Tanta University
2nd year
Faculty of Engineering
Computer and Automatic control Eng. Dept.
First Term, Final Exam
Electronic Circuits and Measurements
16-01-2008
Three Hours

Answer all the following:

Q1)

A) Draw the circuit diagram of the variable attenuator. Write only without derivation an expression for the attenuator resistance.

B) Find the characteristic resistance of the symmetrical T-attenuator with $R_1 = 25\ \Omega$ and $m = 1.4$. Prove that the input resistance of the attenuator is $48.732\ \Omega$ when the attenuator is loaded by its characteristic resistance.

C) Design a $80\ dB$, $50\ \Omega$ attenuator using four symmetrical T-sections.

Q2)

A) Draw the circuit diagram of the band stop filter. Drive an expression for the cutoff frequency. Draw also the frequency response of the filter.

B) With aid of circuit diagram, explain the theory of operation of the chopper modulated amplifier.

C) Find the pass band gain and the cutoff frequency of a high pass filter with $R = 100\ K\Omega, C = 500\ PF$, $R_s = 20\ K\Omega$, and $R_L = 150\ K\Omega$.

Q3)

A) Draw the circuit diagram of a slicer circuit. Draw also the output waveform, if the input is sinusoidal waveform.

B) Define the total harmonic distortion of a complex wave. Draw the circuit diagram of a resonant circuit harmonic analyzer.

C) In an amplifier, six identical stages are cascaded. The lower and upper cutoff frequencies of each stage are 100 Hz and 100 KHz respectively. Find the lower and upper cutoff frequencies of the amplifier.

Q4)

A) Draw the block diagram of the function generator. Show on your graph the different output waveforms of the generator.

B) What is the function of wave analyzer? Draw its simple circuit diagram. Write an expression of the deflection. What is the maximum deflection of the analyzer?

C) A complex wave has the following: $Y_{30} = 315$, $Y_{60} = 305$, $Y_{90} = 330$, $Y_{120} = 390$, and $Y_{150} = 305$. Determine the amplitudes of the fundamental, 3rd, and 5th harmonics and write the equation of the complex wave using summation method with grouped terms.

Q5)

A) Using lead-lag circuit, construct the Wien bridge oscillator and explain its operation. With aid of drawing, drive an expression for the feedback ratio and the phase shift. What is the frequency of oscillation of the oscillator?

B) Consider a Colpitts oscillator circuit with $R_1 = R_2 = 10\ K\Omega$, $C_3 = 0.1\ \mu F$, $R_E = 2\ K\Omega$, $C_E = 0.1\ \mu F$, $C_1 = 0.001\ \mu F$, $C_2 = 0.01\ \mu F$, and $L = 15\ \mu H$. What is the frequency of oscillation? What is the feedback fraction? How much voltage gain does the circuit need to start oscillation?

C) Draw the circuit and schematic diagrams of the 555 timer for monostable operation, explain its operation. Draw the output waveform of the circuit. What is the pulse width.

Faculty of Engineering,		**Data Structures & Algorithms.**
Computer & A. Control Eng. Dept.	***Time Allowed : 3 hours***	**2nd Year Students.**

ANSWER THE FOLLOWING QUESTIONS. YOU MAY ASSUME ANY MISSING DATA.

Question 1 (16 points)

(a) Trace the action of the binary search algorithm, including listing the values of Low, High and Middle for the list 0, 250, 650, 700, 800, 900, 950, 1000 for each of the following search elements: (i) -30 (ii) 1000

(b) Trace the action of the bubble sort algorithm for the list 0, 250, 650, 700, 800, 900, 950, 1000.

(c) Design a C++ structure to represent a video movie owned by a video store in terms of its title, its number of copies and its type. The video type can be one of the following cases: Educational, Scientific, and Comic. Then write two C++ functions, one to read a movie data from the keyboard and the other to print the data stored in a movie.

Question 2 (24 points)

(a) Write a C++ function called GetMinMax() that takes a linked list storing temperatures and returns the minimum and maximum temperatures.

