 1)$ عدد تام ثم أوجد قيمة $(10001111)_3$ واكتب العدد 630 في النظام الرباعي . (٦ درجات)

(١-ب) أوجد الأعداد $x, y, z \in \mathbb{Z}$ والتي تحقق

$$g.cd(3636, 12378, 3054) = 3636x + 12378y + 3054z$$

(٢-أ) إذا كان $n \in \mathbb{N}$ ، $n > 2$ ، فأثبت أن $\Phi(n)$ عدد زوجي ثم أوجد $\Phi(4050)$ (٤ درجات)

(ب) اشترى تاجر فاكهه 50 صندوق من الفاكهه بسعر 2000 جنيهاً وكان سعر صندوق التفاح 120 جنيهاً وسعر صندوق البرتقال 50 جنيهاً وصندوق الموز 25 جنيهاً . إذا كان التاجر يريد أن يشتري علي الأقل صندوق من كل نوع فكم يشتري من كل نوع . (٦ درجات)

(٣-أ) أوجد حل التطابقه الخطية $19x \equiv 1 \pmod{280}$ ثم بين أن $(34^{57} - 1) \mid 11$. (٥ درجات)

(ب) (i) أوجد فصول التكافؤ قياس 8 ومنها أوجد $[5] \oplus_8 [7], [5] \otimes_8 [7]$. (درجتان)

(ii) أوجد قيمة $l.c.m(900, 2016, 1512)$. (٣ درجات)

(٤-أ) أوجد حل لنظام التطابقات الخطية الآتية :

$$x \equiv 11 \pmod{36}, x \equiv 7 \pmod{40}, x \equiv 32 \pmod{75}$$

(ب) أثبت أن $\frac{1}{2}n\Phi(n) = \sum_{1 \leq k < n} k$ حيث $g.c.d(k, n) = 1$ ثم بين باستخدام نظرية أولر أن

$$a^{13} \equiv a \pmod{2730}$$

(٥-أ) إذا كان p, q أعداد أولية مختلفة بحيث $a^p \equiv a \pmod{q}, a^q \equiv a \pmod{p}$ فأثبت أن

$$a^{pq} \equiv a \pmod{pq}$$

(ب) تحقق من أن العدد $n = 1729$ هو عدد شبه أولي وأن العدد $n = 561$ هو عدد كارمايكل .

(٤ درجات)

(٦-أ) أثبت أنه إذا كانت f دالة ضربية فإن الدالة $F(n) = \sum_{d|n} f(d)$ هي دالة ضربية ثم أوجد

$$\tau(1125), \sigma(1125), \sigma_2(1125), \mu(210)$$

(ب) باستخدام نظريات فيرما بين ما إذا كان العدد 123 أولي أم غير ذلك . (٣ درجات)

(ج) أثبت أن $\Phi(3n) = 3\Phi(m) \Leftrightarrow 3|n$. (درجتان)

Department of Mathematics	بسم الله الرحمن الرحيم	قسم الرياضيات
Faculty of Science		كلية العلوم
امتحان نهاية الفصل الدراسي الأول ٢٠١٤-٢٠١٥ م		
الدرجة الكلية: 50	الفرقة: المستوى الثالث	اسم المقرر: تحليل عددي (١)
الزمن: ثلاث ساعات	رقم المقرر: ٣٢٣ ر	

Answer Four questions only from the following:

1-a) Derive the following numerical integration formula:

$$\int_{x_0}^{x_n} f(x) dx = \frac{h}{3} \left[f_0 + 2 \sum_{i=1}^{\frac{n}{2}} f_{2i-1} + 4 \sum_{i=1}^{\frac{n}{2}-1} f_{2i} + f_n \right]$$

Discuss the convergence of the above method taking:

$$f(x) = e^x \quad x_0 = 0 \quad \text{and} \quad x_n = x \quad (8 \text{ marks})$$

b) Determined the value of n and h required to approximate

$$\int_0^1 \frac{1}{1+x} dx \text{ to within } 10^{-7} \text{ by Trapezoidal method. (4.5 marks)}$$

