Mathematics Department
Term Exam
Theory of Compilers
Code: MC 458
Time: 2 hours
June 2015

كلية العلوم- قسم الرياضيات

امتحان الفصل الدراسي الثاني
المستوي: الرابع
المقرر: نظرية المترجمات
الرمز: 458 رك
الزمن: ساعتان
يونيو 2015

Answer the following questions: (50 Marks)

I. Write the scientific term: (20Marks)

Definition	Scientific term
1. An enumerated type representing what logical entity we read out of the source code.	
2. A strict superset of the regular languages.	
3. Beginning with the start symbol, try to guess the productions to apply to end up at the user's program.	
4. Move a terminal across the split	
5. Match the longest possible prefix ofthe remaining text.	
6. Identify the meaning of theoverall structure.	
7. A set Σ of symbols that actas letters.	
8. Guess which production should be inverted.	
9. If there is atleast one string with two or more parse trees	
10. Design one possible structure.	
11. A family of descriptions that can be used to capture certain languages	
12. A formalism for defining languages.	
13. Pick the rule that was defined first.	
14. Marks the end of a line.	
15. An abstract representation of a program's syntax.	
16. The leftmost complete cluster of leaf nodes.	
17. The set ofterminals that can follow A in aderivation:	
18. Rule that matches any character and reports an error.	
19. Extra information derived from the text, it can be a numeric value.	
20. Recover the structure described by a series of tokens.	

II. True or false? (10 Marks)

1. Sometimes we will discard a lexeme rather than storing it for later use. ( )
2. There are three main kinds of finite automata: ( )
3. In LR (1) parsing algorithm, If action [state, t] is reduce A $\rightarrow \omega$ then shift the input and set state = goto[state, t]. ( )
4. When parsing, our alphabet was ASCII or Unicode characters. ( )
5. Any LR(1)grammar is LL(1). ( )
6. A shift/reduce conflict is an error where a shift/reduce parser cannot tell which of many reductions to perform. ( )
7. LR(1) automata are impractically large. ( )
8. LR parser can deterministically handle conflicts by guessing which option to choose. ( )
9. We associate a set of lexemes with each token. ( )
10. The Earley parser always runs in O(n) on unambiguous grammars. ( )
11. ε-transitions are followed automatically and without consuming any input. ( )
12. If α derives β, we write $\alpha \rightarrow \beta$. ( )
13. Ambiguity is a property of languages. ( ).

14. Leftmost BFS works on grammars without left recursion.
15. LR(0) only accepts languages where the handle can be found with no right context. ( )
16. All LR(1) grammars areLALR(1). ( )
17. The output grammar describes all possible parse trees that would be accepted by the automaton. ( )
18. Some tokens might be associated with lots ofdifferent lexemes. ( )
19. SLR(1) is weak because it has nocontextual information. ( )
20. In NFA, every state must have exactly one transition defined for every letter. ( )

III.Answer only four questions of the following: **(20 Marks)**

1. **Given the following grammar:** **(5 Marks)**

$E \rightarrow T$

$E \rightarrow T + E$

$T \rightarrow int$

$T \rightarrow (E)$

Use the Leftmost DFSParsing algorithm to derive **int+int**

2. Given the following grammar: (5 Marks)

E →int

E → (E Op E)

Op →+

Op →*

Use the LL(1)algorithm to derive **(int + (int * int))**

(4)

3. Given the following grammar: **(5 Marks)**

$S \rightarrow E$

$E \rightarrow E + E$

$E \rightarrow$ **int**

Use the **Earley** algorithm to derive **int+int+int**

(5)

4. Given the following grammar: (5 Marks)

$E \rightarrow F$

$E \rightarrow E + F$

$F \rightarrow F * T$

$F \rightarrow T$

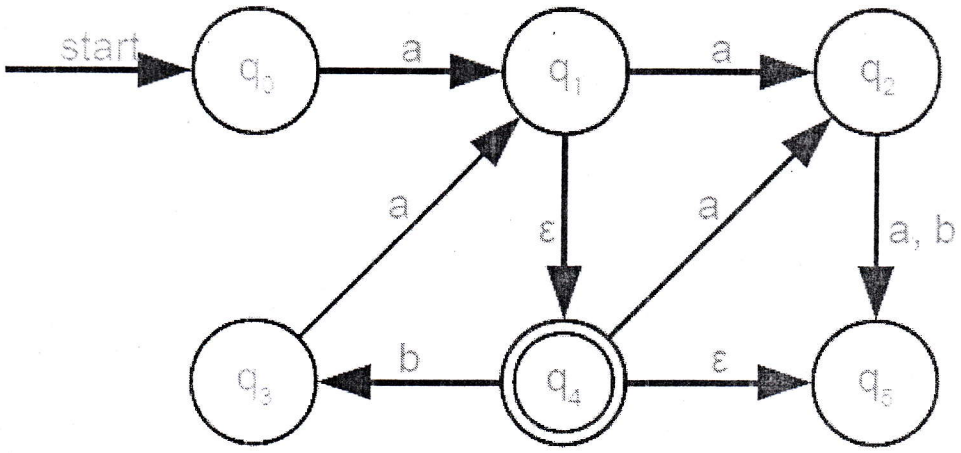
$T \rightarrow \mathbf{int}$

$T \rightarrow (E)$

Use the Predictive Parsing algorithm to derive **int + int * int**

(6)

5. **Use the subset construction to convert the following NFAs into DFAs:**



=== With My Best Wishes ===

Dr. Dalia Nashat

(١)

	إمتحان نهائي الفصل الدراسي الثاني	الزمن : 3 ساعات
قسم الرياضيات - كلية العلوم	إحصاء رياضي	
2015 -2016 م	رابعة علوم شعبة رياضيات	الدرجة: 50

أجب عن الأسئلة الآتية : (درجة كل سؤال 10 درجات)

(1) (أ) إذا كان X متغير عشوائي دالة كثافته الإحتمالية $f_X(x)$ حيث $X \in A$ وكان $z = g(x)$ تحويل تناظر أحادي فوقي وقابل للإشتقاق. أوجد $f_Z(z)$.

(ب) أختيرت عينة عشوائية حجمها 17 من مجتمع معتدل بالبارامترات μ، σ^2 وإذا كان $S^2 = 2.5,\ \bar{X} = 22.5$ أوجد 95% فترة ثقة لكل من μ، σ^2 علماً بأن: $t_{.025,16} = 2.12$، $\chi^2_{.975,16} = 6.91,\ \chi^2_{.025,16} = 28.85$.

(2) (أ) أختيرت عينة عشوائية حجمها n من مجتمع يخضع لتوزيع بواسون بالبارامتر λ فأثبت أن $\bar{X}$ هو مقدر $MVUE$ وأيضاً مقدر متسق لـ λ.

