Tanta University		Department: Computer and Control Engineering Total Marks: 75 Marks		Faculty of Engineering
Course Title: Microprocessors and Interfacing Systems Date: January 2011 (First term)			Course Code: EC2108 Allowed time: 3 hrs	Year: 2nd No. of Pages: (2)

Answer the following questions

Problem number (1)   (14 Marks)

[a] Put (☑) or (x), then write correct statement (10 Marks)

1)   The code segment is limited to 64 Kbytes in 80386.
2)   STOSB
3)   In real mode, segments can begin at any location in the memory system.
4)   AND AL, BL
5)   MOV AX, DL
6)   LES BX, CAT
7)   INC BYTE PTR[BL]
8)   PUSH BX is equivalent to PUSH EBX
9)   MOV ES, DS
10)   IN AX, CX

[b]   If a MOV SI, [BX + 20_H] instruction appears in a program, what is its machine language equivalent? (4 Marks)

Op-code MOV is 22_H			
R/M code	Addressing mode	Code	REG field
000	DS: [BX + SI]	011	BX
001	DS: [BX + DI]	110	SI
111	DS: [BX]	111	DI

Problem number (2)   (24 Marks)

[a] Draw the internal architecture of the microprocessor 80386 then describe the use of all registers. (10 Marks)

[b] Comparison between: (9 Marks)
1) The real mode operation and the protected mode operation.
2) The 16-bit instruction mode and the 32-bit instruction mode.
3) LOOP instruction and JMP instruction.

[c] Code a descriptor that describes a memory segment that begins at location 210000_H and ends at location $21001F_H$. This memory segment is a code segment that can be read. The descriptor is for an 80286 microprocessor. (5 Marks)

Problem number (3)   (21 Marks)

[a] For the following instructions determine the data addressing mode and define its function. (10 Marks)
1) MOV [1234$_H$], BX
2) MOV [BP], DL
3) MOV CL, [EDX + EDI]
4) MOV ARRAY[EBX], EAX
5) MOV [EBX + 2*ESI], AX

[b] In a machine language instruction, what is specified by the MOD field, the D and W bits found in some machine language instructions. (5 Marks)

[c] Describe the operatrion of each of the following instructions and the content of the destination operand in each instruction after execution assuming the initial values are DS =0600H, BX = 4F82H (6 Marks)
1) INC BX
2) SUB BH, 22$_H$
3) ROR BX, 2
4) AND BX,F0FF$_H$

Problem number (4)   (16 Marks)

[a] Suppose that DS = 0200H, BX = 0300$_H$, SS = 0400$_H$, SP = 0001$_H$, and DI = 0400H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (6 Marks)
1)   MOV AL, [1234$_H$]
2)   PUSH BX
3)   MOV CX, [BX]

[b] Explain the meaning of the following instructions: (10 Marks)
1) . MODEL SMALL
2) LODSB
3) POP DS
4) MOV BX, OFFSET DATS
5) MOVSX BX, DL
6) OUT DX, AX
7) LGS SI, DATA4
8) DATAS DW 20 DUP(?)
9) MUL DI

مع أطيب الأمنيات بالتوفيق

طسابن

TANTA UNIVERSITY
FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTERS AND AUTOMATIC CONTROL
EXAMINATION (SECOND YEAR) STUDENTS OF COMPUTERS AND AUTOMATIC
CONTROL ENGINEERING

| COURSE TITLE: DIGITAL SYSTEMS			COURSE CODE: CCE2107
DATE: 24- 1- 2011	TERM: FIRST	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3 HOURS

<u>Notes:</u>

Systematic arrangement of calculations and clear neat drawings are essential.
Any data not given is to be assumed

1/3

PROBLEM # ONE (15 marks)

الإمتحان مكون من 4 أسئلة فى 3 صفحات (ورقتين)

<u>I-</u> Draw and explain the ring counter circuit?
(5 marks)

<u>II-</u> What is meant by a shift register? What is the difference between it and the shift circulate left register, if the initial value was 1101, then what will be the value stored after three clock pulses?
(7 marks)