(b) Write a C++ function called Previous() that takes a linked list and a position p and returns the position that precedes p.

(c) Design and implement an ADT called Point to represent a 3-dimensional point with the following operations:

- A default constructor
- A constructor
- Add() to add two point objects
- Sub() to subtract two point objects

Question 3 (30 points)

(a) Write a C++ function that takes a list, L , and splits it into two sublists L1 and L2. If the number of elements in L is odd, the element should go in L1. So the required function on the list {2, 3, 5, 7, 11, 100} should yield the two lists {3, 7,100} and {2, 5, 11}.

(b) Write an algorithm that finds the k-th largest element in an array of size N by modifying the selection-sort algorithm.

(c) Write a C++ function to merge two sorted arrays, A1 and A2, and stores result in a linked list L so that L is a sorted one. Do a timing analysis of your function.

Question 4 (30 points)

(a) Write-a C++ function called DeleteList() that deletes a linked list and sets its head to NULL.

(b) Write a C++ function Append() that takes two lists, 'A' and 'B', appends 'B' onto the end of 'A', and then deletes 'B'.

(c) Write a C++ function deleteNth() which can delete a node at any index within a list.

Best Wishes
Dr. Hisham Saied Mahmoud

نظم رقمية ٤ حاسبات

Tanta University
Faculty of Engineering
Computers & Control Department

Second Year Students
First Term Exam
January 2008

Digital Systems

Time Allowed: 3 Hours

Answer the following *five* questions.

Question 1

(a) Consider three variables A, B, and C. Show, through algebraic manipulation, that
   i) $\Sigma m\,(1,2,3,4,5,6,7) = A + B + C$
   ii) $\Pi M\,(0,1,2,3,4,5,6) = ABC$

(b) You are given an XOR gate and two XNOR gates, with two inputs each. Show how these three gates can be connected together to form a circuit with four inputs A, B, C, D and two outputs X,Y, satisfying the accompanying function table. Also find the minterm expansion (m-notation) and maxterm expansion (M-notation) of each of the circuit outputs.

A	B	C	D	X	Y
0	0	1	0	0	1
0	1	0	1		
1	0	0	1		
1	1	1	0		
0	0	0	1	1	0
0	1	1	0		
1	0	1	0		
1	1	0	1		
0	0	0	0	1	1
0	1	1	1		
1	0	1	1		
1	1	0	0		

Question 2

(a) Draw the logic diagram of a 4-to-1 multiplexer with an Enable line, and construct the relevant function table.

(b) Realize the logic function

$$F(A, B, C, D) = A'C + A'BD + ACD + A'B'D$$

with an 8-to-1 multiplexer when the control inputs are B, C, and D.

(c) Show how two 1-to-4 demultiplexers can be connected together to implement a 1-to-8 demultiplexer.

Question 3

(a) A 4-to-10 decoder with inverted outputs is used to realize three functions

$$K(A, B, C, D) = \Pi M(0, 1, 3, 9)$$
$$L(A, B, C, D) = \Pi M(1, 2, 4, 9)$$
$$H(A, B, C, D) = \Pi M(1, 3, 7, 9)$$

which are then fed into a 3-input OR gate to produce a final output Z.
   i) Verify that Z is independent of the variable A.
   ii) Show that the whole circuit can be replaced by a single 3-input OR gate.

(b) Construct a 4-to-16 decoder using five 2-to-4 decoders with Enable lines. Apply the tree decoding method.

Question 4

(a) Give a definition for the encoder and specify the function it performs. Why are encoders preferable in information transmission and storage?

(b) Implement a 16-to-4 encoder using four 4-to-2 encoders and external logic.

Question 5

(a) Design a 4-input, 4-output logic circuit that converts from excess-3 code to 8-4-2-1 BCD code.

(b) Implement the code converter of part (a) using a 4-to-16 decoder with inverted outputs and four external NAND gates.