(ب) إذا كان المتغيران X ، Y مستقلين بحيث أن $X \sim N(0,1)$، $Y \sim \chi^2(k)$ وإذا كان $Z = \dfrac{X}{\sqrt{Y/k}}$ فأثبت أن: $Z \sim t(k)$.

(3) (أ) $X_1, X_2, ..., X_n$ عينة عشوائية من مجتمع معتدل بالمعلمتين μ، σ^2. أثبت أن $\bar{X}$، S^2 هما مقدرين غير متحيزين لـ μ، σ^2 على الترتيب وكذلك أن:

$\bar{X} \sim N(\mu, \sigma^2/n)$ (أستخدم $M_{\bar{X}}(t)$ في [2])

(ب) أختيرت عينة عشوائية $X_1, X_2, ..., X_n$ من مجتمع يتبع التوزيع الأسي بالمعلمة θ: (i) أثبت أن θ هى معلمة مقياس (ii) أوجد مقدر بيتمان لـ θ.

(4) إذا خضع متغير عشوائي متصل X للكثافة الإحتمالية $f_X(x)$ وإذا كان المتغير العشوائي Z بحيث $Z = \begin{cases} a_1, & X \in A_1, \\ a_2, & X \in A_2, \\ a_3, & X \in A_3, \end{cases}$ حيث $A_j,\ j = 1,2,3$ تمثل تقسيماً لفضاء العينة S للمتغير العشوائي X فأوجد توزيع المتغير Z.

وإذا خضع المتغير العشوائي X للكثافة الإحتمالية:

$$f_X(x) = \begin{cases} 9x\, e^{-3x}, & x > 0, \\ 0, & o.w, \end{cases}$$

وكان

$$Z = \begin{cases} -2, & 0 \le x < 1, \\ 0, & 1 \le x < 3, \\ 2, & 3 \le x \end{cases}$$

فأوجد القانون الإحتمالي للمتغير العشوائي Z.

إقلب الصفحة ←

(5) عينة عشوائية مسحوبة من مجتمع يتبع توزيع جاوس العكسي $X_1, X_2, ..., X_n$ بالبارامترين μ, λ (سنرمز له $IG(\mu,\lambda)$) مستعيناً بالصيغ والتوزيعات المعاونة في آخر الورقة :

(أ) أثبت أن مقدري العزوم لـ μ, λ يعطى من

$$\hat{\mu} = \bar{X}, \quad \hat{\lambda} = \frac{n\bar{X}^3}{(n-1)S^2}$$

(أستخدم (b) في [5] ثم [4])

(ب) أثبت أن مقدري الإمكان الأكبر لـ μ, λ يعطى من

$$\hat{\mu} = \bar{X}, \quad \frac{1}{\hat{\lambda}} = \frac{1}{n}\sum\left(\frac{1}{X_i} - \frac{1}{\bar{X}}\right)$$

توزيعات وصيغ معاونة:

[1] $X \sim$ Poisson(λ) $\Rightarrow$ (a) $f_X(x;\lambda) = \frac{\lambda^x}{x!}e^{-\lambda}$, $x = 0,1,...(\lambda > 0)$

(b) $E(X) = V(X) = \lambda$

[2] $X \sim N(\mu.\sigma^2) \Rightarrow M_X(t) = \exp\left[\mu.t + \sigma^2.\frac{t^2}{2}\right]$

$X \sim N(0.1) \Rightarrow f_X(x) = \frac{1}{\sqrt{2\pi}}e^{-x^2/2}, \quad -\infty < x < \infty$

$Y \sim \chi^2(k) \Rightarrow f_Y(y;k) = \frac{1}{\Gamma(k/2)2^{k/2}}y^{(k/2)-1}e^{-y/2}, \quad y > 0$

$Z \sim$ t(k) $\Rightarrow f_Z(z) = \frac{\Gamma[(k+1)/2]}{\Gamma(k/2)\sqrt{k\pi}\,[1+z^2/k]^{(k+1)/2}}, \quad -\infty < z < \infty$

[3] $X \sim$ Exp(θ) $\Rightarrow f_X(x;\theta) = \frac{1}{\theta}e^{-x/\theta}, \quad x > 0, \ (\theta > 0)$

[4] $n(\overline{X^2} - \bar{X}^2) = (n-1)S^2$

[5] $X \sim IG(\mu,\lambda) \Rightarrow$ (a) $f_X(x) = \left(\frac{\lambda}{2\pi x^3}\right)^{1/2} e^{-\frac{\lambda(x-\mu)^2}{2\mu^2 x}}, \quad x > 0$

(b) $E(X) = \mu, \quad E(X^2) = \mu^2 + \frac{\mu^3}{\lambda}$

أنتهت الأسئلة

أ.د. عبد الباسط عبد الله أحمد

Assiut University
Faculty of Science

Computer architecture (421 h)
Final exam
Second term 2014/2015

4th level
Time: 2 Hours

Part I (multiple choices): Write the correct answer in your answer sheet. **(5 marks)**

1. Which of the following changes the content of an 8-bit register from $(10110011)_2$ to $(01011001)_2$?

   A) Arithmetic right shift B) Right rotate C) Logical right shift
   D) Both (A) & (B) E) None of the previous

2. Which of the following modes is used to handle data transfer to and from peripherals?

   A) Programmed I/O B) Interrupt driven I/O C) Direct memory access (DMA)
   D) All of the previous E) None of the previous

3. A group of bits that tells the computer to perform a specific operation is known as:

   A) Operation code B) Micro-operation C) Micro-instruction
   D) Operand field E) None of the previous

4. A set of processors that execute different instruction sequences on different sets of data at the same time.

   (A) SISD (B) SIMD (C) MISD (D) MIMD

5. When an instruction is read from the memory, it is called:

   (A) Indirect cycle (B) Fetch cycle (C) Interrupt cycle
   (D) Execute cycle (E) None of the previous

6. Which of the following registers holds the data to be written into memory or receives the data read from memory?

   (A) MAR (B) MBR (C) IR
   (D) PC (E) All of the previous

7. Which of the following has the highest I/O data rates?

   (A) Graphics display (B) Ethernet (C) Laser printer (D) Keyboard

8. In memory hierarchy, as one goes down from registers to tape, which of the following is correct?

   (A) Decreasing cost per bit (B) Increasing access time
   (C) Decreasing frequency of access of the memory by the processor
   (D) All of the previous (F) None of the previous

9. The addressing mode where the content of the program counter (PC) is added to the address part of the instruction in order to obtain the effective address is called:

   (A) Register (B) Register indirect (C) Indexed
   (D) Base-register (E) None of the previous

10. Which of the following CPU registers holds the address of the instruction to be fetched next?

    (A) AC (B) Stack pointer (SP) (C) PC
    (D) IR (E) None of the previous

Part II: (short answers) **(25 marks)**

Q1: List three types of pipeline hazards and explain briefly only one. (2marks)

Q2: What types of operands are typical in machine instruction sets? (2marks)

Q3: List four advantage of SMP organization over uniprocessor organization. (2marks)

Q4: List the main structural components of a computer. (2marks)

Q5: List four different advanced DRAM organization. (2marks)

Q6: List four memory access methods with example for each one. (3 marks)

Q7: Differentiate between base-register addressing mode and indexed addressing mode. (2 marks)

Q8: List four elements of bus design. (2 marks)

Q9: Mention one advantage and one disadvantage for direct and register addressing modes. (2 marks)

Q10: List four differences between static RAM and dynamic RAM (4 marks)

Q11: List four functions for I/O module. (2 marks)

Part III: (problems) **(17 marks)**

P1: A computer uses a memory unit with 256K words of 32 bits each. A binary instruction is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part. (4 marks)

a. How many bits are needed to address the memory unit?
b. How many bits are there in the register code part?
c. How many bits are there in the operation code?
d. What is the memory unit size in bytes?

