Mansoura University		Faculty of Science	
Course Name: Operating Systems		Date: 11-6-2012	Duration: 2 hours
Examiner: Dr. Mahmoud Abdellatif		Final Exam	Total Marks: 60

Answer all Questions :

Question No 1 : Answer the following :[20 Marks]

A. Define the meaning of Swapping and draw Schematic View of Swapping
B. What are the benefits of Multithreaded programming?
C. In Dynamic Storage-Allocation Problem, How to satisfy a request of size n from a list of free holes
D. Draw the state diagram of a process from its creation to termination, including all transitions, and briefly elaborate every state and every transition.
E. Draw diagram for A View of Operating System Services

Question No 2 : [20 Marks]

A: Define the meaning of a *race condition*? Answer the question first and use an execution sequence to illustrate your answer.

B: there are   Five processes A, B, C, D and E arrived in this order at the same time with the following CPU burst and priority values. A smaller value means a higher priority.

	CPU Burst	Priority
A	3	3
B	7	5
C	5	1
D	2	4
E	6	2

Fill the entries of the following table with waiting time and average waiting time for each indicated scheduling policy and each process.   **Rewrite this table in your answer notebook and fill it**

	Waiting Time					Average
Scheduling Policy	A	B	C	D	E	Waiting Time
First-Come-First-Served						
Non-Preemptive Shortest-Job First						
Priority						
Round-Robin (time quantum=2)						

Question no 3 : :[20 Marks]

A: Rewrite the following expression using parbegin/parend to achieve maximum parallelism.

$$x := (-b + (b ** 2 - 4 * a * c) ** .5)/(2 * a)$$

B: Consider the following snapshot of a system:

5 processes P_0 through P_4;   3 resource types:

   A (10 instances), B (5instances), and C (7 instances)

   Snapshot at time T_0:

	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Answer the following questions using the banker's algorithm:
1. What is the content of the matrix *Need*?
2. Is the system in a safe state?
3. If a request from process Pi arrives for (2,1,2), can the request be granted immediately?

With my best wishes

Mansoura University Faculty of Science Dept. of Mathematics Artificial Intelligence		3rd year Time: 2 Hours Date: 25/6/2012 Maximum 60 Marks

Answer the following questions:

Question #1 (30 Marks)

a) What is meant by philosophy of artificial intelligence?

b) Define the following:-

1. Cognitive Science   2. Syllogism   3. Confirmation Theory

c) What is the difference between:

1. Probability and Fuzzy logic   2. Induction and deduction learning

3. Rational Agent and Simple Reflex Agent   4. Cloud Computing and grid computing

d) Describe the agent interaction with environment through sensors and actuators?

e) What is meant by PEAS? Clarify the PEAS description of a medical diagnosis system?

f) State the most important parameters in genetic algorithms?

g) When is it better to use genetic algorithms? State its different applications?

Question #2 (30 Marks)

a) State the different types of:

1. soft computing   2. evolutionary algorithm techniques   3. machine Learning algorithms

b) Draw the block diagram of Fuzzy expert system?

c) State the techniques involved in Data Mining?

d) Realize the following functions by using logic gates:

$$F = AB + C, \quad Y = C,$$

and then describe the circuit by using HDL?

e) Simply the following function
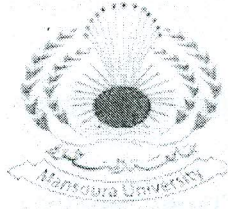
$$F(w,x,y,z) = \sum(0,1,2,4,5,6,8,9,12,13,14),$$

and then realize it by using NAND gates.

f) Describe how to realize 4x16 decoder by using 3x8 decoders?

g) Implement the following function by using multiplexer:

$$F(A,B,C,D) = \sum(1,3,4,11,12,13,14,15)$$

Faculty of Sciences **Department of Mathematics** **Course: Computer's Algebraic** **Systems (Java)** **Date: 18/6/ 2012** **Course Code: M 343**		**Year: 3rd (Statistics and** **Computer sciences)** **Full mark: 60** **Time: 2 hours** **Semester: May-2012**

Answer the following questions

Question 1-a: Write a valid Java expression for each of the following algebraic expressions,