<u>III-</u> Using whatever means possible, prove or disprove that the two combinational logic circuits shown below have equivalent function. Explain your approach and show your work. (3 marks)
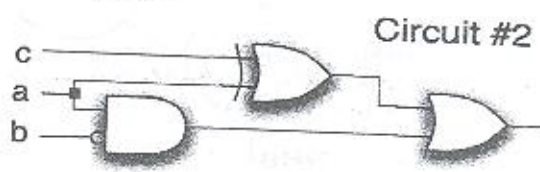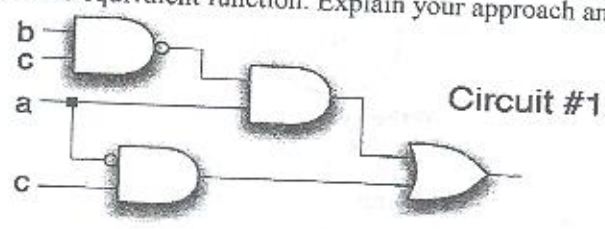
Circuit #1

Circuit #2

PROBLEM # TWO (20 marks)

<u>I-</u> Your task is to derive the state diagram associated with the following sequential logic circuit diagram:
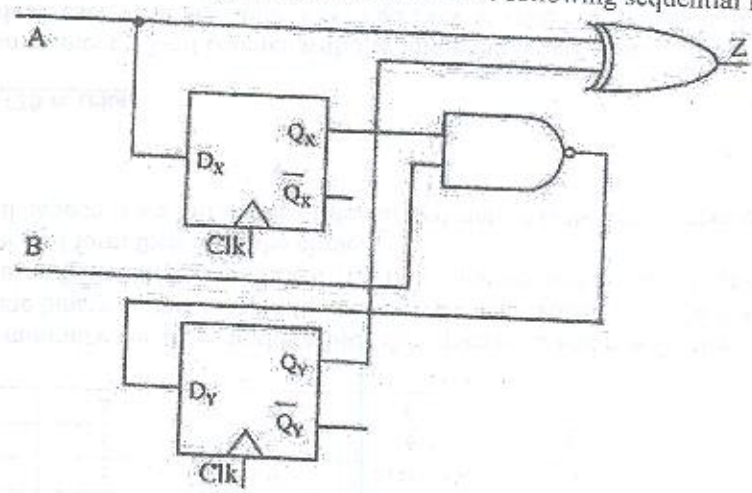
(a) Is this a <u>MEALY MACHINE</u> or a <u>MOORE MACHINE</u> and why?
(b) Write Boolean equations for the circuit nodes: Z, D_X and D_Y.
(c) Fill in the state transition table.
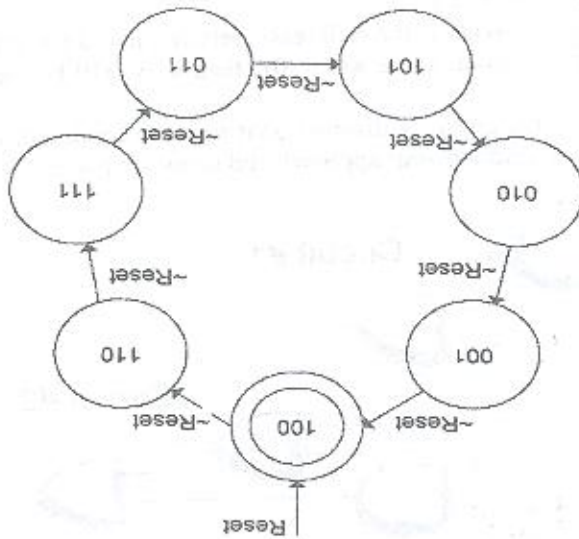(d) Draw the state diagram.

(10 marks)

Please Turn Over ⟶

III- The following state table is to be implemented using J-K flip-flops and logic gates.

Present state	Next state at x = 0	output	Next state at x = 1	output
a	a	0	e	0
b	c	0	b	1
c	a	0	f	0
d	c	0	b	1
e	f	0	e	0
f	a	0	f	0

a) Can you minimize the states in this table? If so, please do and rewrite the simplified table.
b) Find a state binary assignment for these states. (Do not reduce the table first).
c) Using this assignment, derive the J-K flip-flop input equations and output equations. Express them in a simplified form then draw the circle.
d) What will happen if we fall in one of the unused states? Is the circuit stable?   (10 marks)

PROBLEM # 3 (20 marks)

I- You are to implement a 3-bit counter with the following (somewhat unusual) state transition diagram. Note that when reset =1 at any state, it will go back to state (100). This is shown as one arc only for simplifying the diagram but should be considered when designing the circuit. Draw the schematic diagram for your 3-bit counter. You may only use 1-bit flip flops and primitive gates.   (10 marks)

II- What is the difference between synchronous and asynchronous: (10 marks)

a) Circuits   b) Counters design   c) clear

PROBLEM # 4 VHDL (20 marks)