P2: If a Computer has 128 operation codes and 512k addresses, how many bits would be required for:

(i) Single address instruction (ii) Two address instruction (2 marks)

P3: Consider a machine with a byte addressable main memory of 2^{16} bytes and block size of 8 bytes. Assume that a cache consisting of 32 lines is used with this machine. How is a 16-bit memory address divided in case of:

(i) Direct mapped cache (ii) Associative cache (2 marks)

P4: Given that the contents of a base register = 300, what is the value loaded into AC for the following addressing mode|: (3 marks)

a. Immediate
b. Memory direct
c. Memory indirect
d. Base-register (displacement)
e. Base-register indirect
f. Relative

199	Load AC	Operand reference = 500	Mode
200	Next instruction		
300	600		
400	800		
500	400		
600	350		
700	150		
800	250		

P5: Consider a program running on a single processor such that a fraction 75% of the execution time involves code that is infinitely parallelizable with no scheduling overhead. Find the speedup factor when running the same program on a computer with 6 parallel processors. What is the maximum speedup limit? (2 marks)

P6: A cache memory access time is 20 ns, a main memory access time is 100 ns, and the hit ratio is 90%. What is the average access time assuming that: (2 marks)

(i) The main memory block is loaded into cache then the CPU access the cache.
(ii) The main memory word is loaded into the CPU directly.

P7: How many check bits are needed if the Hamming error correction code is used to detect single bit errors in a 1024-bit data word? (1 mark)

P8: If the last operation performed on a computer with an 8-bit word was an addition in which the two operands were 00000010 and 10000011, what would be the value of sign and zero flags? (1 mark)

Part IV: (Graphs) **(8 marks)**

G1: Draw the instruction cycle state diagram including the interrupt state. (4 marks)

G2: Draw a diagram for taxonomy of parallel processor architectures. (4 marks)

انتهت الأسئلة وبالتوفيق

Faculty of Science
Math. Dept.

Final Exam
Subject: Data Mining
Code: MC464
Time: 2 Hours
June - 2015

Assiut University

Answer the following questions, where each has 12.5 points.

Q1.

a. What is the data mining and its applications?
b. Draw a cartoon that describes the main steps in data mining process.
c. Apply the priori algorithm with minimum support 2 to the corresponding table.
d. What are kind of attributes? Give an example for each type.

TID	List of item IDs
T1	I1, I2, I5
T2	I2, I4
T3	I2, I3
T4	I1, I2, I4
T5	I1, I3
T6	I2, I3
T7	I1, I3
T8	I1, I2, I3, I5
T9	I1, I2, I3

Q2.

a. Describe the confusion matrix.
b. Build the classification tree using induction decision tree algorithm for this table.
c. Use Weka package to solve the previous question Q2c.

Engine	Turbo	Weight	Fuel	Class
small	no	average	good	no
small	no	light	average	no
small	yes	average	bad	yes
medium	no	heavy	bad	yes
large	no	average	bad	yes
medium	no	light	bad	no
large	yes	heavy	bad	no
large	no	heavy	bad	no
medium	yes	light	bad	yes
large	no	average	bad	yes
small	no	light	good	no
small	no	average	average	no
medium	no	heavy	bad	no
small	yes	average	average	no
medium	no	heavy	bad	no

Q3.

a. Draw a cartoon describing how the classifier can be built and evaluated.
b. How can you measure the distance between two examples?
c. Describe how the hierarchical cluster analysis are working.
d. Why the hierarchical cluster is important in real application. Give a medical and real applications for hierarchical cluster.

Q4.

a. Describe the role of data mining in data of social media
b. What are the two main kinds of graphs? What is kind which is repeated in real application? Give example of these applications.
c. How can you find the most important node in the graph? What can you with this node?
d. Describe an idea for generating graph of internet pages. What do you expect from this graph? What actually will you get?

End of the Questions Best Wishes, Dr. Ibrahim El-Semman

Department of Mathematics		قسم الرياضيات
Faculty of Science		كلية العلوم

امتحان نهائي الفصل الدراسي الثاني ٢٠١٤/٢٠١٥م

المستوى الرابع — الدرجة الكلية: ٥٠ درجة

المقرر: (٤١٤ ر) معادلات تفاضلية جزئية — الزمن: ثلاث ساعات

أجب عن خمسة فقط مما يأتي: (١٠ درجات عن كل سؤال - بواقع ٥ درجات عن كل فقرة)

١- أ) باستخدام طريقة لابلاس – أوجد الحل العام للمعادلة التفاضلية

$$(y-1)r-(y^2-1)s+y(y-1)t+p-q=2y(1-y)^3e^{2x}.$$

ب) بوضع $z^3=u$ في المعادلة التفاضلية $z=3xp+3yq+\frac{\sqrt{z^2+9z^6(p^2+q^2)}}{z^3}$ ، أثبت أن الحل الكامل للمعادلة التفاضلية المحولة يمثل مجموعة مستويات غلافها كرة مركزها نقطة الأصل ونصف قطرها الوحدة ، ثم عين كلا من الحل الكامل والحل المفرد للمعادلة التفاضلية المعطاة.

٢- أ) باستخدام طريقة أويلر – أوجد الحل العام للمعادلة التفاضلية

$$x^2r-2xys-3y^2t+xp-3yq=x^2y\sin\left(\ln x^2\right).$$

ب) بفرض أن $u=\frac{1}{r}f(r)\cos(\omega t+\alpha)$ هو حل للمعادلة التفاضلية $u_{rr}+\frac{2}{r}u_r=\frac{1}{c^2}u_{tt}$ حيث ω,α,c ثوابت ، أوجد المعادلة التفاضلية العادية التي تحققها الدالة $f(r)$ وأعط الحل العام لها. واذا علم أنه لجميع قيم t يكون u محدودة عند $r=0$ ، $u_r=0$ عند $r=a$ ، وأن $u\neq 0$ تطابقيا. فاثبت أن $\beta=\frac{\omega a}{c}$ يجب أن تحقق المعادلة $\tan\beta=\beta$.

