TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty Of Engineering

Final EXAM 2012/2013 – First Term

Course	Energy conversion (EPM2143)	Time	3 hours
Students	2nd Year (Computer and Control Engineering)	Mark	70
Date	10 / 1 / 2013	Number of pages	2

Answer ALL the following questions:

The first question (14 marks)	
A	Draw the power flow diagram for d.c generator.
B	A wave wound, 6 pole long shunt compound d.c generator has 600 armature conductors. The generator is driven at 300 r.p.m. calculate the e.m.f. generated if the flux per pole is 0.06Wb. If now, the generator is required to produce e.m.f of 550 V at reduced value of flux per pole of 0.055 Wb, calculate the speed at which the armature of the generator must be driven.
The second question (14 marks)	
A	Explain the various methods of speed control of d.c series motor.
B	A 220 V d.c. shunt motor has an armature resistance of 0.5 ohm and is excited to produce constant flux. At full load the motor runs at 1000 r.p.m. taking an armature current of 40 A. if a resistance of 0.8 ohm is inserted in series with the armature, determine the speed at full load.
The third question (14 marks)	
A	Explain the short circuit test and open circuit test on transformer. Why these tests are to be performed?
B	A 10KVA, 125/250 V, 50 Hz, single-phase transformer gave the following readings, Open circuit test : 250 V, 0.6 A, 50 W (L.V. side open) Short circuit test : 15 V, 40 A, 100 W (L.V. side shorted) Determine a- The efficiency on full load, 0.8 lagging power factor. b- The voltage regulation on full load, 0.8 leading power factor. c- The efficiency on 50% full load, 0.6 leading power factor. d- Draw the equivalent circuit referred to primary and insert all the values in it.

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The fourth question (14 marks)	
A	Discuss briefly the various methods of speed control of a three-phase induction motor.
B	The full load power input to 4 pole, 50 Hz three-phase induction motor is 50 kW, running at 1440 r.p.m. calculate its full load efficiency if stator losses are 1000 W and frictional losses are 650 W.
The fifth question (14 marks)	
A	Discuss the methods used for starting single-phase induction motors.
B	A 230 V, three-phase wye-connected round rotor synchronous generator gives on open circuit, e.m.f of 230 V, for afield current of 0.38 A. the same field current on short circuit causes an armature current of 12.5 A. the armature resistance measured between two lines is 1.8 ohm. Find the regulation for the current of 10 A at 0.8 lagging and 0.8 leading power factors.

Good Luck and best wishes
Dr. Abd El-Wahab Hassan

Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: **Digital Systems**	Course Code: **CCE2107**	Year: **2nd Computers**
Date: **Jan. 13th 2013 (First Term)**	Allowed time: **3 hrs**	No. of Pages: (3)

Remarks: **Please Read the question more than once to fully understand it before you start solving, Do not forget to make verification and validation for your answers.**

Problem number (1) (30 Marks)

a) Define: Flip-flops, Registers and counters.

b) What functions do JK and T Flip-flops provide?

c) Why 00/11 is not used in the RS Flip-flop?

d) How D Flip-flop is constructed from RS Flip-flop? And how its function is obtained through RS Flip-flop modification made?

e) How T Flip-flop is constructed from JK Flip-flop? And how its function is obtained through JK Flip-flop modification made?

f) How to reset the output of JK and T Flip-flops in every possible way?

Problem number (2) (25 Marks)

a) What is the difference between synchronous set and asynchronous set in details? Draw the circuit you are using as an example.

b) How to convert shift-right register to shift-right circulate register? If the initial value in the shift-right register is (010010) and you are making serial transfer to another register with the same length, how many clock pulses will you need to fully transfer this register? Show step by step at each clock pulse the content of the two registers.

c) Draw the circuit that adds two registers A and B serially. The output is stored in B. The content of A should be destroyed during the addition.

Problem number (3) (20 Marks)

a) Design a universal register that performs the following operations:

1- set the output to all 0's
2- set the output to all 1's
3- parallel load from external inputs (I's)
4- keep last value
5- load last value's complement
6- shift right

b) Design the sequential circuit that counts: 1,3,4,0,2,1,3,..... Don't forget to check the unused states.

c) Draw the synchronous binary counter using T and D flip flops.

d) In the following ASM chart :

1- What are the values checked?

