Menoufia University
Faculty of Electronic Eng.
Computer Science and Eng. Dept.
Academic Year: 2022 / 2023
2nd Year - 1st Semester.
Course: Microprocessors and Applications

Menoufiya University

Final Theory Exam
Exam Data: 31/12/2022
Start Time: 10:00 AM
Exam Duration: 3 Hours
Part-01, No. of Questions: 3
Course Code: CSE 217

Answer the following questions: Total marks of Part-01 [30]

Microprocessor Registers

AX	4321 H	SP	0012 H	IP	0155 H	CS	20A2 H
BX	1199 H	BP	00FF H	FLAGS	0000 H	DS	3000 H
CX	1000 H	SI	1888 H	ES	4000 H		
DX	2000 H	DI	0A55	SS	3019 H		

Program-invisible registers

LDTR	80000
GDTR	90000

Memory

11000B	FF	9061A	FF	9060D	FF	8060D	FF	....	8888
11000A	32	90619	32	9060C	32	8060C	32	...	
110009	10	90618	10	9060B	10	8060B	10	...	
110008	24	90617	24	9060A	24	8060A	24	....	
110007	10	90616	10	90609	10	80609	10	3188A	56
110006	00	90615	00	90608	00	80608	00	31889	12
110005	FF	90614	FF	90607	10	80607	FF	31888	2A
110004	FF	90613	FF	90606	FF	80606	FF	....	
110003	00	90612	00	90605	00	80605	00	....	
110002	10	90611	10	90604	10	80604	10	...	
110001	01	90610	00	90603	00	80603	00	...	
110000	00	9060F	FF	90602	FF	80602	FF	30001	29
10FFFF	99	9060E	FF	90601	FF	80601	FF	30000	3F

Figure 1: Content of microprocessor registers and memory locations.

First question: Achieved Program Competencies (A.1 – B.5) [8 M] ~22 min

1. What are the main tasks of the microprocessor?
2. How many memory locations can be addressed by fourth-generation microprocessors?
3. What is the data bus width of 8086 microprocessor?
4. What is the purpose of base index register?
5. Which register holds an address of data array in the stack memory?
6. When is the parity flag set to 1?
7. What does the stack segment hold?
8. Differentiate between global and local descriptors.
9. What is the maximum number of memory locations that can be addressed in the protected mode?
10. Which does AV bit indicate in the 80386 microprocessor descriptors?
11. What is the purpose of program-invisible registers?
12. What are the base registers that used in the register relative addressing of data memory modes?
13. Select an assembly language instruction that stores AH register in the FLAG register.
14. What is the difference between SUB and CMP instructions?
15. Explain how the CMPXCHG instruction functions.
16. What is the difference between TEST and BT instructions?

Second question: Achieved Program Competencies (A.1 – B.5) [11 M] ~34 min

1. In the real mode operation using the values in figure 1, show the starting and ending addresses of code memory segment. [1 M]
2. In the real mode operation, use the values in figure 1 to find the memory location address of the next instruction. [1 M]
3. In the real mode operation, use the values in figure 1 to determine the memory address of the following instruction.

   JMP AX [1 M]
4. Determine the data memory addressing mode of the following instruction and use the values of figure 1 in the real mode operation, to show the memory addresses and their contents.

   MOV [BX+2*SI], BX [1 M]
5. In the real mode operation, use the values in figure 1 to determine the memory addresses and their contents after applying MOVSB instruction. [1 M]
6. Copy 16 Kbytes of data from an area of memory addressed by offset 1234 H into extra memory segment addressed by offset 1000 H. [2 M]
7. Develop a sequence of instructions that sums 100 elements of 8-bit ARRAY and return the result in AX. [2 M]
8. Write a sequence of instructions that cube the 8-bit number found in BL. Load BL with a 25 H initially, and store the result in the memory locations started by offset address 102F H. [2 M]

Third question: Achieved Program Competencies (A.1 – B.5) [11 M] ~34 min

1. In the protected mode operation of Itanium microprocessors, show the starting and ending addresses of data segment. [2 M]
2. Show the stake memory contents after the following sequence of instructions, assuming protected mode operation of 80386 microprocessors using the values in figure 1. [3 M]