Prof. Dr. Mahmoud M. Fahmy

Tanta University
Faculty of Engineering
Department of Computer and Control Eng.
Second Year

final Exam
Microprocessors
Date: 21 -01-2008
Time: 3 hours

Answer the following questions

First question:

(a) What is the function of Data bus, Address bus and Control bus? Show how these buses interconnect various system components.

(b) Briefly describe the three main parts of the system memory.

(c) What is the purpose of the segment register in protected mode memory addressing?

Second question:

(a) What is the main purpose of each of the following register: BX, CX, IP, and CS? Which microprocessors contain an FS and GS segment registers?

(b) In real mode, show the starting and ending addresses of each segment located by the following segment register values: (a) 1000H and (b) 1234H.

(c) For an 80486 descriptor that contains a base address of 01000000H, a limit of 0FFFFH, and G= 0, what starting and ending locations are addressed by this descriptor?

Third question:

(a) Briefly describe the direct addressing and register indirect addressing modes.

(b) Suppose that DS = 0200H, and BX = 0300H. Determine the memory address accessed by each of the following: (a) MOV AL,[1234H] and (b) MOV EAX,[BX].

Fourth question:

(a) Describe the purpose of the D- and W-bits found in some machine language instructions.

(b) In a machine language instruction, what information is specified by the MOD field?

(c) if the register field (REG) of an instruction contains a (010) and W = 0, what register is selected, assuming that the instruction is a 16-bit mode instruction?

(d) What memory-addressing mode is specified by R/M = 001 with MOD = 00 for a 16-bit instruction?

Tanta University – Faculty of Engineering
Department of Physics and Mathematics
Final Examination -Second Year (Computer)

Subject: Mathematics
Date : 12| 1 | 2008
Time : 3 Hours

Answer the following Questions

1-a)If A = { 1,2,3,4,5,6,7,8 } , R is a relation on A defined by R = { (x,y) : x = y+1 } , represent R by coordinate grid diagram, directed graph and binary matrix . Check the properties of R .

1-b) Draw diagrams to represent the complete graphs K_6 and the complete bipartite graphs $K_{2,5}$. Find the adjacency matrix of K_6 and the incidence matrix of $K_{2,5}$

2-a) If a car is traveling along a straight road with constant speed $v = b_1$ [m/sec.] , its position y [m] at time t [sec.] is $y = b_0 + b_1 t$. Suppose that measurements are

t	0	3	5	8	10
y	200	230	240	270	290

Fit a straight line to these data by least squares and estimate from it the speed .

2-b) Given the data

x	0.1	0.2	0.3	0.4	0.5
y = f (x)	0.70010	0.4016	0.1081	- 0.1744	- 0 . 4375

Find an approximate value of the zero of f (x) between 0.3 and 0.4

2-c) Obtain the estimate of the missing figures in the following table

x	2 .0	2 .1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	- -	0.111	0.100	- -	0.082	0.074

3-a) Find the value of y at $x = 2.6$ by using modified Euler's Methods with $h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y(2.2) = 1.5$

3-b) Compute numerically the first two rows of the solution of the wave equation

$$\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2} \qquad , 0 \le x \le 1 \quad , t \ge 0$$

with the boundary and initial conditions

$$u(0,t) = u(1,t) = 0$$

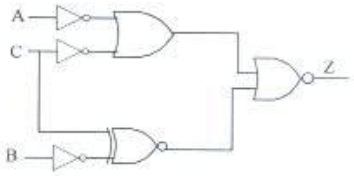
$$u(x,0) = \sin \pi x \quad , \frac{\partial u}{\partial t}(x,0) = 0$$

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات و التحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٧/ ٢٠٠٨

الفرقة الثانية حاسبات (قديم)
المادة : تصميم منطقى
الزمن : ثلاث ساعات يناير ٢٠٠٨

Answer the following questions:

Q(1): a) Show that the following logic-gate network is equivalent to a single three input AND gate.



b) Consider the two four variable functions:

$P(A, B, C, D) = \Sigma\, m\,(0, 2, 4, 7, 8, 11)$

$Q(A, B, C, D) = \Sigma\, m\,(1, 4, 9, 13, 15)$

Express $P \oplus Q$ as a sum of minterms (m-notations).