[i] $\sqrt{x^6 + y^6} + \sin^{-1} \log_e \sqrt{x}$ [ii] $\left(x + \sqrt{y}\right)^7 + \dfrac{e^{x^2+3}}{\cos^{-1}(\tan x + 1)}$ **[4 marks]**

[b] Write a Java program that takes an integer N and prints a table of the powers of 2 that are less than or equal to 2^N. (Take $N = 5$ and print the output). **[5 marks]**

[c] Explain the purpose of the following (Use examples for declaration),

[i] The indexOf Method [ii] The scanner class [iii] The charAt Method **[6 marks]**

Question 2-a: State whether each of the following is true or false. If false, explain why?

1. A Java program is described as both class and group of classes
2. The process of fixing errors in Java is called Decomposing
3. The expression $(x > y \ \&\& \ a < b)$ is true if either $x > y$ is true or $a < b$ is true
4. An array can store many different types of values
5. When the length method ia applied to a string it returns an integer value
6. The trim method returns a copy of a string with all white spaces removed from each end
7. Java language requires only an interpreter to compile its programs
8. The import declaration inside a class declaration is a compilation error
9. Forgetting to include an import declaration for a class is a syntax error
10. The scanner class has only one string method **[5 marks]**

[b] Write a Java program, which use scanner class, that takes two arguments M and N and produces a sample of M of the integers from 0 to $N - 1$. (Note that M is the sample size).

[10 marks]

Question 3-a: Write a Java program that evaluates the multiplication of two square matrices

[5 marks]

[b] Write a Java program that computes the square root of a double variable N using Newton's method and the JOptionPane class. **[5 marks]**

[c] Write a Java program that prints the binary representation of a given positive integer using the scanner class. (What are the outputs if the given number is 19) **[5 marks]**

Please see overleaf

Question 4: What are the outputs of the following codes?   [15 marks, 5 each]

[a]

```
String [] suit = {"Clubs","Diamonds","Hearts","Spades"};
String [] rank = {"2","3","4","5","6","7","8","9","10","Jack","Queen","King","Ace"};
String [] deck = new String [rank.length * suit.length];

for (int i = 0 ; i<suit.length; i++){
    for (int j = 0 ; j<rank.length; j++){
    deck [rank.length*i+j]=rank [j]+ " of "+suit [i];}
    for (int k =0; k<rank.length * suit.length;k++){
    System.out.println(deck[k]);       }
```

[b]

```
long N = 123 ;
long n = N;
for (long i=2; i<=n/i; i++){
    while (n % i == 0){
      n /= i ;
        System.out.print(i+ " "); }    }
    if (n > 1) System.out.print(n);
    System.out.println();
```

[c] In this code let "the length of the series is 7"

```
int i=1;
System.out.println("Enter the length of the Series");
Scanner sc=new Scanner(System.in);
int n=sc.nextInt();
int a=0,b=1;
do {
System.out.print(a+",");
int c=a+b;
a=b;
b=c;
i++;
}while(i<=n);
```

Best wishes and good luck,

Dr Sameh Askar

Lecturer of Mathematics and Computer Sciences

Mansoura University
Faculty of Science
Mathematics Department
3rd year (Statistics and Computer Science)

Second Term 2011/2012
Course: Mathematical Logic
Time allowed: 2 hours
Total marks: 80 marks

Final Exam

Question #1 [20 marks]

a) Construct the truth-tables of the following propositional formulas and determine whether each is a tautology, contradiction, or neither.

     i- $\neg(\neg p \leftrightarrow q) \wedge (r \vee \neg q)$
     ii- $\neg((p \wedge \neg q) \rightarrow r) \leftrightarrow (\neg(q \vee r) \rightarrow \neg p)$

b) Give formal proofs for the following arguments:

     i- if A implies B then $\neg B$ implies $\neg A$
     ii- $((A \rightarrow B) \vee A)$ is a tautology

Question #2 [20 marks]

a) Use propositional resolution to verify each of the following:

     i- $(\neg A \wedge \neg B \wedge C) \vee (\neg A \wedge \neg C) \vee (B \wedge C) \vee A$ is a tautology
     ii- $\neg C \rightarrow \neg A$ is a consequence of $(A \rightarrow B) \wedge (C \vee (D \wedge \neg B))$

b) Check the following Horn formula for satisfiability:

$$(T \rightarrow A) \wedge (C \rightarrow D) \wedge ((A \wedge B) \rightarrow C) \wedge ((C \wedge D) \rightarrow \bot) \wedge (T \rightarrow B)$$

c) Let $C_1 = \{A_1, \neg A_2, A_3\}$ and $C_2 = \{A_2, \neg A_3, A_4\}$

     Use the Cut rule to show that the resolvent of the above two clauses can be derived from them.