   (1) PUSH BX

   (2) POP CX
3. In the protected mode operation of 80286 microprocessors, use the values in figure 1 to determine the memory address and its content after applying the following instruction. [2 M]

   INC WORD PTR [BP]
4. Write a short sequence of instructions that divides the value in BX by the value in CX, and then multiplies the result by 2. The final answer must be stored in the memory locations started by offset address 3A05 H. [2 M]
5. Develop a sequence of instructions that clears (0) in the rightleast ten bits of BX; sets (1) of the leftmost ten bits of BX; inverts bits 6, 7 and 8 of BX, and show the content of BX. [2 M]

With my best wishes
Dr. Mohamed A. El-Rashidy

University	Menoufia	Date	10/1/2023
Faculty	Electronic Engineering	Time	90 M
Department	Physics & Eng. Maths.	No. of Pages	1
Academic Level	Second Year	Full Mark	50 Marks
Course Name	Emg. Math. 5	Exam	Terminal
Course Code		Examiners	Prof. Dr. R. El-Shanawany

(First Part)

Answer all the following questions:

1. 18 Marks

   (a) Construct horizontal forward difference tables for

   $$y = x^4 + 5x + 2, \quad when \quad x = 1, 2, ..., 7$$

   and find the value of y for $x = 8$ from the table constructed.

   (b) Construct horizontal backward difference table for $y = \sin x$, when $x = 15°, 20°, 25°, 30°$ and find the value of $\sin 10°$ from the table.

   (c) Prove that

   $$e^x = \left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{Ee^x}{\Delta^2 e^x};$$

   the interval of differencing being unity.

2. 18 Marks

   (a) Find third difference of

   $$\frac{1}{(2x+3)(2x+5)}, \quad h = 1.$$

   (b) Prove that

   $$\Delta^n y_{x-n} = y_x - \binom{n}{1} y_{x-1} + \binom{n}{2} y_{x-2} - \binom{n}{3} y_{x-3} + ...$$

   (c) Find the value of an annuity at $5\frac{3}{8}\%$, given the following table:

Rate per cent	4	4.5	5	5.5	6
Annuity value	17.29203	16.28889	15.37245	14.53375	13.76483

3. 14 Marks

   (a) Prove that

   $$(i) \qquad \blacktriangledown^2 \equiv 1 + \frac{1}{4}\blacktriangle^2$$

   $$(ii) \qquad \sqrt{1 + \blacktriangle^2 \blacktriangledown^2} = 1 + \frac{1}{2}\blacktriangle^2.$$

   (b) Given that :

$\sqrt{12500}$	$\sqrt{12510}$	$\sqrt{12520}$	$\sqrt{12530}$
111.803399	111.848111	111.892806	111.937483

Show by Gauss backward formula that $\sqrt{12516} = 111.874930$

Menoufia University Faculty of Electronic Engineering Industrial Electronics and Control Eng. Course: Power Electronics Course Field: Specialization Requirements Academic Level: Second Year, 1st Semester Academic Year: 2022 / 2023 Course Code: ACE 216	Final Term Exam Date: 24 / 1 / 2023 Exam Type: Written No. of Exam Pages: 3 No. of Exam Questions: 5 Exam Marks: 70 Marks Exam Time: 3 Hours From 10:00 AM to 1:00 PM

Answer the following questions:

Part – 1:

Question – 1: [15 Marks]

a. Draw the current, voltage and power characteristic curve in the two operational cases i.e. (ON/OFF) for the ideal and practical (real) power electronic switches.

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b. For the circuit shown in Figure 1,

1) What the function of the circuit? Draw the input and output voltage waveforms.
2) Determine the average and rms output voltage.
3) Calculate the efficiency of rectification.
4) Determine the maximum peak inverse voltage PIV of each diode.
5) The manufacturer of the selected power diode in this circuit gives the rate of fall of the diode current as $di/dt = 15$ A/μs, and its peak reverse current $I_{RR} = 48$ A. Calculate the expected value of the reverse recovery time t_{rr}.

