Tanta University- Faculty of Engineering | Engineering Mathematic(3)a Code:PME2111
Phy. and Eng. Mathematics Department | Second year (Computers and Automatic Control)
First Term Exam (28/1/ 2009) | Total Mark:85 | Time: 3 hours

Part I

Answer the following:

1- (a)-If A={1,2,3,4,5,6,7,8} , R is a relation on A defined by xRy if and only if $x < y$, draw the coordinate grid diagram , the directed graph of R , and express R in binary matrix form.

(b)- Define and give an example and a counter example for each of the following relations: reflexive , symmetric , transitive and Antisymmetric. (15 Marks)

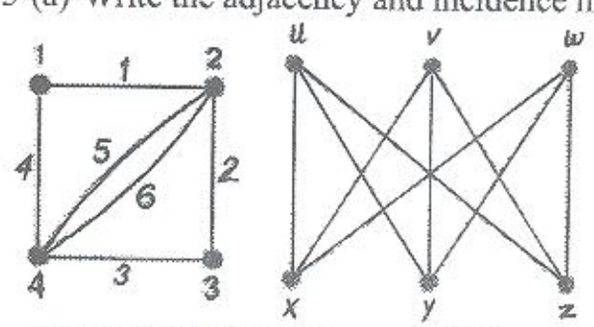
2-(a)If A={.....,-5,-4,-3,-2,-1,0,1,2,3,4,5,.....} and R is a Relation on A defined by xRy if and only if x-y is a multiple of 7 , prove that R is an equivalence relation and write the equivalence classes of R.

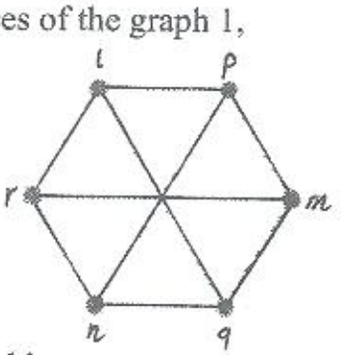
(b)Given the information table for six patients and the symptoms they suffer from,

	Attributes			
Case	Temperature	Headache	Nausea	Cough
1	high	yes	no	yes
2	very_high	yes	yes	no
3	high	no	no	no
4	high	yes	yes	yes
5	normal	yes	no	no
6	normal	no	yes	yes

use the concept of equivalence classes to reduce the symptoms . (15 Marks)

3-(a)-Write the adjacency and incidence matrices of the graph 1,





(b)-Show that the two graphs 2,3 are isomorphic .

(c)- Draw an example for each of the following graphs : Hamiltonian, Regular, Bipartite, Complete.

(d)-Check the Eulerian property for each of the above three graphs ?

(e)- Using two colors, explain an algorithm to decide that a graph is bipartite or not. (12.5 Marks)

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٨ / ٢٠٠٩

الفرقة الثانية حاسبات (جديد)
المادة : نظم رقمية
الزمن : ثلاث ساعات يناير ٢٠٠٩

Answer the following questions:

Q(1): Before the first clock pulse, the circuit has $y_1 = y_2 = 0$, in Fig. 1.
a) construct a timing diagram (D, y_1 , T, y_2).
b) Determine the circuit performance for 5 clock pulses.

Q(2): Design a single-input, single-output, Mealy type network that is satisfies the state graph shown in Fig. 2, using a clocked J-K flip-flop. The states A, B, C, and d designate the flip-flops states 00, 01, 11 and 10 respectively.

Q(3): Draw a state graph and a state table for a single-input, single-output, Mealy type network for which the output is 1 when the network detect that input sequence ends in either 100 or 1101 ;otherwise the output is 0.

Q(4): Draw a reduced state table for the given state table using:
a) The implication chart. b) The equivalence partition.

Present state	Next state x=0	Next state x=1	Output x=0	Output x=1
A	G	F	0	0
B	E	C	0	1
C	G	G	0	0
D	A	G	1	0
E	B	A	1	0
F	D	E	0	1
G	H	E	0	1
H	C	F	1	0

Q(5): Design an asynchronous counter that produces the binary sequence 000, 010, 100, 001, 111, using a falling clocked T-flip flops.