٣- أ) عين الشرط اللازم لكي يكون النظام $p_1x_1+p_2x_2=p_3^2$ ، $p_1+p_3=p_2+1$ متوافق ، ثم أوجد الحل الكامل لهذا النظام.

ب) أوجد الحل العام للمعادلة التفاضلية $r-2yp+y^2z=(y-2)e^{2x+3y}$.

٤- أ) باستخدام طريقة جاكوبي – أوجد الحل الكامل للمعادلة التفاضلية $p_1=0$ $(x_2+x_3)(p_2+p_3)^2+z$.

ب) أوجد حل المعادلة التفاضلية $x^2u_{xx}+x\,u_x+u_{yy}=0$ على الصورة $u=XY$ بحيث تحتوي Y على دوال مثلثية فقط ، والدالة u تحقق الشروط $u\to 0$ as $x\to\infty$ ، $u_x=-\cos(2y)$ $when$ $x=a$.

٥- أ) باستخدام طريقة شاربت - عين كلا من الحل الكامل والحل المفرد (إن وجد) للمعادلة التفاضلية

$$2xz=x^2p+2xyq-pq\ .$$

ب) أوجد حل دالمبير لمسألة كوشي لوتر غير منتهي للمعادلة الموجية $u_{tt}=c^2u_{xx}$, $-\infty<x<\infty$, $t\geq 0$ والتي تحقق الشروط $u(x,0)=f(x),\ u_t(x,0)=g(x)$ ، ثم أوجد حل هذه المعادلة عندما $f(x)=\sin x,\ g(x)=\cos x$.

٦- أ) باستخدام طريقة مونج – عين الحل الكامل للمعادلة التفاضلية $q^2r-2pqs+p^2t=pq^2$.

ب) أوجد الحل العام للمعادلة التفاضلية $z_{xy}=x^2y$ ثم أوجد الحل الخاص الذي يحقق الشروط $z(x,0)=x^2,\ z(1,y)=\cos y$.

انتهت الأسئلة ،،،

ا.د.عبدالرحيم ابراهيم صادق

د.محمد عبدالله عبدالرازق

Assiut University	**4th Mathematics**	**Time:3 hours**
Faculty of Science	**Complex Analysis 412M**	**Jun : 2015**
Math. Dep.	**Instructor: Professor Dr. Mohamed Abd El-Rahman Ahmed**	

Answer only five of the following questions:

1- a) In the light of your study of complex numbers, explain that $(C,+,\cdot)$ consists a field where C is the set of all complex numbers. **(8 degrees)**

b) Solve the equations:

$z^2+z+1=\theta$, $e^{3z-2}=-i$, $\sin(z)=\sqrt{2}$, $\cosh(z)=\frac{1}{2}$,

where θ is the zero vector in C. **(12 degrees)**

2-a) Mention with details four properties that are satisfied for real-valued functions and not satisfied for the corresponding complex-valued functions. **(8 degrees)**

b) Show that:

(i) $\overline{\cos(iz)}=\cos(i\bar{z})$, (ii) $|\sinh(z)|^2=\sinh^2(\mathrm{Re}(z))+\sin^2(\mathrm{Im}(z))$,

(iii) **if** $\lim_{z\to z_0}\frac{f(z)-f(z_0)}{z-z_0}$ **exists, then it is unique and it equals** $f'(z_0)$.

(12 degrees)

3- Let $z_1\neq 0$ and $z_2\neq 0$. Is:

(I) $\arg(z_1z_2)=\arg(z_1)+\arg(z_2)$, (II) $\frac{z_1}{z_2}=\frac{|z_1|}{|z_2|}e^{i(\arg(z_1)-\arg(z_2))}$,

(III) $\ln\left(\frac{z_3}{z_1z_2}\right)=\ln(z_1)-\ln(z_2)-\ln(z_3)$; $z_3\neq\theta$, (IV) $\overline{\left(e^{iz^2}\right)}=e^{i(\bar{z})^2}$, **(20 degrees)**

(V) $|z_2-z_1\bar{z}_1|\geq||z_2|-|z_1||$, (VI) $|z_1|\leq|\mathrm{Re}(z_1)|+|\mathrm{Im}(z_1)|$.

4- a) Determine with proof Residue Theorem. **(7 degrees)**

b) Write Laurent series of the function $f(z)=\frac{1}{(z+2)(z^2-4)}$ for the domain $|z|>2$. **(6 degrees)**

c) Prove that the existence of the limit of a complex-valued function f leads to the existence of the limit of a function $|af|$, $a<-1$, given by

$|af|(z):=|a||f(z)|$ $\forall z\in C$.

(7 degrees)

To behind

(2)

5- a) Give with proof a characterization of the continuity of a complex-valued function . (7 degrees)

. b) Verify that $u(x,y)=e^{x}(x\cos(y)-y\sin(y))$ is a harmonic function. Also, deduce the corresponding analytic function (6 degrees)

c) Using Residue Theorem, find $\int_{C}\frac{e^{z}\tan\left(\frac{iz}{4}\right)}{\left(z^{2}+\pi^{2}\right)^{2}}dz$ taken counterclockwise around the circle $|z|=4$. (7 degrees)

6- a) State and prove a characterization of the limit of a complex-valued function . (6 degrees)

b) Evaluate $\int_{C}\frac{z}{(z^{2}+9)(z+3i)}dz$ where C is the circle $|z+i|=2$ described counterclockwise. (7 degrees)

c) Conclude that the continuity of the limit of a complex-valued function f at a point z_0 leads to the continuity at z_0 of a function $\sqrt{|f|}$ given by

$$\sqrt{|f|}(z):=\sqrt{|f(z)|} \qquad \forall z\in C.$$

(7 degrees)

Finish

GOOD LUCK

Faculty of Science
Mathematics Department
Term Exam
Selected topics in Computer Science (2)
Time: 2 hour
Code: MC 455
June 2015

كلية العلوم- قسم الرياضيات

امتحان الفصل الدراسي الثاني
المستوي: الرابع
المقرر: موضوعات مختارة في علوم الحاسب (2)
الرمز: 455 رك
الزمن: ساعتان
يونيو 2015

Answer the following questions: (50 Marks)

1. Choose the suitable number from (A) to (B): (20 Marks)

(A)	(B)	
1. pseudocode	A set of primitive instructions built into every computer.	( )
2. Object	Program used to translate the source program into an object program.	( )
3. compiler	A constructor with no parameters.	( )
4. debugging	A data structure that represents a collection of the same types of data.	( )
5. Array	A sequence of characters that consist of letters, digits, ( ), and ($).	( )
6. JRE	Words that specify the properties of the data, methods, and classes.	( )
7. modifiers	A constant value that appears directly in the program	( )
8. break	The process of finding and correcting errors	( )
9. Reserved words	An input value used to signify the end of the loop.	( )
10. static	A collection of statements that grouped together to perform an operation.	( )
11. method	A template or blueprint for objects.	( )
12. class	The default value of a data field for a reference type.	( )
13. no-arg	A method that is associated with an individual object	( )
14. instance method	Java program that can run from a Web browser	( )
15. applet	The code with natural language mixed with Java code.	( )
16. null	Create and compile Java programs.	( )
17. public	An entity in the real world that can be distinctly identified.	( )
18. sentinel value	Words that have a specific meaning to the compiler.	( )
19. identifier	A variable shared by all instances of the same class.	( )
20. continue		
21. literal	Word immediately ends the innermost loop, which contains the break.	( )
22. Machine language		
23. JVM		