I- Draw the block diagram that corresponds to the following VHDL model. Be sure to label all inputs, outputs, internal signals, and component ports.   (5 marks)

LIBRARY ieee;
USE ieee.std_logic_1164.ALL;

Please Turn Over ⟶

عة حاسبات

| Tanta University | Department: Elec. Power and Machines Engineering
 Total Marks: 70 Marks | Faculty of Engineering |

| Course Title: Energy Conversion
 Date: Jan. 12th 2011 (First term) | Course Code: EPM2143
 Allowed time: 3 hrs | Year: 2rd Computer and Control Engineering
 No. of Pages: (2) |

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches if possible)

Question number (1)   (18 Marks)

a) A single-phase 2300/230 V, 100 KVA transformer has the following actual parameters:

$R_{HV} = 0.2 \ \Omega$, $R_{LV} = 0.0015 \ \Omega$, $X_{HV} = 0.7 \ \Omega$, $X_{LV} = 0.0075 \ \Omega$, $R_{C(HV)} = 20 \ k\Omega$, $X_{m(HV)} = 12 \ k\Omega$

  (i) **Obtain** an equivalent circuit of the transformer referred to the high voltage side.
  (ii) If the transformer delivers rated load at 220 V and 0.8 lagging power factor, **determine** the voltage regulation and the efficiency.
  (iii) **Draw** the phasor diagram for the condition (ii).   (12 Marks)

) **Write down** the energy balance equation for the motor mode. **Prove** that the developed torque acts in the direction that tends to decrease the reluctance and increase the inductance.
                                                                                          (6 Marks)

Question number (2)   (14 Marks)

a) **Explain**, aiding with appropriate sketches, the different methods used to control the speed of dc motors.   (3 Marks)

b) **Draw** the external characteristics (i.e the relation between the terminal voltage and the load current) of different types of dc generators.   (3 Marks)

c) An 8-pole, 500-rpm dc shunt generator with 800 wave-connected armature conductors supplies a load of 25 A at its rated terminal voltage of 240 V. The armature resistance is 0.25 Ω and the field winding resistance is 240 Ω. The rotational loss is 280 W. **Determine:**

  (i) The induced emf   (ii) The flux per pole
  (iii) The torque applied   (iv) The efficiency   (8 Marks)

Question number (3)   (14 Marks)

a) A three-phase, 208-V, 50-Hz, 4-pole, 1440-rpm, wound-rotor induction motor has a standstill rotor impedance of (0.6+j2) ohm and a negligible stator impedance.

  (i) **Define** the slip, the breakdown slip and the synchronous speed. **Show** how can the direction of this speed be determined and reversed?
  (ii) **Explain briefly** the effect of the supply voltage and supply frequency on the motor torque/speed characteristics. **Illustrate** your answer with suitable sketches.
  (iii) **How** does the increase in the rotor resistance affect the breakdown slip, the starting torque, the breakdown torque? **Illustrate** your answer with suitable sketches.
  (iv) Determine the value of resistance to be added to each phase of the rotor circuit so that maximum torque is developed at the starting condition.
  (v) **Determine** the speed at full-load torque with the added rotor resistance.   (8 Marks)

----

b) A 440-V, 50-Hz, 6-pole, three-phase induction motor is taking 65-kVA, at 0.8 power factor and running at a slip of 2.5 %. The stator copper losses are 0.6 kW and the rotational losses are 3 kW. **Compute** the motor efficiency and the shaft torque.

(6 Marks)

Question number (4)   (12 Marks)

a) For a three-phase synchronous motor, **explain briefly** the effect of the field current variation on the armature current and power factor. **Illustrate** your answer with suitable sketches.

(3 Marks)

b) A three-phase, 12-KVA, 460-V, 50-Hz, 4-pole, star connected synchronous machine has a negligible stator winding resistance and a synchronous reactance of 8 ohms per phase at rated terminal voltage. The machine is first operated as a generator in parallel with a three-phase, 460-V, 50-Hz power supply.

(i)   **Write down** the conditions for connecting two synchronous generators in parallel.

(ii) **Determine** the excitation voltage and power angle when the machine is delivering rated KVA at 0.8 PF lagging. **Draw** the phasor diagram for this condition.

(iii) With the field current as in (ii) the prime mover is slowly increased. **Determine** the maximum power that the generator can supply. **What** are the corresponding values of stator current and power factor?