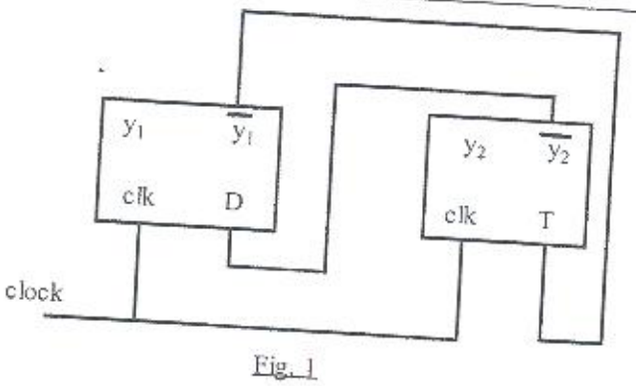


Fig. 1

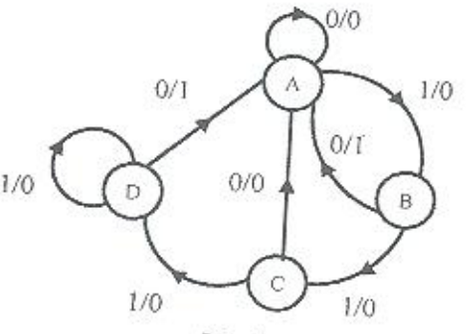


Fig. 2

مع أطيب الأمنيات بالتوفيق

nta University *Second year of department of computer ...d Control Eng.*

culty of Engineering *Energy Conversion Final Exam. (14 January 2009)*

partment of Electrical Power and Machines *Time allowed: three hours*

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tempt all questions

uestion 1

(a) The following test data obtained from short-circuit and open circuit tests of a 75 KVA, 4600/230 V, 60 Hz single-phase transformer:
Open circuit test (on low voltage side): $V_0 = 230$ V, $I_0 = 13.04$ A, $P_0 = 521$ Watts.
Short circuit test (on high voltage side): $V_{sc} = 160.8$ V, $I_{sc} = 16.3$ A, $P_{sc} = 1200$ Watts.
Sketch the transformer approximate equivalent circuit referred to the high voltage side with the values of the parameters. (8 points)

(b) Describe and sketch three different types of a single-phase induction motor. (3 points)

(c) Draw the torque-speed curve of an induction motor and derive اثبت its developed torque. (3 points)

estion 2

(a) A 3-phase, star-connected, 220 V (line-to-line), 10 hp, 50 Hz, 6-pole induction motor has the following constants in ohms per phase referred to the stator:
$r_1 = 0.294$, $r_2' = 0.144$, $x_1 = 0.503$, $x_2' = 0.209$, $X_m = 13.25$. Iron losses are neglected. Using the approximate equivalent circuit, for a slip of 0.02 and taking the phase voltage as a reference, compute in polar form:

(i) Rotor current referred to the stator,

(ii) The stator current

(6 points)

(b) If the rotor current referred to the stator of the motor of part (a), for a different slip, is 19 A, find the gross mechanical power developed in terms of the slip. (3 points)

(c) For the motor of part (a) , compute :

(i) The additional rotor resistance referred to the stator to limit the starting current to 20 A.

(ii) Approximate value for the slip at maximum torque.

(6 point) تحليل طاقة - علاج جديد

Question 3

(a) Discuss, with the aid of suitable sketches, the different methods used to control the speed of dc shunt motors. (6 points)

(b) A 460 V, dc series motor runs at 500 rpm taking a current of 40 A. Assume flux is proportional to the field current. If the load is reduced so that the motor is taking 30 A, compute the speed in rps and torque. Total resistance of the armature and field circuit resistance is 0.8 ohm. (8 points)

Question 4

(a) Discuss, with the aid of suitable sketches, the voltage build-up process of dc shunt generators. Sketch the no-load characteristics at different speeds and define the critical resistance. (6 points)

(b) A long compound dc generator delivers 100 A at 240 V to a resistive load. The armature, series field, and shunt field resistances are 0.1 , 0.045 and 100 ohms respectively. Sketch the circuit diagram and determine :

(i) The armature current,

(ii) The generated emf

(6 points)

Question 5

(a) A 380 V (line-to-line), 100 KVA, 50 Hz, star-connected synchronous generator has a synchronous reactance 0.15 ohm per phase. The armature resistance is neglected. Compute:

(i) The voltage regulation when the generator supply the rated KVA at 0.8 power factor lagging,

(ii) The torque angle δ

(9 points)

(b) Aided with illustrations, explain the basic construction and the principle of operation of two-phase control motor. (4 points)

(c) Aided with illustrations, discuss the use of linear motors in high-speed electric trains. (2 points)

END OF EXAM. **LUCK◂ GOOD▸BYE**

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امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٨ / ٢٠٠٩

الفرقة الثانية حاسبات (جديد)
المادة : المعالجات الدقيقة ونظم الموائمة
الزمن : ثلاث ساعات يناير ٢٠٠٩

Answer the following questions:

Q(1): Put (☑) for true statement or (x) for false statement (12 degree)