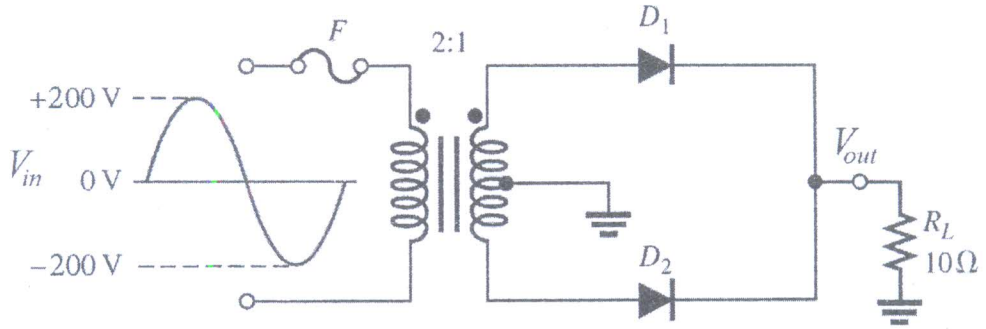

Figure 1

Question – 2: [20 Marks]

a. For the circuit shown in Figure 2, the supply voltage is $V_s = 150\,V, 60\,Hz$. The circuit parameters is given as, $C = 0.1\,\mu F$ and $R_1 = 47\,k\Omega$, $R_2 = 150\,k\Omega$. The SBS has a break over voltage of 7.4 V.

i. Calculate the minimum and maximum values of firing angle α.

ii. Sketch the load voltage and the capacitor voltage.

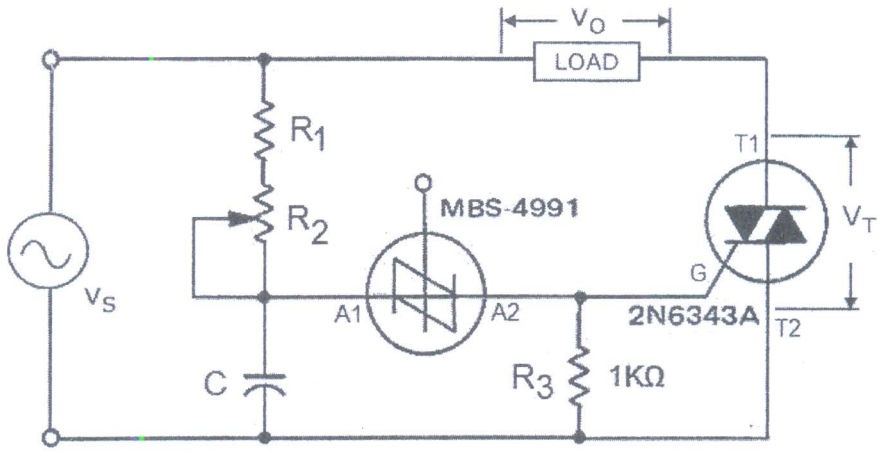

Figure 2

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b. Consider the circuit shown in Figure 3, a 5 KΩ resistive load is supplied from a 100 volt, 50 Hz ac supply. From the data sheet, the UJT parameters are: $V_s = 30$ V, $\eta = 0.51$, $I_P = 10$ μA, $V_V = 3.5$ V, $I_V = 10$ mA and the width of the pulse trigger = 50 μsec. Assume $V_D = 0.5$ V. If the delay angle of the SCR is to be controlled in the range from 30° to 150°, Find V_Z and all circuit parameters.

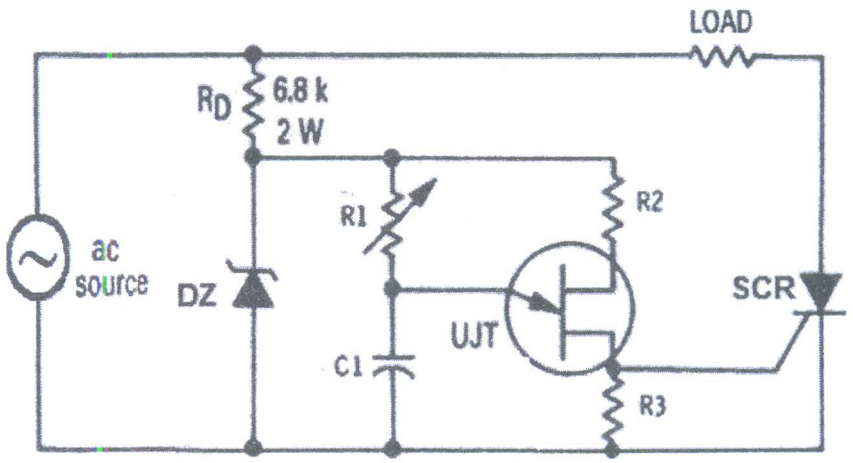

Figure 3

Question No. 3:

3.a Mark using (√) for correct sentence and (×) for incorrect sentence :

( ) The steady state current in an RC series circuit with step input voltage tends to zero .