(9 Marks)

Question number (5)   (12 Marks)

a) A 230-V, 50 Hz, 1 HP universal motor runs at 1500 rpm and takes 1-A when connected to a 230-V dc source. **Determine** the speed and the power factor of the motor when it is connected to a 230-V, 50-Hz supply and is loaded to take 1-A (rms) of current. The motor resistance and inductance are 10 Ω and 0.25 H respectively.   (3 Marks)

b) A six phase (stator poles) permanent magnet stepper motor has two rotor poles. **Determine** the possible step angles that can be obtained, showing the corresponding sequence of excitation.

(3 Marks)

c) **Give short notes** on the main features of the following:
(i)   Single phase induction motor
(ii) Servomotors

Illustrate your answer with suitable sketches.   (6Marks)

WISH YOU ALL THE BEST

Dr. Said M. Allam

Tanta University		Department: Electronics & Comm. Engineering Total Marks: 85 Marks		Faculty of Engineering

Course Title: Electronic Circuits and Measurements Date: January 2011 (First term)	Course Code: EEC2146 Allowed time: 3 hrs	Year: 2nd No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches…etc)

Notes:
Systematic arrangement of calculations and clear neat drawings are essential.
Any data not given is to be assumed – Answer as many questions as you can.
Answer as brief as possible.

Question number (1) (20 Marks)

a) Explain several techniques that help reduce the effect of error on practical measurements.
(5 Marks)

b) Current was measured during a test as 20.5 A , flowing in a resistor of 0.2Ω. It was found that the ammeter reading was low by 1.3% while the resistance value was high by 0.5%. Find the true power as a percentage of the power that was originally calculated . (7 Marks)

c) A voltmeter having a sensitivity of 1.5 k Ω/volt reads 80 V on its 150 V range, when connected across an unknown resistor in series with milliammeter, the ammeter reads 15 mA.
Calculate (i) apparent resistance (ii) actual resistance of unknown resistor
(iii) error due to loading effect of voltmeter
(8 Marks)

Question number (2) (20 Marks)

a) Explain the basic principle of operation and construction of strain guage, what is the advantage of using a compensating gauge ? (7 Marks)

b) List various types of temperature transducers and explain the applications of each .
(8Marks)

c) A thermocouple produces a voltage of 50mV.Its internal resistance is 50 Ω .The resistance of its leads is 10 Ω. Its output is read by an ammeter having an internal resistance of 120 Ω. determine the output voltage . (5 Marks)

Question number (3) (20 Marks)

a) Explain the origin of ground loops. Sketch a circuit model for show the effect of ground loop noise and suggest several methods for removing the effects of common mode noise voltage .
(7 Marks)

b) Show how OP amp and RC network can be used to design a phase shift oscillator and explain its operation.
If the oscillator have a three stages with equivalent resistors R =10 k Ω and capacitors C =0.001µF are available , determine the value of the feed back resistance R_f necessary for your design to operate as an oscillator, determine the frequency of oscillation   (8 Marks)

c) Show how probe capacitance affects timing measurements. Determine the percentage change in a rise time of a signal generator as a result of probe capacitance, assuming the signal source resistance and capacitance are $R_s = 50 \Omega$, $C_s = 20pF$, while probe resistance and capacitance are $R_P = 1M \Omega$ and $C_P = 10pF$ (5 Marks)

P.T.O.   Page: 1/2

(a) Explain the construction of Wien bridge oscillator using an n-channel JFET as a stabilizing element and explain its operation.   (7 Marks)

(b) Sketch the block diagram of a staircase –ramp digital voltmeter and explain its operation.
                                                                                          (8 Marks)

(c) Explain the construction and principle of operation of the 555timer chip .Explain how to use it as a voltage controlled oscillator   (10 Marks)

Good Luck ....
                                    Prof. Mustafa Mahmoud

عحاسبان

Tanta
University

Department of Physics&Mathematics

Faculty of
Engineering

Problem number (1)

a- Using Lagrange polynomial to find one approximation root of the equation $\sin x + x - 1 = 0$.

b- From the following table Find:

  (i) Linear spline form

  (ii) f(1.1)and f(4.5) using

     Newton's forward and backward

x	1	2	3	4	5
F(x)	2	6	8	9	12

Problem number (2) (a)From the following table

x	0	0.25	0.5	.75	1	1.25	1.5
F(x)	1.1	2.3	3.1	4.2	7.2	9.3	11.2

Find   D2,2 (Ricardson extrapolation) where $D_{n,1} = a\left(\dfrac{h}{2^{n-1}}\right)$, a(h) is central

approximation of f '(0.5) and h=0.5.