2. True or false? (10 Marks)

1. Java is partially modeled on C++. ( )
2. The programs that compiled into the Java Virtual Machine code called exe file. ( )
3. JRE is the full featured Software Development Kit for Java. ( )
4. A line comment is preceded by slash and star (/*) in a line ( )
5. char c = 97; same as char c = (char)97; ( )
6. The binary search approach compares the key element sequentially with each element in the array. ( )
7. Constructors must have different name than the class itself. ( )
8. A String object is immutable; its contents cannot be changed. ( )
9. An odd number % 2 is always 0. ( )
10. The switch-expression must yield a value and must always be enclosed in parentheses. ( )
11. Classes are constructs that define objects of the same type. ( )
12. %d used to print a number in standard scientific notation with printf. ( )
13. A sentinel-controlled loop can be implemented using a confirmation dialog. ( )
14. The *behavior* of an object is defined by a set of arrays. ( )

15. The size of long is 64-bit. ( )
16. You can declare a local variable with the same name multiple times in different nesting blocks. ( )
17. The expression (var--) decrements var by 1 and to the new value in var after the decrement ( )
18. The result of the comparison is a Boolean value. ( )
19. Syntax Errors causes the program to abort ( )
20. Every statement in Java ends with a semicolon (;). ( )

3. Write the output of the following blocks of code: **(10 Marks)**

No	Code	Output

1.	public class Test {
	public static void main(String [ ] args) {
	double[ ] x = new double[ ]{1, 2, 3};
	System.out.println ("Value is " + x[1]);
	}
	}	

2.	int y = 0;
	for (int i = 0; i<10; ++i) {
	y += i;
	}
	System.out.println(y);	

3.	class Test {
	public static void main(String[ ] args) {
	System.out.println(xmethod(5));
	}
	public static int xmethod(int n, long t) {
	System.out.println("int");
	return n;
	}
	public static long xmethod(long n) {
	System.out.println("long");
	return n;
	}
	}	

4.	char ch = 'F'; if (ch>= 'A' &&ch<= 'Z') System.out.println(ch);	
5.	System.out.println("abc".compareTo ("aba"));	

6.	public class Test {
	public static void main(String[ ] args) {
	int[ ][ ] values = {{3, 4, 5, 1}, {33, 6, 1, 2}};
	
	int v = values[0][0];
	for (int row = 0; row < values.length; row++)
	for (int column = 0; column < values[row].length; column++)
	if (v < values[row][column])
	v = values[row][column];
	System.out.print(v);
	}
	}	

7.	System.out.println((int)(45.378 * 100) / 100.0);	
8.	boolean even = false; System.out.println((even ? "true" : "false"));	
9.	char ch = 'F'; if (ch >= 'A' && ch <= 'Z') System.out.println(ch);	

10.	for (int i = 1; i <= 6; i++) {
	for (int j = 6; j >= 1; j--)
	System.out.print(j <= i ? j + " " : " " + " ");
	System.out.println();
	}	

4. Underline the error in the block of code below and correct it: **(10 Marks)**

No	Code	Correction

1.	public class Test {
	public static void main(String[] args) {
	A a = new A();
	a.print();
	}
	}
	class A {
	String s;
	A(String newS) {
	s = newS;
	}
	void print() {
	System.out.println(s);
	}
	}	

2.	public class Test {
	public static void main(String[] args) {
	int n = 2;
	xMethod(n);
	System.out.println("n is " + n);
	}
	void xMethod(int n) {
	n++;
	}
	}	

3.	public class Foo {
	private int x;
	public static void main(String[] args) {
	Foo foo = new Foo();
	System.out.println(foo.x);
	}
	}	

4.	System.out.println ((true) && (3 => 4));	
5.	int i = 3434; double d = 3434; System.out.printf("%5.1f %5.1f", i, d);	

6.	public class Test {
	public static void main(String[] args) {
	final int[ ] x = {1, 2, 3, 4};
	int[ ] y = x;
	x = new int[2];
	for (int i = 0; i < y.length; i++)
	System.out.print(y[i] + " ");
	}
	}	

7.	class TempClass {
	int i;
	public void TempClass(int j) {
	int i = j;
	}
	}
	public class C {
	public static void main(String[ ] args) {
	TempClass temp = new TempClass(2);
	}
	}	

8.	class Test {
	public static void main(String[] args) {
	String s;
	System.out.println("s is " + s);
	}
	}	

9.	int x;
	double d = 1.5;
	
	switch (d) {
	case 1.0: x = 1;
	case 1.5: x = 2;
	case 2.0: x = 3;
	}	

10.	pu blic class Test {
	public static void main (String args[]) {
	int i = 0;
	for (i = 0; i < 10; i++);
	System.out.println(i + 4);
	}
	}	

=== With My Best Wishes ===

Dr. Dalia Nashat

Assiut University
2nd Term 2014/2015

Final Exam Faculty of Science, Computer Science
4th Level – Distributed Computing MC452
2 Hour –50 Points

Faculty of Science
Mathematics Dept.

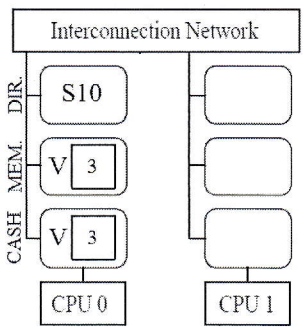
Answer the following Questions: (10 Points each)

Q1. Complete **ONLY 10** statements from the following items: (**1 Point each**)

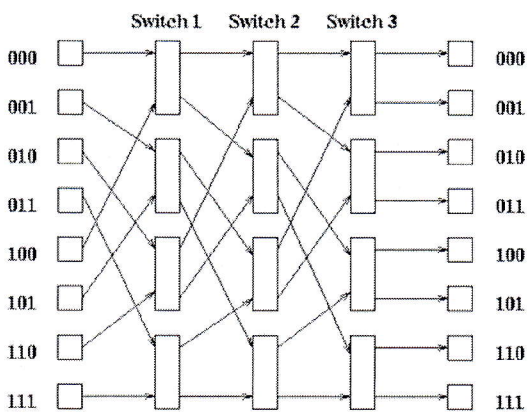
1. ___ solves a problem faster using multiple CPUs with local memory per CPU.
2. The number of edges per switch node in the ***Binary tree network*** is __.
3. ___ is an application programming interface for shared memory multiprocessing programming.
4. The bisection width for a ***2D mesh tree network*** with *M* switches is ___.
5. The communication is called ___ when a task needs values from a small number of other tasks.
6. The function ___ is the first MPI function called by each process.
7. The diameter of the ***Butterfly network*** of depth 4 is ___.
8. Independent tasks apply different operations to different data elements are called ___.
9. The MPI function ___ is used to return the current time.
10. In ***Flynn's Taxonomy***, SIMD means ___.
11. ___ is the third step in the ***Foster's Methodology***.