( ) The rms value of sum of sinusoids of different frequencies equals to the sum of rms of individual sinusoids .

( ) For periodic current in an inductor , no net energy transfer takes place.

( ) A rapid decrease in inductor current results in excessively high inductor voltage.

( ) Apparent power is sometimes called real power. (5 marks)

3.b An RLC series circuit contains a coil of inductance 10 H and a resistance of 200 Ω and a capacitor of 10 mF . Assuming current i=0 at t=0, determine (a) the state of damping in the circuit (b) an expression for the current when a step voltage of 10 V is applied. (8 marks)

Question No. 4 :

The circuit of Fig. 1 has V_{CC} =50 V, L=100 mH, R=10 Ω, t_1=30 ms, and T=150 ms. What is the purpose of the resistor in this circuit . Determine (*a*) an expression for the inductor current (*b*) the peak current and peak energy storage in the inductor, (c) the average power absorbed by the resistor, and (d) the peak power supplied by the source. (9 marks)

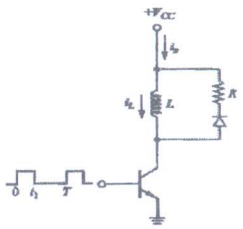

Fig.1

Question No. 5 :

5.a A half-wave rectifier with resistive inductive load uses a freewheeling diode where R = 20Ω, V_m=150 V, and the frequency is 60 Hz. (a) Assume L is infinitely large . Determine the power absorbed by the load and the power factor as seen by the source , sketch V_o, i_{D1}, i_{D2}. (b) Determine the average current in each diode (c) for a finite inductance, determine L such that the peak-to-peak current is no more than 6 percent of average current . (8 marks)

5.b What is the purpose of using heat sinks? Obtain an expression for the thermal power flowing from the junction to the case, from the case to the heat sink, and then from the heat sink to ambient. (5 marks)

Note : The Fourier series for the half-wave rectified sine wave is given by ;

$$v(t) = \frac{V_m}{\pi} + \frac{V_m}{2}\sin(\omega_0 t) - \sum_{n=2,4,6\ldots}^{\infty} \frac{2V_m}{(n^2-1)\pi}\cos(n\omega_0 t)$$

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Good Luck

Menoufia University
Faculty of Electronic Engineering
Subject: Microprocessors
Year: 2nd Year – 1st Semester

Final Written Exam
Code: CSE 211
Date: 31 - 12 - 2022
Time: 90 Minutes (Paper II)

No of Questions: 3 **Exam Paper II** Academic Year: 2022/2023

Answer all the Following Questions: [Total Marks: 20]

First Question: [10 Marks]

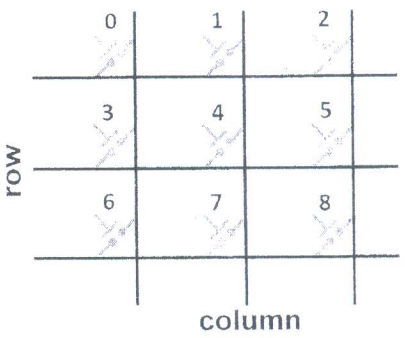
Design the hardware interface and write an 8086-assembly language program for the following project:

- One LED is connected to bit-3 of PORT B (PB3), a switch (SW) is connected to bit-7 of PORT C (PC7), and a 7-segment is connected to PORT A.
- The addresses of ports A, B, C and Control of the 8255A are 0H, 4H, 8H and 0CH respectively (0, 4, 8, and 12 decimal).
- The forward voltage of a LED (V_D) is 3V, and the LED current (I_D) is 4 mA.

The program monitors the status of the switch (SW), and performs the following:

- If the switch (SW) is pressed, the program flashes the LED 12 times (ON time = 0.4 seconds, OFF time = 0.8 seconds).
- If the switch (SW) is released, the program flashes the letter H on the seven segment 8 times (OFF time = 0.4 seconds, ON time = 0.8 seconds).
- Repeat.