(b)Find an approximate value of $\displaystyle\int_{0}^{8} \left(\int_{0}^{8} e^{x^2+y^2}\, dx \right) dy$ by using

Trapezoidal rule on x-axis with h=2   and   Simpson rule on y-axis with k=2

Problem number (3)

(a)Deduce the global error by using Euler method for first order ordinary differential equation

(b) Using Rung –Kutta method to find y(0.2) and z(0.2)

$$\frac{dy}{dx}=x+y+z, \qquad \frac{dz}{dx}=x-y , \qquad\qquad y(0)=1 \text{ and } z(0)=0$$

Problem number (4) (a) Using Newtons-backward to find Adams-Bash fourth –Moulton form

$$y_{n+1}=y_n+ \frac{h}{24}[55f_n-59f_{n-1}+37f_{n-2}-9f_{n-3}]$$

and using it to find y(0.4) of $\dfrac{dy}{dx}=x+y+1$, y(0)=0 and h=0.1 .

(b) Use finite difference method to find the solution of

$$u_{tt} = u_{xx} , \qquad 0 \le x \le 1 \text{ and } u(x,0)=x(1-x),\ u(0,t)=1,\ u_t(x,0) = 20$$

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

Problem number (5)

(a) Given a graph with the following lists vertex-set {1,2,3,4} and edge-list {12, 23, 24, 34, 14}

    (i) Draw this graph

    (ii) Find the adjacency matrix and incidence matrix of this graph

    (iii) Find the degree-sequence of this graph

    (iv) Give two subgraph of this graph

(b) Draw a non-simple graph with six vertices and degree-sequence (0,3,3,4,5,5)

(c) Build a binary tree which its vertices orders in preorder as 7325468 and inorder as 2345678

Prof .Dr . : Abd-El Aziz Ahamed Abo- Khadra

Dr. M.Shokry.

سؤال ادارات

Tanat University		Department: Computer and control engineering		Faculty of Engineering

Title: Data Structures and Algorithms
Final exam, Date: 22/1/2011, **Total marks:** 100

Course code: CCE2106 **Year:** Second year
Allowed time: 3 hours **Number of pages:** 2

Workout the following questions

Question 1 (15 marks)
I. State the differences between linear and nonlinear data structures and give some examples for each type.(5 Marks)
II. State the difference between sequential access and random access data structures in giving some data structure examples for each. (5 Marks)
III. State the difference between the generic List<T> and the non generic list, ArrayList, in the .NET framework class library. What class of them you prefer? Why? (5 Marks)

Question 2 (15 marks)
Given the integer numbers 100, 5, 2, 10, 1, 30, 4, 62, 70 and 40 stored in their writing order in an array.

I. Write an algorithm in any language of your choice that accept the array as a parameter and sort its contents in descending order using selection sort algorithm. (5 Marks)
II. Schematically, explain the operation of your code (how the position of each number is changed inside the array as the algorithm does its work.) (5 Marks)
III. Analyze the algorithm and give its Big Oh (asymptotic) running time cost. (5 Marks)

Question 3 (15 marks)
Binary search is one of the most famous searching algorithms.

I. Differentiate between binary search and sequential search from performance point of view .(5 Marks)
II. Write one recursive implementation and another iterative implementation for binary search in any language of your choice. The implementation should take an array and a search value. (5 Marks)
III. What is the difference between recursive and iterative implementations? (5 Marks)

Question 4 (15 marks)
I. Identify the suitable data structure for each of the following (5 Marks)
    a. Converting decimal numbers to another base
    b. Calculate the shorted path from a city to another
    c. Modeling storage location hierarchies on a storage device
    d. Building storage of citizens that will be frequently searched by national IDs
    e. Building storage of employees that will be frequently searched by names
II. If the two input stacks for the algorithm shown below are empty. Show the contents of each of them after the execution of the algorithm if the input string exp="15 + 30 − 45 + 60 − 75 + 90". (5 Marks)