2-a) Find the degree of the polynomial interpolating the following data :

x	-1	0	1	2	3	4
f(x)	-10	-5	-6	-7	-2	15

. Then find $f(-0.5)$ and $f(3.5)$ (8 marks)

b) Find the root of $f(x) \equiv x^3 + 4x^2 - 10 = 0$ in $[1, 2]$ by using the secant method for two steps, taking $x_0 = 1$ and $x_1 = 2$ (4.5 marks)

P . T . O

3- a) Obtain the following estimate for the absolute error in the Lagrange interpolation formula:

$$|f(x) - L_n(x)| \leq \frac{M_{n+1}}{(n+1)!} |\pi_{n+1}(x)|$$

where $M_{n+1} = \max |f^{(n+1)}(x)|$ and

$$\pi_{n+1}(x) = (x - x_0)(x - x_1) \dots (x - x_n)$$

(7marks)

b) To what degree of accuracy we calculate $\sqrt[3]{17}$ by means of Lagrange's interpolation polynomial for the function $y = \sqrt[3]{x}$ if we choose $x_0 = 8$, $x_1 = 27$ and $x_2 = 64$

(5.5 marks)

4 - Solve the following system

$$10x_1 + 2x_2 + x_3 = 17$$

$$x_1 + 10x_2 + x_3 = 24$$

$$3x_1 + x_2 + 10x_3 = 35$$

By the method of iteration. Show that the process of iteration converges for the above system. What is the maximum error after applying 13 iterations ?

(12.5marks)

5- Consider the problem of finding the Fixed – Point of :

$$g(x) = \cosh\left(\frac{x}{e}\right) - 1 \quad \text{on } [-1, 1]$$

- (i) Take $x_0 = 1$ and apply the fixed point method to find x_1 and x_2
- (ii) Show that the sequence generated by $x_n = g(x_{n-1})$, $n \geq 1$ converges to the unique Fixed Point of g on $[-1, 1]$.
- (iii) What is the maximum error after applying 15 iterations ?

(12.5 marks)

With Best Wishes

Prof. Dr. Salah EL-Gendi

Dr. Abdalla El-Safty

Answer the Following Questions

(50 Marks)

I. Choose the correct answer and write it's letter in the answer table:

(20 Marks)

Answers table

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer																				

- Data is transmitted by packet switching using the standard -----
A. TCP B. IP
C. HTTP D. FTP
- is a program which interprets the HTML documents and displays it on the screen.
A. DNS B. Hypertext
C. Browser D. Java
- is a compact string of characters used to identify or name a resource.
A. URI B. URL
C. WWW D. DNS
- A (An) ----- is an html code that is enclosed in angel brackets <>
A. attribute B. tag
C. head D. body
- An XHTML document consists of ----- main parts.
A. two B. three
C. four D. five
- All tags must be -----
A. bold B. italic
C. uppercase D. lowercase
- All values of attributes need to surrounded by -----
A. [] B. " "
C. { } D. < >
- used to separate text within a web page.
A. <p> B.

C. <meta> D. <i>
- defines the smallest header.
A. h3 B. h4
C h5 D. h6
- Choose the correct XHTML tag to make a text bold
A. <btext> B. <bold>
C. D.
- What is the correct XHTML for inserting an image?
A. B. <image src="image.gif">
C. image.gif D.

12. Which one of the following elements defines the relationship between two linked documents:
 A. <link> B. <a>
 C. <cite> D. <rel>
13. The 'quotes' property sets the type of quotation marks for -----
 A. <blockquote> B. <q>
 C. <cite> D. <pre>
14. Basic syntax for XHTML tags and attributes is -----
 A. <tag attribute=value> </tag> B. <tag attribute=value> <tag>
 C. <tag attribute="value"> <tag> D. <tag attribute="value"> </tag>
15. What is the correct XHTML for making a hyperlink to Wikipedia website?
 A. Wikipedia
 B. Wikipedia
 C. Wikipedia
 D. Wikipedia