Question #3 [20 marks]

a) Translate into English the following first-order formulas and determine which of them represent true propositions when interpreted in $\mathcal{R}$.

     i- $\exists x \forall y\, (x > y \rightarrow x > y^2)$
     ii- $\exists x \forall y\, (x + y = x)$
     iii- $\forall x \forall y\, (x > y \rightarrow \exists z\, (x > z \wedge z > y))$

b) Determine the free and bound occurrences of variables and the scope of each quantifier in the following formulae (where P is a unary predicate, and Q a binary one.)

     i- $\exists x \forall z\, (Q(z, y) \vee \neg \forall y\, (Q(y, z) \rightarrow P(x)))$
     ii- $\exists x\, (\forall z Q(z, y) \vee \neg \forall y Q(y, z)) \rightarrow P(x)$

c) Rename the bound variables in each of the formulas in (b) to obtain a clean formula.

Question #4 [20 marks]

a) Negate each of the following formulas and import the negations inside all other logical connectives.

     i. $\forall x\, ((x = x^2 \wedge x > 1) \rightarrow x^2 < 1)$
     ii. $(\exists x P(x) \rightarrow \exists x Q(x)) \rightarrow \exists x\, (P(x) \rightarrow Q(x))$

b) Transform the following formula into a prenex DNF and a prenex CNF. Then Skolemize the resulting formula and transform it into clausal form.

$$(\exists x P(x) \rightarrow \neg \exists x Q(x)) \rightarrow \forall x\, (P(x) \rightarrow \neg Q(x))$$

Mansoura University
Faculty of Science
Math. Dept.
3rd year (stat.&Comp.Sci.)

Exam : May 2012
Time : 2 hours
Date 14/6/2012

Subject : Regression Analysis (Math.334)

Answer the following questions: Total (80 Marks)

1) a- Write short notes on the following: (9 M.)
Stepwise method, Multicollinearity, Detecting Multicollinearity.

b- Given the data : (10 M.)

x	2	2	3	1	2	1	1	3	2	4
y	11	9	14	8	10	9	7	15	10	17

i) Find and interpret the sample correlation coefficient.
ii) Test the hypothesis $H_o : \rho = 0$ aginst $H_1 : \rho \neq 0$ at the level of siginificance 0.05 .

c- Prove that $S^2 = SSE / (n-2)$, is an unbiased estimate of σ^2. (6 M.)

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2) a- An experiment is conducted to fit a multiple regression equation relating the yield y to temperature x_1, reaction time x_2, and concentration of one of the reactants x_3. Two levels of each variable were chosen and measurements corresponding to the coded independent variables were recorded as: (25 M.)

y	x_1	x_2	x_3
5	-1	-1	-1
6	1	-1	-1
7	-1	1	-1
8	-1	-1	1
10	1	1	-1
9	1	-1	1
11	-1	1	1
12	1	1	1

i) Estimate the multiple linear regession equation $\mu_{Y|x_1,x_2,x_3} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$.
ii) Estimate σ^2.

Hint: Please turn over →

3) a- The amounts of solids (in grams) removed from a particular material when exposed to drying periods (in hours) of different lengths are:

x(hours)	4	4	4.5	4.5	5	5	5.5	5.5	6	6	7	7
y(grams)	14	13	11	9	10	11	15	14	12	8	16	17

(i)   Fit a simple linear regression $\mu_{Y/X} = \alpha + \beta x$.

(ii) Test for lack of fit, if the model is adequate, at level of significance 0.01.