Q(2): a) Plot the following function on a Karnaugh map.

$$F(A,B,C,D) = B'C' + A'BD + ABCD' + B'C$$

b) Find the minimum product of sums

c) Find the minimum sum of products

Q(3): I) Express $F = ABC + DE + ACG + AD' + AB\bar{E}'$ in the form of

a) Product of three sums b) Sum of four products

II) Realize the function

$F(A, B, C, D) = \Sigma\, m\,(1, 3, 6, 8, 9, 10, 14)$

Using an 8-to-1 multiplexer with control inputs A, C, and D

Q(4): I) A combinational circuit is specified by the following three Boolean functions:

$F_1 = X'Y' + XYZ'$, $F_2 = X' + Z$ and $F_3 = XY + X'Y'$

construct the circuit with a decoder and external gates.

II) An 8 × 1 multiplexer has inputs A, B, and C connected to the selection inputs S_2, S_1, and S_0, respectively. The data inputs I_0 through I_7, are as follows: $I_1 = I_2 = I_7 = 0$, $I_3 = I_5 = 1$, $I_0 = I_4 = D$, and $I_6 = D'$. Determine the Boolean function that the multiplexer implements.

Q(5): Develop a minimized Boolean implementation of a "ones count" circuit that works as follows. The subsystem has four binary inputs: A, B, C, D: and generates a 3-bit output: XYZ. XYZ is 000 if none of the inputs are 1, 001 if one input is 1, 010 if two are one, 011 if three inputs are 1, and 100 if all four inputs are 1.

i) Draw the truth tables for X, Y, Z.

ii) Minimize the functions X, Y, Z using 4-variable K-maps. Write down the Boolean expressions for the minimized sum-of-products form of each function.

مع أطيب الأمنيات بالتوفيق و النجاح

بسم الله الرحمن الرحيم

جامعة طنطا — المادة: اقتصاد — الزمن : ساعتان

كلية الهندسة — الفرقة: الشعب الكهربية (لائحة قديمة) — التاريخ: 23-1-2008

أجب عن الأسئلة الآتية:

السؤال الأول

- ما هي العوامل الرئيسية التي تؤثر على تكلفة الاستثمار للمشروعات الصناعية ، وما هو المقصود بنقطة التعادل لهذه المشروعات؟

السؤال الثاني

1- تعتمد الطرق المركبة (الديناميكية) لتقييم المشروعات الصناعية على وضع معدل الخصم للنقود في الاعتبار ، تكلم عن أهم هذه الطرق()

2- مشروع تجاري قائم يحقق مبيعات سنوية مقدارها 48 مليون دولار ، وتصل تكلفة ما يقوم بشرائه من مواد من خارجه سنويا 33 مليون دولار ، كما يبلغ قسط الإهلاك السنوي لهذا المشروع 2 مليون دولار – فما هي صافي القيمة المضافة التي يحققها هذا المشروع سنويا؟

السؤال الثالث

عرف ما يلي:-

1- القيمة السوقية للأصل
2- معدل سعر الخصم للنقود
3- الإهلاك
4- رأس المال الثابت()

السؤال الرابع

- تكلم عن ثلاثة صناعات مختلفة تدخل تحت تصنيف الصناعة التحويلية؟
- ما هي أهم المؤشرات التي يمكن الاخذ بها في تصنيف المشروعات الصناعية بالنسبة لأحجامها؟

- احسب قسط الإهلاك السنوي باستخدام طريقة المجموع الرقمي للسنوات لمعدة بلغت تكلفة شرائها 7 مليون دولار ، وتكلفة النقل والتركيب لها 8، مليون دولار – مع عمر نافع لها مقدر بستة سنوات، وقيمة نفاية لها بما مقداره 12% من إجمالي تكلفتها؟