II. Choose the suitable number from (A) to (B):

(20 marks)

(A)	(B)	
1) Internet	A unit of information carriage	()
2) <meta>	A new version of HTML based on XML	()
3) 	a text to display in a tool tip	()
4) Universal selector	Used to apply the style for only one occurrence of a certain tag	()
5) Link	Is actually an absolute positioned <div> with some CSS properties	()
6) type selector	Define the structure of a sequence of characters within a line	()
7) <blockquote>	element defines a table cell.	()
8) Grouping	Used to apply certain style for all occurrences of a certain tag	()
9) Class selector	made up of two or more selectors separated by whitespace.	()
10) Descendant selector	A network of computer networks	()
11) title	Used when several selectors share the same declarations	()
12) ID selector	used for ordered list	()
13) Z-axis positions	element defines a table row.	()
14) Packet	particularly relevant when boxes overlap visually	()
15) Dreamweaver	An extension of xhtml file.	()
16) <td>	all-in-one visual development tool for creating, publishing, and	()
17)	managing websites and mobile content.	()
18) Inline elements	becomes active once you click on it	()
19) html	tag defines the start of a long quotation	()
20) XHTML	Is used for line break	()
21) Layers	used to specify keywords that describe a document's	()
22) <tr>		

III. Check with True (√) or False (X)**(10 marks)**

- 1- In XHTML, tags should appear in pairs, and no overlapping tags are allowed. ()
- 2- The following is a legitimate XHTML code: `<em><h2>Bold and italic</h2></em>` ()
- 3- The output of the following XHTML code in browser will be "txet cibara emos":
`<bdo dir="rtl">some Arabic text</bdo>` ()
- 4- If there is a CSS rule "p {font-size: 14px;}" in the external style sheet and there is a CSS rule "p {font-size: 12px;}" in the internal style sheet, then the font-size of the text in a paragraph will be 14px ()
- 5- Every host on the Internet has a unique IP address. ()
- 6- Comments are enclosed in `<!-- -->` ()
- 7- The class of the element, used to specify dissimilar attributes for dissimilar elements by putting them in the same class. ()
- 8- Width of the table's column is determined by the cell with the most text in it. ()
- 9- A declaration block consists of a list of declarations in curly braces (`<>`). ()
- 10- Local CSS confined to multiple elements (tag). ()

IV. Write the XHTML code for the following:**(5 marks)**

No	Code	Output
1.		CPU Central Processing Unit ALU Arithmetic Logic Unit GHz Gigahertz
2.		First Name: (accesskey = 1)
3.		<i>This is h3 text</i>

=== With My Best Wishes ===

Dr. Dalia M. Nashat



Answer the Following Questions:

(50 Marks)

I. Write the scientific term:

(15 marks)

1. The one program running at all times on the computer. (.....)
2. A software-generated interrupt caused either by an error or a user request. (.....)
3. An extension of main memory that provides large nonvolatile storage capacity. (.....)
4. Information in use copied from slower to faster storage temporarily. (.....)
5. Collection of separate, possibly heterogeneous, systems networked together. (.....)
6. Host OS, natively compiled for CPU. (.....)
7. Programming interface to the services provided by the OS. (.....)
8. Indicates the address of the next instruction to be executed for the process. (.....)
9. Distributing threads across cores, each thread performing unique operation. (.....)
10. An intermediate data structure between user and kernel threads (.....)

II. Check the answer with True (√) or False (X)

(10 marks)

1. Cache smaller than storage being cached. ()
2. Two interrupt are generated per block, rather than the one interrupt per byte. ()
3. Asymmetric Multiprocessing means each processor performs all tasks ()
4. Process is a passive entity and program is an active entity. ()
5. Storage management keeping track of which parts of memory are currently being used. ()
6. One advantage of modular programming that modules can be developed dependent on each other. ()
7. MS-DOS was created to provide the most functionality in the least space. ()
8. In memory, a process consists of multiple parts like data section which containing temporary data. ()
9. Job queue responsible to set of processes waiting for an I/O device ()
10. I/O-bound process spends more time doing I/O than computations, many short CPU bursts. ()
11. OS acts as an intermediary between a user and the computer hardware. ()
12. In Multiprogramming, CPU switches jobs so frequently that users can interact with each job while it is running ()
13. Public cloud includes both public and private cloud computing components ()
14. One-to-Many means many user-level threads mapped to single kernel thread. ()
15. Policy in OS design and implementation means what will be done. ()