(iii) Constract a 95% confidence interval for the slope β.   (20 M.)

b- Prove that A the least square estimator of the intercept α in $\mu_{Y/x} = \alpha + \beta x$, is normally distributed with mean $\mu_A = \alpha$ and variance

$$\sigma_A^2 = \sigma^2 \left(\sum_{i=1}^{n} x_i^2 \right) \Big/ n \sum_{i=1}^{n} (x_i - \bar{x})^2 .$$ (10 M.)

Hent: $t_{10,0.025} = 2.228, t_{10,0.05} = 1.812, , f_{0.01}(4,6) = 9.15, f_{0.01}(2, 6) = 10.96, Z_{0.05} = \pm 1.96$

$Z_{0.025} = 3.45, \chi^2_{2,0.01} = 9.21, \chi^2_{3,0.01} = 11.35.$

أ.د. بيه الدسوقى   تمنياتى بالتوفيق.

Answer the following Questions:

[1]-(i) Evaluate $\displaystyle\int_0^\infty t^2 \cosh 2t \, dt$

(ii) Prove that $\Gamma(2x) = \dfrac{2^{2x-1}}{\sqrt{\pi}} \Gamma(x) \Gamma(x + \dfrac{1}{2})$

(iii) Prove stirling's formula, for large n, $n! \simeq \sqrt{2\pi n}\, n^n e^{-n}$.

[2]-(i) Evaluate $\displaystyle\int_0^2 (4 - x^2)^{3/2} dx$

(ii) Show that $\displaystyle {}_1F_1(a;b;x) = \frac{\Gamma(b)}{\Gamma(a)\Gamma(b-a)} \int_0^1 (1-t)^{b-a-1}\, t^{a-1}\, e^{xt}\, dt$

(iii) Prove that $\ln(1+x) = x\, {}_2F_1(1,1;2;-x)$

[3]-(i) Evaluate (a) $\displaystyle\int_0^1 x\, P_5(x)\, dx$, (b) $\displaystyle\int_{-1}^1 (P_2(x))^2\, dx$, (c) $\displaystyle\int_{-1}^1 P_2(x)\, P_4(x)\, dx$

(ii) Prove that $\left(\dfrac{1}{x}\dfrac{d}{dx}\right)^n (x^n J_n(x)) = J_0(x)$

(iii) Prove that

(a) $J_1'(x)\, J_{-1}(x) - J_{-1}'(x)\, J_1(x) = 0$,

(b) $J_{\frac{1}{2}}'(x)\, J_{-\frac{1}{2}}(x) - J_{-\frac{1}{2}}'(x)\, J_{\frac{1}{2}}(x) = \dfrac{2}{\pi x}$.

Discuss the significance of the result.

[4]-(i) Expanel $f(x) = x^2$ in a series of the from $\displaystyle\sum_{k=0}^\infty A_k P_k(x)$

(ii) Show that the Hermite polynomials satisfy the differential equation $y'' - 2xy' + 2ny = 0$

(iii) Prove that $\displaystyle\int_0^\infty e^{-x} L_m(x) L_n(x)\, dx = \begin{cases} 0, & \text{if } m \neq n \\ (n!)^2, & \text{if } m = n \end{cases}$

بسم الله الرحمن الرحيم

المستوى الثالث - احصاء رياضى - معادلات تكاملية (٢١٨)
رياضيات

3th Level Exam

June 2012

Mathematics

Statistics & Computer Science

Time : 2 hours

Integral Equations

Full mark 80

Faculty of Science
Mathematics Department

1- Solve the following integral equation

$$\int_0^x (t^n x^{n+1} - t^{n+1} x^n)\varphi(t)\, dt = x^{2n}, \quad n=2,3,\dots \qquad \textit{20 marks}$$

2- Find the characteristic values and Eigen functions of the integral equations

$$\varphi(x) = \lambda \int_1^2 (x+t)\varphi(t)\, dt. \qquad \textit{20 marks}$$

3- Find the resolvent kernel for Volterra type equation with kernel

$$K(x,t) = e^{t-x}\sin(x-t) \qquad . \qquad \textit{20 marks}$$

4- Find the resolvent kernel of the kernel

$$K(x,t) = \sin(x+t) \quad 0 \le x, t \le 2\pi$$

by using the recursion relations. \qquad \textit{20 marks}