TANTA UNIVERSITY — Second Year
Faculty of Engineering
Dept. of computer and control Eng — Time allowed: Three hours

Energy conversion — *FINAL EXAM. 2008* — *Electrical machines*

Attempt all questions
من فضلك لاحظ أن درجات الأسئلة موضحة

QUESTION 1

Copy the following statements in your answer book in order بالترتيب. Answer by writing beside each statement label (T) for true and (F) for false statements. Support by illustration(s)/state reason(s)/support by equation(s) as required.

i) In order to spread the main magnetic field uniformly over a wider area, a commutator is used.

ii) One turn of a dc machine winding consists of two conductors.

iii) D.C. series motors should be connected directly to the supply voltage if there is a possibility of having light خفيفة loads. State reason(s) supported by illustration(s).

iv) In d.c. motors, when the flux increases the speed decreases. State reason(s) supported by equation(s)

v) The voltage induced in a transformer is of the generator voltage type.

vi) To reverse the direction of rotation of d.c. shunt motors, the motors terminals are reversed. State reason(s) supported an equation.

vii) The direction of rotation of an induction motor is reversed by exchanging the connection of two stator terminals. Supporte by two illustrations.

viii) Production of reluctance torque in synchronous machines requires d.c. excitation.

ix) The direction of rotation of a d.c. generator is the same as that of the driving motor.

x) In shunt-excited d.c. generators the field current increases when the terminal voltage decreases. State reason(s) supported by an equation.

(14 points for all parts of question) (يمكن إجابة هذا الجزء بلغة عربية سليمة)

QUESTION 2

The full-load armature current and the speed of a two-pole wave connected d.c. shunt motor are respectively 100A and 1200 rpm. The line voltage is 400 V and the armature resistance is 0.2 ohm

a) What will be the speed when the developed torque is half that at full-load and a resistance of 1.8 ohms is added to the armature circuit? The field

resistance is unaltered. Ignore the effect of armature reaction and the voltage drop due to brushes.

b) Calculate the developed full load torque in N.m. without the additional resistance in the armature circuit

c) If the net flux per pole is 0.05 Wb, calculate the number of conductors and resistance of each conductor.

d) What is the frequency of the rotor current at full load without the additional resistance in the armature circuit?

e) Calculate the starting armature current with the additional resistance in the armature circuit.

QUESTION 3

A 3-phase, 230, 60 Hz, 100 hp, six pole induction motor operating at rated conditions has an efficiency of 91 percent and draws a line current of 248 A. The core loss, stator copper loss, and rotor copper loss are 1697 W, 2803 W, and 1549 W respectively. Determine (a) power input; (b) total losses; (c) air-gap power; (d) shaft speed; (e) power factor; (f) combined windage, friction and stray power loss. g) draw the power-flow diagram.

(14 points)

QUESTION 4

A 4800 V, 3-phase, two-pole, 60 Hz star connected, synchronous generator with a synchronous reactance of 13.8 ohms per phase is operating at the rated conditions and 90 percent power-factor lagging. The excitation phase voltage is 3801 V with a phase angle of 23.1 degrees. Taking the terminal voltage as a reference. Determine (a) voltage regulation; (b) maximum power that can be developed, assuming a cylindrical rotor; (c) full-load current; (d) power factor

(14 points)

QUESTION 5

The low-voltage secondary winding of a 100-kva, 60 Hz, 12,000 : 2,400-volt distribution transformer is supplying its rated Kilovolt-amperes at rated secondary voltage to an inductive load of 0.80 power factor. Determine the primary current, primary voltage, and primary power factor using the approximate equivalent circuit referred to the secondary. The resistances and leakage reactances of the windings are

R_1= 7.0 ohms, R_2 = 0.30 ohm, X_1 =19.0 ohms and X_2 =0.75 ohm. The results of an open-circuit test, taken on the low-voltage side, are 1.6 A and 987 W. (14 points)

END OF EXAM LUCK◄GOOD►BYE