Second Question: [10 Marks]



Design the hardware interface (keypad side) and write an 8086-assembly language program for the following keypad project.

A 3×3 keypad (shown in the figure) is connected to the 8086 microprocessor through PORT C of the 8255A PPI, where the rows are connected to PC0, PC1 and PC2, and the columns are connected to PC5, PC6 and PC7. Write an 8086-assembly program that detects keystrokes and displays the keys on a ***BCD*** 7-segment connected to the lower 4 bits of PORT B (PB0 to PB3).

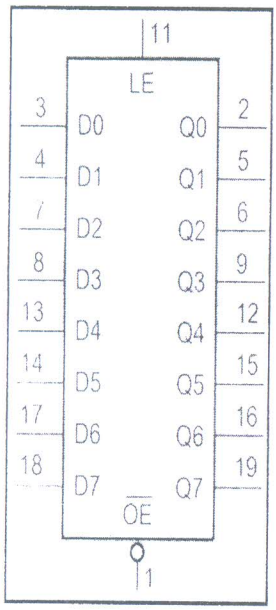
Third Question: [10 Marks]

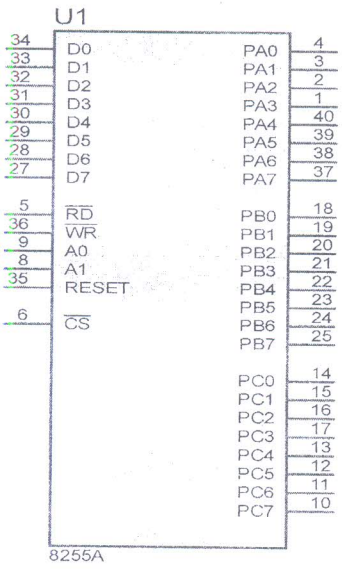
Design the hardware interface (sensors side) and write an 8086-assembly language program for a temperature sensor project. Two LM35 temperature sensors are

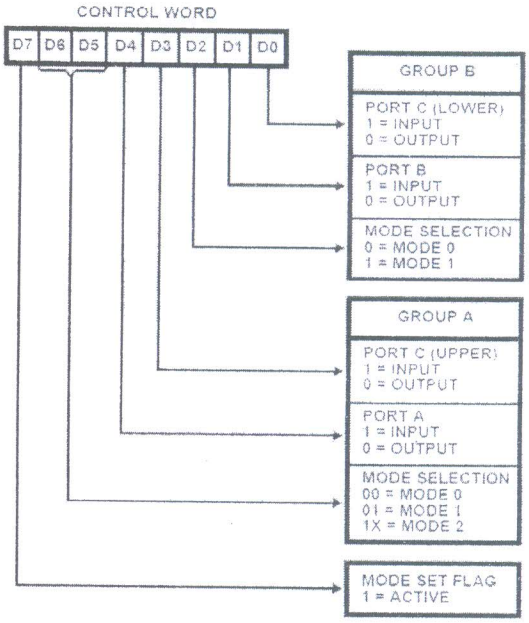
connected to the inputs of two A/D converters (ADC 0804). The sensitivity of LM35 sensor is 10 mV/degree Celsius. The outputs of the two A/D converters are connected to the 8086 via PORT A and PORT B of the 8255A. The program reads the outputs of the two A/D converters, calculates the values of the two temperatures, and displays the smaller temperature on a ***BCD*** 7-segment connected to the lower 4 bits of PORT C (PC0 to PC3).