Q2. Solve the following items, explain using figures if possible:

1. State the difference between shared and switched interconnection networks of a parallel architecture. (**3 Points**)
2. Starting from the following figure, these four operations will occur in the order listed: CPU 1 reads V, CPU 1 write 5 to V, CPU 0 reads V, CPU 0 writes 9 to V. Show the states of the directories, caches, and memories after each of these operations. (**4 Points**)



3. An ***Omega network*** is an indirect topology and it is illustrated for 8 processors in the figure (on the right). Draw one figure contains: (**3 Points**)
   a. The route to send a message from processor 000 to processor 011.
   b. The route to send a message from processor 101 to 010.



Q3. Assume that the execution time of a parallel program are divided into three components; the inherently sequential computations $\sigma(n)$, the potentially parallel computations $\varphi(n)$ and the communication operations $\kappa(n,p)$:

1. Write the ***Speedup***, the ***Efficiency*** and ***Amdahl's Law***. (4 **Points**)
2. State the differences between ***Amdahl's Law*** and ***Gustafson-Barsis' Law***. (2 **Points**)
3. Solve **ONLY ONE** of the following items: (4 **Points**)
   a. Drive the ***Gustafson-Barsis' Law***.
   b. An application program running on 12 processors has the execution time $\sigma(n)$ = 3 minutes and $\varphi(n)$ = 30 minutes. Compute the ***speedup*** and the ***scaled speedup*** of the application. Then compute the ***experimentally determined serial fraction e***.

Q4. Write an MPI program in which each process calculates and prints the sum of the following series:

$$\text{Process } 0\text{: } 1 + 2 + 3 + \ \ldots\ + 1000$$

$$\text{Process } 1\text{: } 2 + 4 + 6 + \ \ldots\ + 2000$$

$$\ldots$$

$$\text{Process } p-1\text{: } p + 2p + 3p + \ \ldots\ + 1000p$$

The process 0 should also collect all the above sums in the variable GSUM and print it. Write the MPI commands to execute and run this program on 10 processes.

Q5. Solve **ONLY TWO** items from the following:

1. Use the ***reduction strategy***, using figures, to compute the minimum number among the following numbers using the parallel computing system. Draw the binomial tree of process. (5 **Points**)

   7, 5, -3, 12, 5, -7, 11, -4, 9, 8, 7, 2, 2, 2, 1, -1

2. Discuss the advantages and disadvantages of using the strategy of "***Extend Compiler***" as a tool to program parallel computer systems. (5 **Points**)
3. Suppose n pieces of work are allocated in a cyclic fashion to p processors: (5 **Points**)
   a. Which pieces of work are assigned to processor k, where $0 \le k \le p - 1$?
   b. What are the most and fewest pieces of work assigned to any processor?
   c. Identify all processes having the most pieces of work.
   d. Identify all processes having the fewest pieces of work.

The End of the Questions ***Best Wishes, Dr. Emad H.A. Mabrouk***

Assiut University
2nd Term 2014/2015

Final Exam Faculty of Science, Computer Science
4th Level – Distributed Computing MC452
2 Hour –50 Points

Faculty of Science
Mathematics Dept.

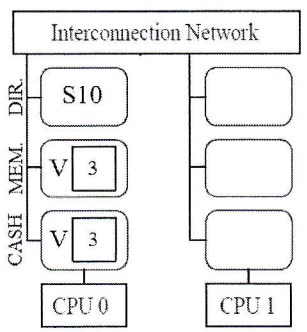
Answer the following Questions: (10 Points each)

Q1. Complete **ONLY 10** statements from the following items: (**1 Point each**)

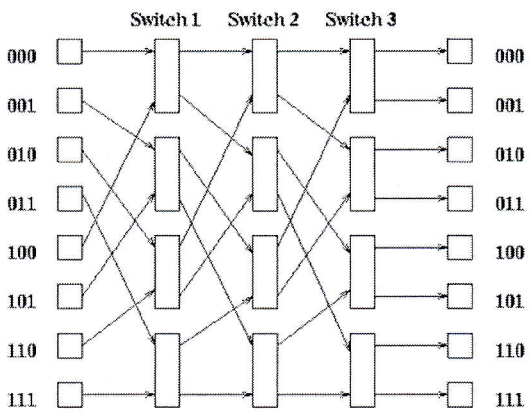
1. ___ solves a problem faster using multiple CPUs with local memory per CPU.
2. The number of edges per switch node in the ***Binary tree network*** is __.
3. ___ is an application programming interface for shared memory multiprocessing programming.
4. The bisection width for a ***2D mesh tree network*** with *M* switches is ___.
5. The communication is called ___ when a task needs values from a small number of other tasks.
6. The function ___ is the first MPI function called by each process.
7. The diameter of the ***Butterfly network*** of depth 4 is ___.
8. Independent tasks apply different operations to different data elements are called ___.
9. The MPI function ___ is used to return the current time.
10. In ***Flynn's Taxonomy***, SIMD means ___.
11. ___ is the third step in the ***Foster's Methodology***.

Q2. Solve the following items, explain using figures if possible:

1. State the difference between shared and switched interconnection networks of a parallel architecture. (**3 Points**)
2. Starting from the following figure, these four operations will occur in the order listed: CPU 1 reads V, CPU 1 write 5 to V, CPU 0 reads V, CPU 0 writes 9 to V. Show the states of the directories, caches, and memories after each of these operations. (**4 Points**)



3. An ***Omega network*** is an indirect topology and it is illustrated for 8 processors in the figure (on the right). Draw one figure contains: (**3 Points**)
   a. The route to send a message from processor 000 to processor 011.
   b. The route to send a message from processor 101 to 010.



ASSIUT UNIVERSITY

Faculty of Science
Mathematics Department

Second Semester Examination– June 2015– Fourth Year Students

Operations Research (2)

M426

Time Limit: THREE Hours

Total Marks: 50 MARKS

Permitted Materials: Calculators

(2)

The exam consists of six questions of different weights. The first four questions are compulsory, whereas the last two questions are optional. Answer ***five questions only*** *using the answer booklet(s) provided. If you answer all six questions, the examiner will only consider the first five answers. Answers are expected to be succinct but complete. Answers that are too long and irrelevant will be penalized.*

Nomenclature

H	Hessian matrix
I	identity matrix
$\mathbb{R}^n$	Euclidean n-space
$\mathcal{C}^k$	the set of all functions whose first k derivatives all exist and are continuous
min	minimize
∇f	gradient of f
ft	feet
s.t.	subject to

Question 1 [**18 marks**]

(a) [2 marks] What do we mean by operations research?