[1] The 80386 was 32-bit microprocessor.
[2] The memory system is divided into TPA, XMS.
[3] A bus is set of common connection lines that carry the same type of information.
[4] In real mode, segments can begin at any location in the memory system.
[5] The local descriptor table is a maximum 8192 bytes in length.
[6] MOV CS, AX
[7] PUSH AX is equivalent to PUSH EAX
[8] MOV BX, AL
[9] A memory segment can touch or even overlap.
[10] MOV ES, DS

Q(2): **[a]** Draw the internal architecture of the microprocessor 80286 then describe the use of all registers. (15 degree)

[b] Comparison in detail between: (12 degree)

1) The real mode operation and the protected mode operation.
2) The 16-bit instruction and the 32-bit instruction.
3) The local descriptor and the global descriptor.

Q(3): **[a]** In the microprocessor 80386, explain the main data addressing modes and give an example for every one. (13 degree)

[b] Describe the purpose of the D and W bits found in some machine language instructions. (8 degree)

Q(4): **[a]** Suppose that DS = 0200H, BX = 0300H, SS = 0400H, SP = 0001H, and DI = 0400H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (10 degree)

1) MOV AL, [1234]
2) PUSH BX
3) MOV CX, [BX]

[b] In a machine language instruction, what is specified by the MOD field? (5 degree)

مع أطيب الأمنيات بالتوفيق

حاسبات (حديث) دوائر وقياسات الكترونية

Faculty of Engineering — Tanta University
Second Year-First Term — Computer and Automatic Control Dep.
21-01-2009 — Circuits and ElectronicMeasurements
Time Allowed: Three Hours

Answer All The Following

1-a-) Explain with aid of circuit diagram, how you can overcome the crossover distortion in the class B push-pull power amplifiers using two power supplies.

b-) In the circuit diagram in part (a), if $R_1 = R_2 = 470\ \Omega$, $R_L = 16\ \Omega$, and $V_{CC} = \pm 20$ V. Determine the ideal maximum peak output voltage and current.

c-)For the class AB power amplifier shown in Fig. 1:

(i)Determine the values of $V_{B(Q1)}$, $V_{B(Q2)}$, V_E, $V_{CE(Q1)}$, $V_{CE(Q2)}$, and I_{CQ},

(ii)For the 5 V(rms) input, determine the power delivered to the load resistance.

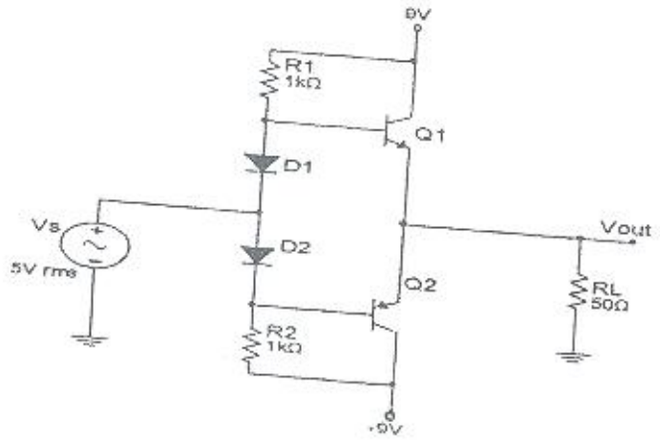

Fig. 1

2-a-) Drive an expression for the output resistance of the noninverting amplifier using a nonideal op-amp. If $R_1 = 1K\Omega$, $R_2 = 39K\Omega$, A=80dB, and $R_o = 50\ \Omega$, find the output resistance of the noninverting amplifier.

b-) Draw the circuit diagram of the difference amplifier. If $V_1 = 5V$, $V_2 = 3V$, $R_1 = 10K\Omega$, and $R_2 = 100K\Omega$, find the values of V_o, V_+, V_-, I_1, I_2, I_3, and I_o.

3-a-) Drive the expressions of the characteristic resistance and attenuation of the symmetrical T attenuator.

b-) Design a 90dB, 50Ω, T-attenuator.

4-a-) Draw the circuit diagram and the frequency response of the band stop filter. Deduce an expression for its cutoff frequency.

b-) Choppers switches can be used to convert a dc signal to an ac signal in a dc amplifiers. Draw the circuit diagram of the mechanical and electronic choppers showing their functions.

5-a-) Draw the circuit diagram of the basic ultrasonic transmission link.

b-) What is meant by "doppler effect". With aid of drawing the waveform, drive an expression for the doppler frequency in terms of the sound wave frequency when the observer (receiver) moves towards the source (transmitter).

c-) Draw the block diagram of the pulse echo system showing the outgoing and reflected waveforms. What are the conditions should be obeyed by the pulse signal.