Choose the correct answer and write it in the answer table:

(20 marks)

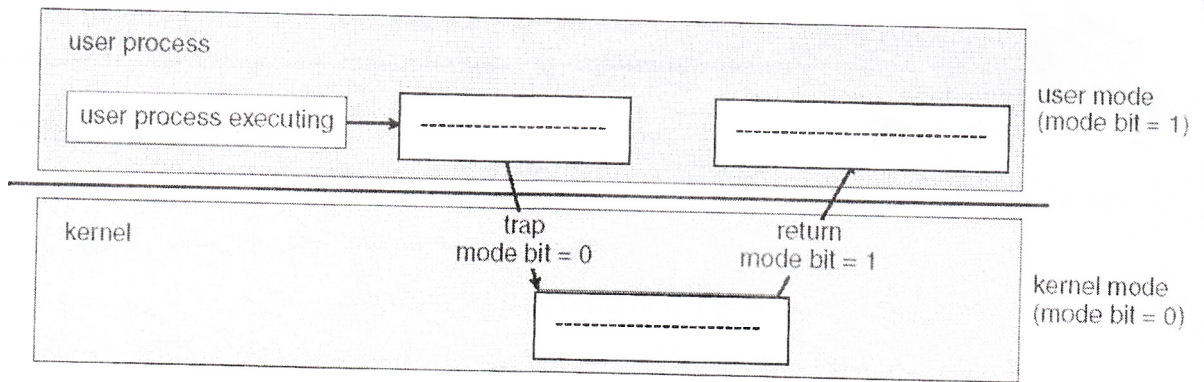
- 1- Computer system can be divided into ----- components.
a. two b. three c. four d. five
- 2- ----- is loaded at power-up or reboot.
a. Firmware b. Kernal c. Application d. system
- 3- Device controller informs CPU that it has finished its operation by causing -----
a. trap b. interrupt c. error d. kernal
- 4- The access time of main memory is ----- (ns)
a. 0.8-0.25 b. 0.25-0.5 c. 0.5-25 d. 80-250
- 5- The operating system is responsible for creating and deleting ----- processes
a. user b. system c. user and system d. application
- 6- ----- system provides interface for clients to store and retrieve files
a. Compute-server b. Network operating c. File-server d. Portals
- 7- The simplest method used to pass parameters to the OS in system calls is -----
a. stack b. block c. table d. register
- 8- Specifying and designing an OS is highly creative task of -----.
a. software engineering b. database c. web design d. networks.
- 9- Early OSes was in ----- language.
a. Algol b. assembly c. C++ d. PL/1
- 10- ----- allows direct access to hardware.
a. SOLARIS b. WINDOWS c. UNIX d. MS-DOS
- 11- ----- consists of 2 separable parts: Systems programs and Kernel .
a. SOLARIS b. WINDOWS c. UNIX d. MS-DOS
- 12- The bottom layer (layer 0) in Layered OSes, is the -----
a. security b. user interface c. hardware d. operation
- 13- State ----- in process means the process is waiting to be assigned to a processor.
a. new b. ready c. waiting d. running
- 14- ----- term scheduler controls the degree of multiprogramming.
a. Short b. Medium c. Long d. Multi
- 15- If no parent waiting (did not invoke wait()) process is -----
a. zombie b. child c. orphan d. terminated
- 16- ----- creation is heavy-weight while thread creation is light-weight.
a. Program b. Process c. OS d. File
- 17- -----I/O is easy to program but is not always efficient.
a. Synchronous b. Asynchronous c. Symmetric d. Asymmetric
- 18- System-call interface maintains a ----- indexed according to the number of system calls.
a. queue b. linked list c. stack d. table
- 19- Thread creation is ----- process creation
a. slower than b. faster than c. more expensive than d. equal to
- 20- Process executes last statement and asks the operating system to delete it using ----- system call.
a. exit() b. wait() c. abort() d. delete()