III. Write an algorithm that takes the resulting stacks as argument and calculate the result of the expression. (5 Marks)
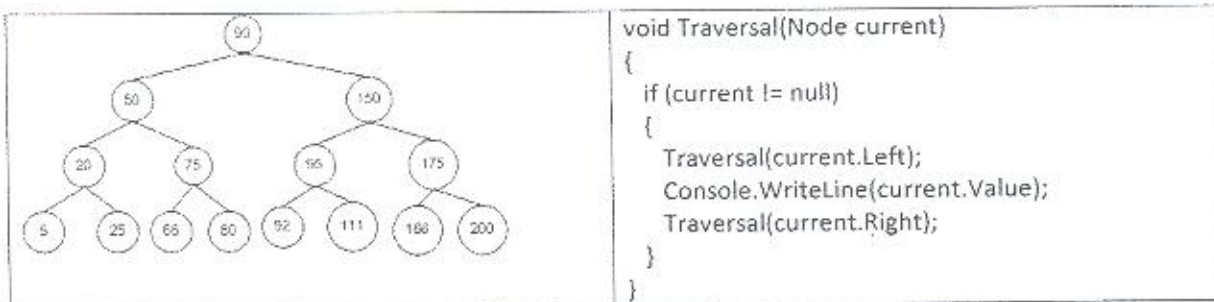
```
void Calculate(Stack N, Stack O, string exp)
{
    string ch, token = "";
    for (int p = 0; p < exp.Length; p++)
    {
        ch = exp.Substring(p, 1);
        if (IsNumeric(ch))  token += ch;
        if (ch == " " || p == (exp.Length - 1))
        {
            if (IsNumeric(token))
            {
                N.Push(token);
                token = "";
            }
        }
        else if (ch == "+" || ch == "-" || ch == "*" || ch == "/")
            O.Push(ch);
    }
}
```

Question 5 (15 marks)

Consider the binary tree and the algorithm shown below


```
void Traversal(Node current)
{
    if (current != null)
    {
        Traversal(current.Left);
        Console.WriteLine(current.Value);
        Traversal(current.Right);
    }
}
```

I. What is the output of the algorithm if the root node of the tree is passed to it? (5 Marks)

II. What is the asymptotic run time complexity of the algorithm? (5 Marks)

III. What would be the resulting tree after the deletion of the node 150 from the given tree? Give all possibilities. (5 Marks)

Question 6 (15 marks)

Consider the graph shown below and node (a) as a starting node. Apply Dijkstra's algorithm to find out the shortest path to all other nodes. Show your steps graphically
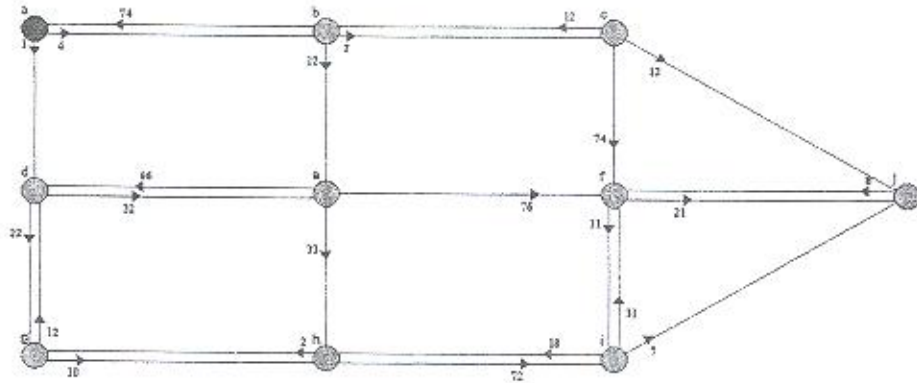
Question 6 (10 marks)

You studied two approaches to get the minimum spanning tree in a graph. Apply each of the two approaches to the graph shown below; explain each step in your solution in drawing. Do these two approaches give the same result for the given graph? If your answer is yes, under what condition this will be always true?
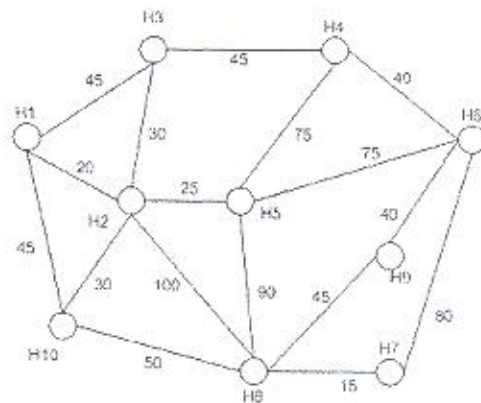
Good Luck

Course examination committee

Dr. Hamed M. Hemeda

Dr. Ahmed Al Tahawy

Dr. Tarek Al Ahmady

Prof. Hisham Arafat Khalifa

Course Coordinator: Dr. Hamed M. Hemeda