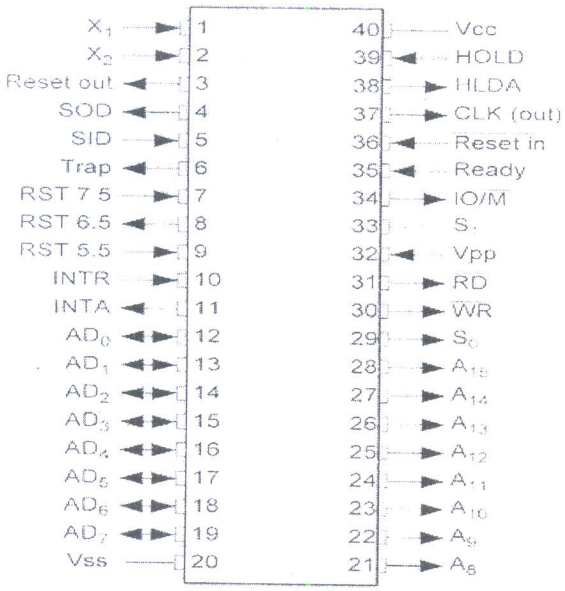
With my best wishes,

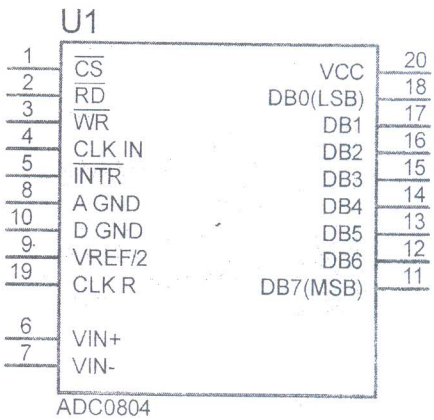
Dr. Zeiad El Saghir











MENOUFIA UNIVERSITY
FACULTY OF ELECTRONIC ENG.
SUBJECT : Electric Circuit Theory (Part 1)
TIME: 3 HOUR Jan. 2023 2nd YEAR

Answer the following questions: (35 MARKS)

Q.1 A– Determine the circuit elements if the applied voltage to the circuit is:

$$V(t) = 100 \sin (50\,t + 30^\circ)$$

The true power in the circuit is 200 W and the power factor is 0.707 leading. Construct the phasor and impedance diagram.

B – For the circuit shown in Fig.1. *Find the following:*

1- The Norton equivalent circuit.
2- If $Z_1 = (5 - j5)$ is connected between the terminal A&B find the power delivered in R_1.

Q.2 A – For the circuit shown in Fig.2.
Determine the voltage across the impedance $(2 + j\,5)\ \Omega$ using superposition method .

B – The current and the voltage to a load are represented as:

$$e_T = 20 + 30 \sin (377\,t) + 50 \sin (1130\,t + 30^\circ)$$

$$i_T = 15 \sin (377t) + 14 \sin (1130\,t - 30^\circ)$$

Determine the following:

1 – The frequency of each component of the driving voltage.
2 – The rss voltage. 3 – The rss current.
4 – The active power drawn by the load.
5 – The apparent power. 6 – The power factor.
7 – The impedance offered by the load for each frequency.

Q.3 A – A voltage: $V(t) = 20 \sin \omega t$ is applied to a series RLC circuit. At the resonance frequency of the circuit, the maximum voltage across the capacitor is found to be 500 V. Moreover, the bandwidth is known to be 400 rad/sec and the impedance at resonance is 200 Ω. Find:

1 – The resonance frequency.
2 – The values of L and C of the circuit.

B – A series RLC circuit has a maximum current of 0.1 A flows through the circuit when the capacitor is at 5 μF and L = 0.1 H with a fixed frequency and a voltage of 5 V.

Determine the following:

1 – The resonance frequency. 2 – The Bandwidth.
3 – The Quality factor Q.
4 – The values of resistance at resonant frequency.