Answers table

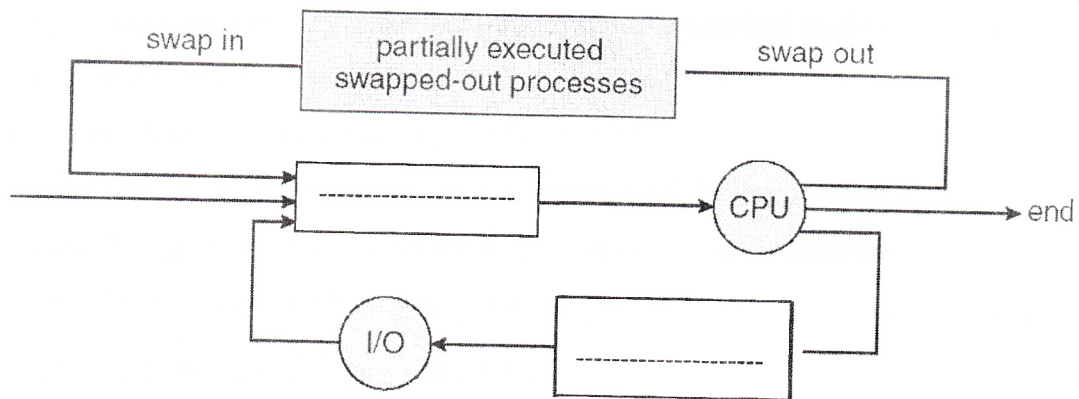
Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer																				

IV. Complete the following diagrams:

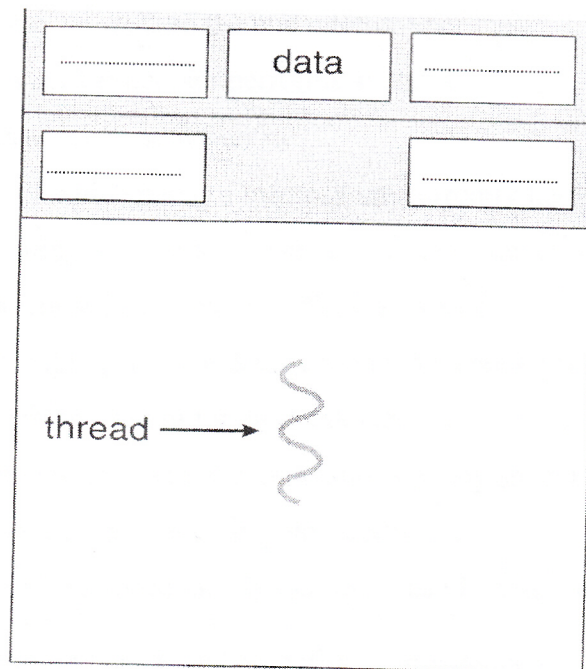
(5 marks)



Transition from user to kernel



The queueing diagram



Single threaded process

== With My Best Wishes ==

Dr. Dalaa M. Nashat

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امتحان نهائي الفصل الدراسي الأول للعام الجامعي ٢٠١٤/ ٢٠١٥ م		
الفرقة: المستوى الثالث	الشعبة: الرياضيات	
اسم المقرر: موضوعات مختاره في الرياضيات التطبيقية (١) الدرجة الكلية: ٥٠ درجة	رقم المقرر: ٣٣٥ ر	الزمن : ٣ ساعات التاريخ: ٢٠١٥/١/١٦ م

أجب عن خمسة أسئلة فقط مما يأتي:-

السؤال الأول:

- (أ) اثبت نظرية جرين الأولى .
(ب) حقق نظرية جرين الأولى للمتجه $\underline{A} = 4x\underline{i} - 2y^2\underline{j} + z^2\underline{k}$ المأخوذ على المنطقه
 $x^2 + y^2 = 4$, $z = 0$, $z = 3$

