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

الفرقة الثانية حاسبات- قوى كهربية (قديم)
المادة : تحليل الدوائر الكهربية (من الخارج)
الزمن : ثلاث ساعات يناير ٢٠٠٩

Answer the following five questions:

Q(1): For the circuit in Fig. Q1

a) Prove that $V_o = \frac{R_b}{R_a}(V_b - V_a)$ when $\frac{Ra}{R_b} = \frac{R_c}{R_d}$

b) For $\frac{Ra}{R_b} = \frac{R_c}{R_d} = \frac{2}{5}$, $V_b = 4.0$ V and $V_{cc} = 15$ V, what range of values for V_a will result in linear operation?

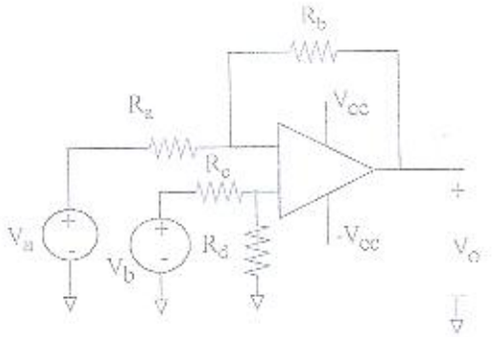

Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of 0.5 μF capacitor:

$V(t) = 0 \qquad t \le 0$
$V(t) = 5t \qquad 0 \le t \le 4$
$V(t) = 20\, e^{-(t-4)} \qquad 2 \le t \le \infty$

a) Derive the expressions for the capacitor current, power, and energy.

b) Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3. There is no energy stored at $t = 0$.

1- Derive the numerical expressions for v(t) for the time intervals $t < 0$, $0 < t < 50$ μs, and $50\ \mu s < t < \infty$

2- Calculate $v(50^- \mu s)$ and $v(50^+ \mu s)$

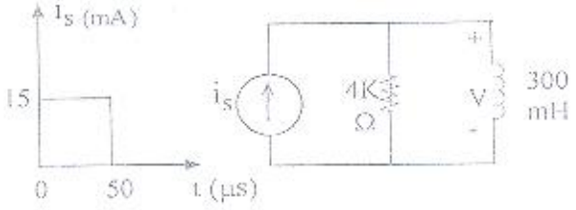

Fig. Q3

(انظر الصفحة التالية)

Q(4): The switch in the circuit shown in Fig. Q4 has been in position a for a long time. At t = 0 the switch is thrown to position b. Find

a) $V_c(t)$ for $t \geq 0$

b) $i(t)$ for $t \geq 0^+$

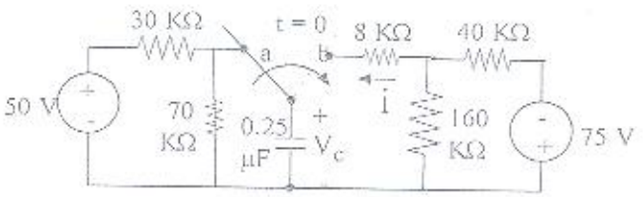

Fig. Q4

Q(5): The initial energy stored in the circuit in Fig. Q5 is zero. At t = 0, a dc current source of 20 mA is applied to the circuit.

a) What is the initial value of I_L and dI_L/dt ?

b) What is the numerical expression for $I_L(t)$ when $t \geq 0$?

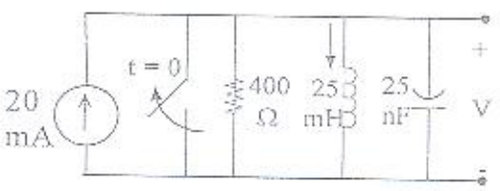

Fig. Q5

مع أطيب الأمنيات بالتوفيق والنجاح

Tanta University *Second year of department of computer and Control Eng.*

Faculty of Engineering *Final Exam. (14 January 2009)*

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

Attempt all questions

Question 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 its developed torque. (3 points)

Question 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 points)

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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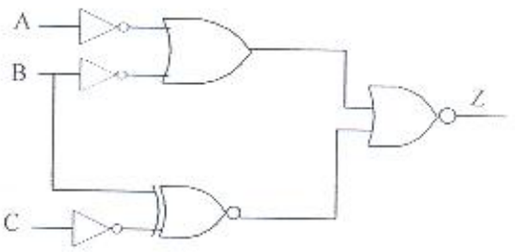
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٨ / ٢٠٠٩

الفرقة الثانية حاسبات (قديم)
المادة : تصميم منطقى (من الخارج)
الزمن : ثلاث ساعات يناير ٢٠٠٩

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:

$P(A, B, C, D) = \Sigma\, m\,(0, 2, 4, 7, 8, 10)$

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

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) 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

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

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

construct the circuit with a decoder and external gates.