Best Wishes
Said Elhalafawy

Tanta University, *Faculty of Engineering,* *Computer and Control Engineering Dept.,* *Subject: Data Structures and Algorithms*	*Final Written Exam* *Second Year (Computer)* *Date: 24 / 01 / 2009* *Time: 3 Hours*

Answer the following questions:

First question:

(a) What is *Data Structures* and what is *Algorithm*?

(b) Write an algorithm to *multiply two matrices* (A and B) of sizes n × n.

(c) Write an algorithm to perform each of the following operations:

(i) Append a node after the 5th node of a linked list.

(ii) Delete the end node from a linked list.

(d) Write a C++ program to create a database of employees. Each employee is defined by identification number (*ID*), name (*name*), and salary (*salary*). By using *pointer* to the database, allow a user to input data of 50 employees from the keyboard and then prints the database on the screen.

Second question:

(a) Show how you can represent *Stack* in C++ programs.

(b) Write an algorithm to implement *push* operation.

(c) Write an algorithm to implement *Stacktop* operation.

Third question:

(a) Show how you can represent *Queue* in C++ programs.

(b) Write an algorithm to implement *insert* operation.

(c) Write an algorithm to implement *remove* operation.

Fourth question:

(a) By using *recursion*, write a function to recursively compute the factorial of a given number n.

(b) What is the main idea of the *Bubble sort* and the *Quicksort*?

(c) Write a *Quicksort* algorithm to sort a list of numbers.

Fifth question:

(a) What is the main idea of *Binary Search*?

(b) Show the actions done, step-by-step, when searching for an item x=18 in the following list by *Binary Search*:

10 12 13 14 18 20 25 27 30 35 40 45 47

(c) Write an algorithm to implement *Binary Search* in C++.

«With my best wishes»

حاسبات جديد

Tanta University- Faculty of Engineering | Engineering Mathematic(3)a | Code:PME2111
Phy. and Eng. Mathematics Department | Second year :Computers and Automatic Control
First Term Exam (28/1/ 2009) | Total Mark:85 | Time: 3 hours

Part II

Answer the following:

4-The upward velocity of a rocket is given as a function of time in the following table.

t (s)	0	10	15	20	22.5	30
$v(t)$ (m/s)	0	227.04	362.78	517.35	602.97	901.67

a) Use Lagrange's formula to determine the value of the velocity at t=16 seconds using: 1- **Second order polynomial.** **2-Third order polynomial.**
b) Using the third order polynomial interpolant for velocity from (i), find the distance covered by the rocket from $t=1$ ls to $t=16$s.
c) Using the third order polynomial interpolant for velocity from (i), find the acceleration of the rocket at $t=16s$. (12.5 Marks)

5.1-Prove that:

a) $\Delta=(1-\nabla)^{-1}-1,\ E=(1-\nabla)^{-1},\delta=\nabla(1-\nabla)^{-1/2}=\Delta(1+\Delta)^{-1/2}$.

b) Derive a formula for Newton's Forward Interpolation.

c) From the following table, find the number of students who obtained less than 45 marks.

Marks	30-40	40-50	50-60	60-70	70-80
No. of St.	31	42	51	35	30

5.2-Solve the initial boundary value problem

$$\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2},0\le x\le 1,0\le t\le\frac{1}{9},$$

with the boundary conditions: $u(0,t)=0,u_x(1,t)=1$ and

the initial condition: $u(x,0)=x$. Use step sizes of $h=\frac{1}{3}$ and $k=\frac{1}{18}$. (15 Marks)

6.1- The distance covered by a rocket in meters from $t=8$ s to $t=30$ s is given by

$$x=\int_8^{30}\left(2000\ \ln\left[\frac{140000}{140000-2100\,t}\right]-9.8t\right)dt$$

Use four segment Simpson's rule to find the approximate value of x.

6.2- Find the solution to the following system of equations using the Gauss-Seidal method

$$12x_1+3x_2-5x_3=1$$
$$x_1+5x_2+3x_3=28$$
$$3x_1+7x_2+13x_3=76,$$

Use $[x_1\ x_2\ x_3]^T=[1\ 0\ 1]^T$ as the initial guess and conduct two iterations.

6.3- Given the following initial value problem:

$y^{(2)}+2y^{(1)}+y=e^{-t},y(0)=1,y^{(1)}(0)=2$, find

a) $y(0.75)$ b) $y^{(1)}(0.75)$

by Euler's method. Use a step size of $h=0.25$. (15 Marks)