(درجات)

السؤال الثاني:

(أ) أثبت المتطابقات الآتية:

- (i) $\nabla \cdot (\Psi \nabla \Phi) - \nabla \cdot (\Phi \nabla \Psi) = \Psi \nabla^2 \Phi - \Phi \nabla^2 \Psi$,
(ii) $\nabla \cdot (\underline{a} \wedge \underline{b}) = \underline{b} \cdot (\nabla \wedge \underline{a}) - \underline{a} \cdot (\nabla \wedge \underline{b})$,
(iii) $\nabla \cdot [(\Phi \nabla \Psi) \wedge (\Psi \nabla \Phi)] = 0$.

(درجات)

(ب) احسب $\nabla \cdot (\underline{a} \wedge \underline{b})$ حيث $\underline{a} = (y, z, x)$, $\underline{b} = (xy, yz, xz)$ (درجات)

السؤال الثالث:

(أ) إذا كان $\nabla \Phi = 2xyz^3\underline{i} + x^2z^3\underline{j} + 3x^2yz^2\underline{k}$ فأوجد Φ إذا علم أن $\Phi(1, -2, 2) = 4$

(درجات)

(ب) حقق نظرية ستوكس في حالة الداله $\underline{F} = y\underline{i} + 2x\underline{j} + z\underline{k}$ وسطح نصف الكره العلوى

(درجات)

$$x^2 + y^2 + z^2 = a^2 , \quad z \geq 0$$

من فضلك أنظر باقى الأسئلة فى الورقه الثانبه

15

$$\nabla^2 \Phi = \frac{d^2 \Phi}{dr^2} + \frac{2}{r} \frac{d\Phi}{dr}$$

(درجات)

$$\nabla^2 \Phi = 0$$

$$\underline{A} = 5x^2\underline{i} + 10z\underline{k}$$

(۵ درجات)

السؤال الخامس:

أ) احسب $d\Sigma$ بدلالة x, y ومتجه الوحدة في الاتجاه العمودي على السطح واذكر تعريف الدوال

$$\delta(x), \bar{\delta}(x - x_0) \ , \quad \delta(\underline{r}) \ , \ \delta(\underline{r} - \underline{r}_0)$$

وكذلك أذكر بدون برهان

$$\int_{-\infty}^{-\infty} e^{i\mathbf{k} \cdot \mathbf{r}} d\mathbf{k} , \int_{-\infty}^{-\infty} \cos(\mathbf{k} \cdot \mathbf{r}) d\mathbf{k} , \int_{-\infty}^{-\infty} \frac{\sin x}{x} dx , \int_0^{\infty} \sin(\mathbf{k} \cdot \mathbf{r}) d\mathbf{k} ,$$

(۵ درجات)

(ب) اثبت العلاقات الآتية.

$$\oint \Phi d\Sigma = \int (\nabla \Phi) dV \quad , \quad \oint d\Sigma \wedge B = \int (\nabla \wedge B) dV \quad , \quad \int \Phi dl = \int d\Sigma \wedge \nabla \Phi$$

(۵ درجات)

السؤال السادس:

(أ) عرف مستعينا بالرسم الإحداثيات القطبية الكروية واذكر متجهات الوحده وعنصر الطول والمساحة والحجم وكذلك اكتب متجه ميل الداله بدون برهان والعلاقه بين الإحداثيات الكارتيزيه والكرويه

(درجات)

(ب) استنتج العلاقة بين متجهات الوحدة في الإحداثيات الكارتيزيه والكرويه ومن ثم استنتج صيغه لمتجه الموضع في الإحداثيات الكرويه بدلالة متجهات الوحدة في نفس هذه الإحداثيات. (٥ درجات)

(درجات)

وضح إجابتك بالرسم كلما أمكن ذلك

مع تمنياتنا بالنجاح،،،،،،،،

لجنة الممتحنين.

أ.د. فاروق علي السيد.

أ.د. أحمد عصام عبد القادر.

1505