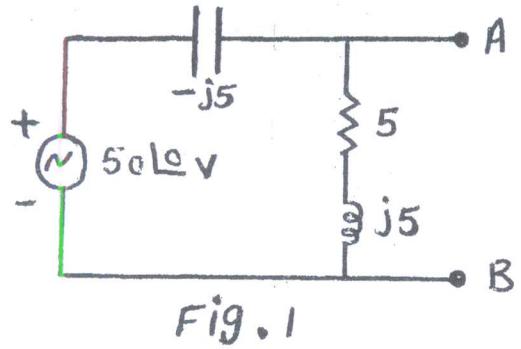


Fig. 1

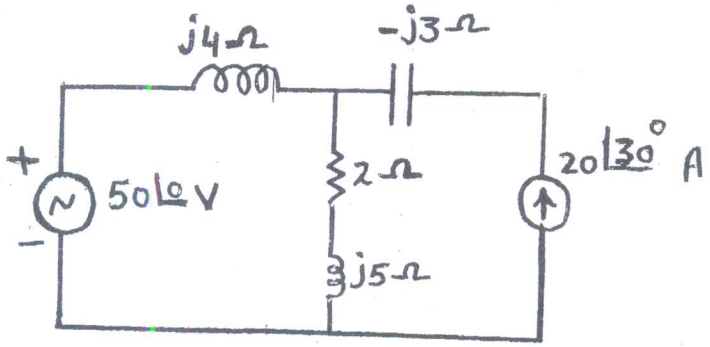


Fig. 2

University	: Menoufia		*Date*	: 3/01/2023
Faculty	: Electronic Engineering		*Time*	: 3.0 Hours (for two parts)
Program	: General		*No. of pages*	: 1
Academic level	: Second year		*Full Mark*	: 70 Marks for two parts
Course Name	: Electric Circuits		*Exam*	: Final Exam
Course Code	: ECE 213		*Examiner*	: Dr. A. M Sharshar

Part II: **Total marks for Part II: 35 Marks**

Answer all the following questions:

1- For the circuit of Fig. 1; (*a*) write a complete set of mesh equations; (*b*) calculate V_o.

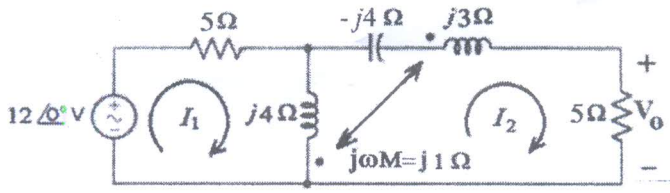


Figure 1. For problem 1.

2- Given the network in Fig. 2; (a) Using mesh analysis find I_1, I_2, V_1, and V_2.
(b) Replace the transformer and the secondary circuit using Thévenin's theorem, then use the equivalent circuit to compute I_1.

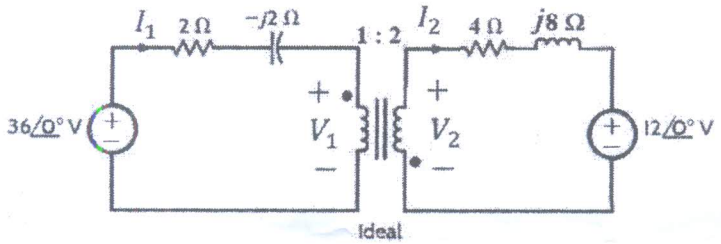


Figure 2. For problem 2.

3- The switch in the circuit shown in Fig. 3 has been in position 1 for a long time. At $t = 0$, the switch moves to position 2. Find; (a) $v_o(t)$ for $t \geq 0$ (b) $i_o(t)$ for $t \geq 0^+$

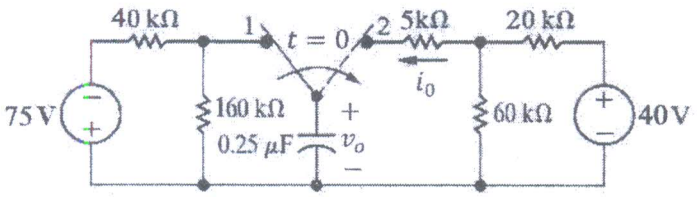


Figure 3. For problem 3.

4- For the parallel *RLC* circuit, shown in Fig. 4, given $R = 100\ \Omega$, $L = 100$ mH, and $C = 10$ μF, energy is stored at the instant the dc current source is applied. The initial current in the inductor is 30 mA, and the initial voltage across the capacitor is 40 V. Find (a) $i_L(0)$, and $di_L(0)/dt$; (b) $i_L(t)$ for $t \geq 0$; (c) $v(t)$ for $t \geq 0$; (d) $i_R(t)$, and $i_C(t)$ for $t \geq 0$. (e) does the initial capacitor current change abruptly?.

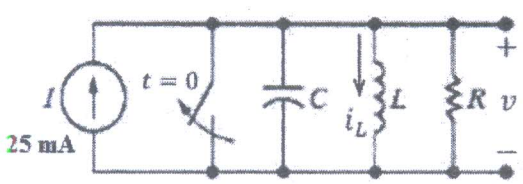


Figure 4. For problem 4.