Q(5): Design a combinational circuit with three inputs, x, y, z, and three outputs, A, B, and C. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input.

مع أطيب الأمنيات بالتوفيق والنجاح

محاسبات فقط

Tanta University (لائحة قديمة) 2nd year 1st term Exam.
Faculty of Engineering Logic and Electronic Circuits
Dept. of Computer and Control Eng. Time allowed : 3 Hours

Answer the following questions:

1- a- Find the Z- parameters of the T-network that has $Z_a = 8\ \Omega$, $Z_b = 10\ \Omega$, and $Z_c = 12\ \Omega$.
b- Find the ABCD parameters of the ideal transformer that has turns ratio of 10 : 4.
c- Find the input impedance of the ideal transformer that is given in (1-a) when it is loaded by a capacitor of 10 micro Farad.

2- a- Find the Y-parameters of the π-network that has $Y_1 = 0.4$ mho, $Y_2 = j\ 0.4$ mho, and $Y_3 = -j\ 0.3$ mho.

b- A Common Emitter Amplifier has the parameters, $h_{re} = 0$, $h_{ie} = 200\ \Omega$, $h_{fe} = 100$, and $h_{oe} = 100\ \mu$ mho. Also $R_L = R_L = R_C = 800\ \Omega$, $R_1 = 1.3\ k\Omega$, $R_2 = 2.7\ k\Omega$, $R_S = 2\ k\Omega$, and $C_E = C_i = C_o = 20\ \mu$ Farad. Calculate the input impedance, voltage gain, and the current gain.

3-a- Show how you could use the operational amplifier to integrate the following inputs:

$V_a = 5\ \text{Sin}\ \omega t$, $V_b = 5\ t$, $V_c = 5$

b- A five bits A/D converter with resolution 0.5, and $R_F = 0.35$ LSB resistance. Determine the output voltage when the input voltage is "11010".

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4 - Draw the logic circuit of the following functions, and minimize them,

$$F_1 = C + AB\overline{C} + AB$$
$$F_2 = ABC\overline{D} + A\overline{B}C\overline{D} + AB\overline{C}\ \overline{D} + A\overline{B}\ \overline{C}\ \overline{D}$$

5- a- Simplify the functions:

$$F_1 = \sum 0, 1, 2, 3, 4, 6, 7, 8, 12, 13$$
$$F_2 = \overline{A}BC + \overline{A}B\overline{C} + A\overline{B}\ \overline{C} + A\overline{B}C$$
$$F_3 = \overline{A}C + \overline{A}B + A\overline{B}C + BC$$

b- Compare between calculating the value of the following function as Sum of Products and as Product of Sum;

$$F = \overline{A}\ \overline{B} + \overline{A}B + A\overline{B} + AB$$

Tanta University,
Faculty of Engineering,
Computer and Control Engineering Dept.,
Subject: Data Structures and Algorithms

الفرقة الثانية
حاسبات
تحكم

Final Written Exam
[redacted]
Date: 24/01/2009
Time: 3 Hours

Answer the following questions:

First question:

(a) Write the general syntax of declaring *Structures* and *Arrays*?
(b) What are the differences between *static* and *dynamic* data structures?
(c) Write an algorithm to multiply two square matrices X and Y of n numbers.
(d) Write an algorithm to compute the prime numbers less than 32.

Second question:

(a) Write the general syntax of declaring a *pointer*?
(b) What is a linked list?
(c) Show how you declare a node of a linked list containing a data part and a pointer to next node?
(d) Write an algorithm to perform each of the following operations on a list:
    (i) Append a node at the start of a linked list.
    (ii) Delete the end node from a linked list.

Third question:

(a) Write a C++ program to first allow a user to input 10 integer numbers into an array X, then, by using pointer go through the array elements to find the smallest number in the array. Finally, print on the screen both the array elements and the smallest number.
(b) Write a C++ program to first create a database of students. Each student is defined by identification number (*ID*), name (*name*), and telephone (*tel*) which contains two telephone numbers *home* and *mobile*. Then, allow a user to input data of 20 students from the keyboard and finally prints the database on the screen.

Fourth question:

(a) Write a function to compute the factorial of a given number n.
(b) Write an algorithm to sort an array X on n numbers.
(c) Write an algorithm to find the index of an item d=8 in a list S of n numbers.

«With my best wishes»