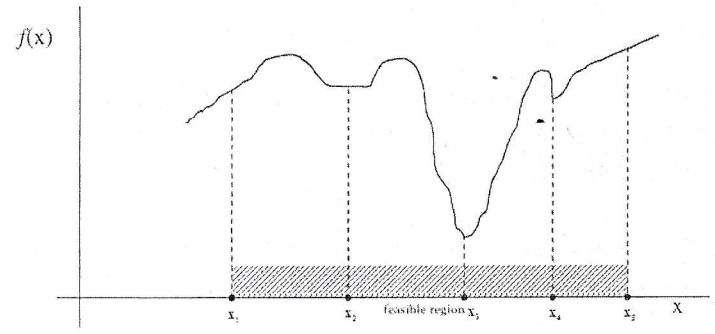
(b) [2 marks] Indicate the degrees of freedom and the problem type of the problem below:

$$\begin{aligned} \min\ & f(x,y,z) = 3x^2 + 4\sin(yz) \\ \text{s.t.}\ & x + 4y \leq 10, \\ & y + z = 6 + \pi, \\ & x - y \leq 3; \\ & z \in \{0, \pi/2, \pi\}. \end{aligned}$$

(c) [2 marks] Can we solve a maximization problem as a minimization problem? Explain.

(d) [2 marks] Answer true or false: All inequality constraints are active for all feasible designs.

(e) [5 marks] Determine the types of the extremizers $\mathrm{x}_i, i = 1, \ldots, 5$ in the following figure.



(f) [5 marks] Suppose that we want to construct a box whose base length is 3 times the base width. The material used to build the top and bottom cost \$10/ft^2, and the material used to build the sides cost \$6/ft^2. If the box must have a volume of 50 ft^3, formulate the problem of determining the dimensions that will minimize the cost to build the box. Also mention the type of the optimization problem.

Question 2 [**10 marks**]

(a) [2 marks] Consider the function $f(x) = -\sqrt[x]{x}$ defined on the set $\Omega = \{x | 1 \leq x \leq 3\}$. Check the existence of a global minimum for f.

(b) [8 marks] Find the minimum point(s) of the function $f(x_1, x_2) = x_1^3 + x_2^3 + 2\,x_1^2 + 4x_2^2 + 6$.

Question 3 [**9 marks**] Let $f(x) = x^2 + 4\cos(x)$, $x \in \mathbb{R}$. We wish to find the minimizer x^* of f over the interval $[1, 2]$.

(a) [5 marks] Use the golden section method to locate x^* to within an uncertainty of 0.2.

(b) [4 marks] Apply Newton's method using the same number of iterations as in Part (a) with the initial guess 1. What do you observe?

Question 4 [**7 marks**] Describe the steepest descent algorithm for finding an approximate local minimum of a multivariable function, then perform two iterations only of the algorithm to minimize the function $f(x_1, x_2) = x_1 - x_2 + 2\,x_1^2 + 2\,x_1\,x_2 + x_2^2$, starting from the point $[0, 0]^T$.

Question 5 (Optional) [**6 marks**] Derive Newton's method for the minimization of a multivariable function, then use it to minimize the function $f(x_1, x_2) = x_1 - x_2 + 2\,x_1^2 + 2\,x_1\,x_2 + x_2^2$, by taking the starting point as $[0, 0]^T$.

Question 6 (Optional) [**6 marks**] Consider the problem:

$$\begin{aligned} &\min\ f(\boldsymbol{x}) \\ &\text{s.t. } \boldsymbol{x} \in \Omega, \end{aligned}$$

where $f \in \mathcal{C}^2(\Omega)$. For each of the following specifications for $\Omega, \boldsymbol{x}^*$, and f, determine if the given point $\boldsymbol{x}^*$ is: (i) definitely a local minimizer, (ii) definitely not a local minimizer, or (iii) possibly a local minimizer.

(a) [2 marks] $f : \mathbb{R}^2 \to \mathbb{R}$, $\Omega = \left\{ \boldsymbol{x} = [x_1, x_2]^T | x_1 \geq 1 \right\}$, $\boldsymbol{x}^* = [1, 2]^T$, and $\nabla f(\boldsymbol{x}^*) = [1, 1]^T$.

(b) [2 marks] $f : \mathbb{R}^2 \to \mathbb{R}$, $\Omega = \left\{ \boldsymbol{x} = [x_1, x_2]^T | x_1 \geq 0,\ x_2 \geq 0 \right\}$, $\boldsymbol{x}^* = [1, 2]^T$, $\nabla f(\boldsymbol{x}^*) = [0, 0]^T$, and $\mathbf{H}(\boldsymbol{x}^*) = \mathbf{I}$.

(c) [2 marks] $f : \mathbb{R}^2 \to \mathbb{R}$, $\Omega = \left\{ \boldsymbol{x} = [x_1, x_2]^T | x_1 \geq 1,\ x_2 \geq 2 \right\}$, $\boldsymbol{x}^* = [1, 2]^T$, $\nabla f(\boldsymbol{x}^*) = [1, 0]^T$, and $\mathbf{H}(\boldsymbol{x}^*) = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$.

End of Examination

Best Wishes

Dr. Kareem Taha Elgindy

Department of Mathematics,
Faculty of Science,
University of Assiut .
Year: 2014-2015

اسم المقرر: تحليل عددي (٢)
رقم المقرر: ٤٢٤ر

الدرجة الكلية : ٥٠ درجة
١٠ درجات لكل سؤال

الزمن: ثلاث ساعات

أجـب عن خمسـة من الأسئلة التالية:

1- I) Derive the fourth-order Adams-Moulton method for solving the initial-value problem

$$\frac{dy}{dt} = f(t,y), \quad a \le t \le b, \quad y(a) = \alpha . \qquad \textbf{(5 marks)}$$

II) Calculate a finite-difference solution of the equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \quad 0 \le x \le 1, \quad t > 0,$$

satisfying the initial condition

$$u = 1 \text{ for } 0 \le x \le 1 \text{ when } t = 0,$$

and the boundary conditions

$$\frac{\partial u}{\partial x} = u \quad \text{at } x = 0 \text{ for all } t,$$

$$\frac{\partial u}{\partial x} = -u \quad \text{at } x = 1 \text{ for all } t,$$

using an explicit method with $h = \frac{1}{10}$ **and** $k = \frac{1}{1000}$. **(5 marks)**

2- I) Derive the implicit finite difference method to approximate the solution to the heat equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \quad a \le x \le b, \quad t > 0,$$

satisfying the boundary conditions

$$u(a,t) = \alpha, \; u(b,t) = \beta, \quad t > 0,$$

and the initial condition

$$u(x,0) = f(x), \quad 0 \le x \le 1. \qquad \textbf{(5 marks)}$$

II) Use the Euler method to approximate the solution of the following Equation

$$y'' - 2y' + y = t\,e^t - t, \quad 0 \le t \le 1, \quad y(0) = y'(0) = 0. \qquad \textbf{(5 marks)}$$

3- I) Use Newton's method with $X^{(0)} = 0$ **to compute** $X^{(2)}$ **of the following nonlinear problem**

$$x_1^2 - x_2^2 + 2x_2 = 0,$$
$$2x_1 + x_2^2 - 6 = 0. \qquad \textbf{(5 marks)}$$

II) Derive the nonlinear shooting method to approximate the solution to the boundary-value problem

$$y'' = f(x,y,y'), \quad a \le x \le b, \quad y(a) = \alpha, \; y(b) = \beta. \qquad \textbf{(5 marks)}$$

البقية في الخلف

4- I) Derive the linear finite difference method to approximate the solution to the boundary- value problem

$$y''(x) = p(x)y'(x) + q(x)\,y + r(x),\quad 0 \le x \le 1\,,\quad y(0) = \propto,\ y(1) = \beta. \qquad \textbf{(5 marks)}$$

II) Use the above method, write a Matlab code for solving the following problem

$$y''(x) = 4(y - x),\qquad 0 \le x \le 1\,,\quad y(0) = 0,\ y(1) = 1. \qquad \textbf{(5 marks)}$$

5- Show that the error of the Euler method approximation to

$$y' = f(t, y),\quad a \le t \le b,\ y(a) = \alpha, \qquad \textbf{(10 marks)}$$

Is $O(h)$.

6- I) Use the Runge- Kutta method of order 4 to approximate the solution to the initial – value problem

$$\frac{dy}{dt} = \sqrt{2 - y^2}\, e^t \quad 0 \le t \le 0.8 \quad y(0) = 0\,, \qquad \textbf{(5 marks)}$$

II) Use the Runge- Kutta method of order 2, write a Matlab Code for solving the following problem

$$\frac{dy}{dt} = t\, e^t - 2y,\qquad 0 \le t \le 1,\quad y(0) = 0\,. \qquad \textbf{(5 marks)}$$

انتهت الأسئلة

ا.د/عبدالحي عزوز ا.د/محمد عزب

	FACULTY OF SCIENCE **ASSIUT UNIVERSITY**	

Final Exam on Radiometric & Geothermal Methods (452G)
(Two Pages)

June 2015 Time: 2 hours

1- Define <u>five only</u> of the following: *(2 marks each)*

Curi, Thermal conductivity, Terrestrial heat flow, Half-life time, Ionizing radiation, Thermal gradient, Roentgen

4- Mark the following statements as True or False and then correct the false statement (<u>Fifteen only</u>): *(3 marks each)*

1. Correction is needed in geothermal measurements due to Tidal effect
2. The interpretation of radiometric data is mainly qualitative
3. The disadvantage of ^{87}R-^{87}Sr age dating method is that it represents a solid-solid system (no loss of daughter)
4. The greater the depth, the greatest the thermal conductivity and the lowest the thermal gradient
5. The Short half-life of ^{40}K is one of the disadvantage of K-Ar age dating method
6. Thermal conductivity of rocks is controlled by Porosity and mineral content
7. The depth of investigation in radiometric survey can be extended to 100m below ground surface
8. The oxygen isotopes can be used to estimate Ancient climate feature
9. Thermal gradient can be used to detect changes in lithology
10. The appreciable anomaly in radiometric survey is three times the background
11. Salt dome structure will result in high gradient, low thermal conductivity
12. The age of the earth can be determined from the uranium-lead age dating method
13. The scintillation meter is efficient in detecting Alpha and Gamma
14. Salt domes are considered excellent targets in geothermal survey
15. The Radon Emanometer can be used to map faults

(2)

16. Temperature within the earth increases by 3°C per 10 meter
17. The mean heat flow values of contents are higher than oceans
18. The radiometric measurements are usually conducted in conjunction with magnetic and electromagnetic readings
19. The greatest temperature gradient occurs in shales and the lowest in salt and anhydrite
20. The radiometric method can be used to determine asphalt thickness

3- Write briefly (short notes) on <u>Five only</u> of the following: *(3 marks each)*

1) The radiocarbon and tritium method for age dating
2) Most common age dating methods
3) Most common applications of radiometric methods
4) The regional and local information obtained from geothermal method
5) Different types of instruments that can be used in radiometric survey
6) Regions of anomalous heat flow
7) Causes of local variation in temperature beneath the ground
8) Geothermal measuring techniques with example

End of questions Good luck

Associate Professor: Gamal Zidan AbdelAal

Assiut University- Physics Department

Mathematical Physics – Code P316 – Final Exam. (50%)

Term: Spring : 2014- 2015 **Date: 06 June, 2015** **Time: 3 Hours**

Answer the following question: (*all questions carry the same weight* 10 points)

1- i – $\int_0^{\pi} \frac{\sqrt{\sin x}}{(5+3\cos x)^{3/2}}\, dx = \frac{\Gamma^2(\frac{3}{4})}{2\sqrt{2\pi}}$ ii – $\int_0^{\infty} y^2\, e^{-2y^2}\, dy = \frac{\sqrt{2\pi}}{16}$

ii- ***Find*** $\Gamma(-\frac{7}{2})$, $\beta(\frac{1}{2}, \frac{5}{2})$

2- i- ***prove that :*** $J_{-n}(x) = (-1)^n J_n(x)$

ii- $J_{-1/2}(x) = \sqrt{\frac{2}{\pi x}}\ \cos x$

iii- $\int J_0(x) \cos x\, dx = x\ J_0(x) \cos x + x\ J_1(x) \sin x + c$

3- i- $\int_{-1}^{1} x\ P_n(x)\ P_{n-1}(x)\ dx = \frac{2n}{(2n+1)(2n-1)}$

ii- ***Express*** $(x-3)^3$ in terms of Legendre polynomials $\sum_{n=0}^{\infty} a_n P_n(x)$

iii- ***Find*** $P_1^2(x)$, $P_2^2(x)$, $P_3^2(x)$

4- i- ***Find*** the Laplace transform of each of the following:

$t^3 e^{5t}$, $\cos \sqrt{t}$

ii- ***Find*** the inverse Laplace transform of each of the following:

$\frac{(S+1)\, e^{-4\pi S}}{S^2+S+1}$, $\frac{2S^2}{(S-2)(S+1)(S-3)}$

5- ***Find*** the Fourier series of the function: $f(x) = x$, $-\pi < x < \pi$ and ***prove*** that

$$\sum_{n=1,3,5,\ldots}^{\infty} \frac{(-1)^{n+1}}{n^2} = \frac{\pi^2}{8}$$

*** Good Luck*** **Instructor *Prof. Dr. Ahmed A. Ebrahim***