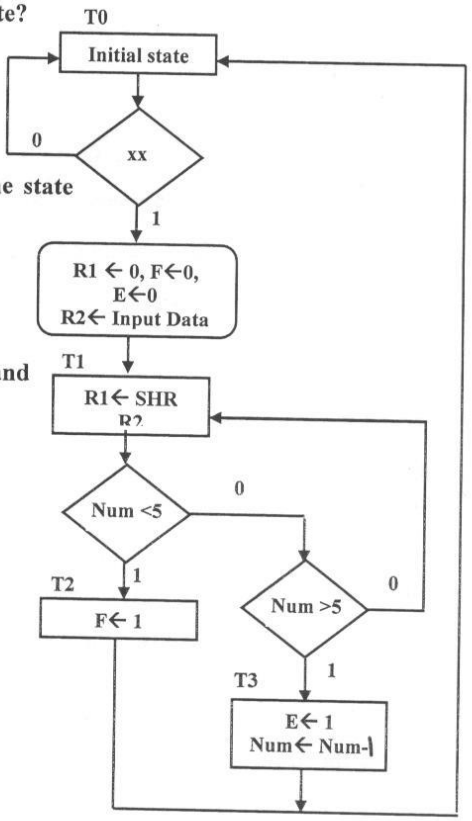
2- What are the operations performed in each state?

3- What is the number of states?

4- Draw the state diagram.

5- Design the control circuit using only D flip-flops and using JK flip-flops and a decoder. Which circuit is better and why?

(Note: when making the design and drawing the state diagram , put Num<5 as Y and Num>5 as Z)



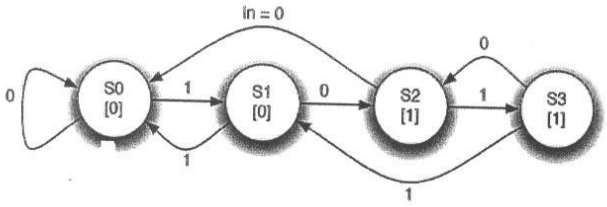
Problem number (4) (15 Marks)

a) Find the errors in the following VHDL code and state why, then correct them.

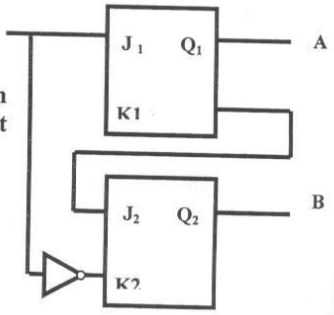
```
Entity 4-to-1Mux
  Port(I0,I1,I2,I3: in;
       s1,s2: in std_logic;
       Z out std_logic_vector);
End entity;

Architecture beh is
Begin
       If(S="00") then Z=I0;
       Else If(S="01") then Z=I1;
       ElsIf(S="00") then Z=I2;
       Else If(S="11") then;
End;
```

b) Write the VHDL code that simulates the following state diagram.



c) Write down the VHDL code that simulates JK flip-flop. Then use it to write the VHDL code that simulates the following circuit hierarchally.



Good Luck

Course Coordinator: Assoc. Prof. Dr. Amany Sarhan

Tanta University

Physics & Engineering Mathematics Department
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Engineering Mathematics (3) a Year: 2nd (Computer and Automatic Control Department)
Course Code: PME2111 Date:17 / 1 / 2013 (First term) Allowed time: 3 hrs No. of Pages: (2)

Remarks: (Answer the following questions. Assume any missing data…)

Problem number (1) (25 Marks)

(a) What is the meaning of round off and truncation errors? Construct a Lagrange polynomial of degree two or less of $f(x) = 2x^2e^x + 1$ using $x_0 = 0, x_1 = 0.5$ and $x_2 = 1$. Approximate $f(0.8)$ and estimate the error bound of Lagrange at $= 0.8$.

(b) The velocity of a rocket v is given as a function of time t ,

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

Find the velocity at $t = 14(s)$ using a 2nd and 3rd order polynomials using general Newton formula. Use the 2nd order polynomial to find:

1) The distance covered by the rocket from $t = 11(s)$ to $t = 14(s)$.
2) The acceleration of the rocket at $t = 14(s)$.

(c) Prove that $\Delta = \frac{\delta^2}{2} + \delta\sqrt{1 + (\frac{\delta^2}{4})}$, where Δ refers to the forward operator and δ refers to the central difference operator.

(d) Estimate the population for years 1895 and 1925 from the following table using Newton's forward and backward formulas:

Year	1891	1901	1911	1921	1931
Population	46	66	81	93	101

(e) Use the directional encoding (771077) to find an approximation value of the curve image using Spline interpolation.

Problem number (2) (15 Marks)

(a) Derive the central difference formula for the second derivative. Find $f'(1.5)$ from the function $f(x) = \text{Ln}\,(x + 4)$ with $h = 0.1$, $N = 2$ using Richardson formula.

(b) Evaluate $\int_1^{2.5}\int_{0.4}^{1.6}(x^3 + xy)dxdy$ with h=0.4 in x- direction, k=0.5 in y- direction using Trapezoidal rule.

(c) Approximate $\int_{0.2}^{1.1} \frac{12.1 + Ln(e^{\frac{2.4}{x}} - 1)}{x^2(e^{x^2} - 1)}\,dx$ using Romberg interpolation with k= 3.

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Problem number (3) (20 Marks)

(a) Derive Gaussian three-points quadrature formula and use it to get $\int_0^1 Ln(3+sinx)dx$.

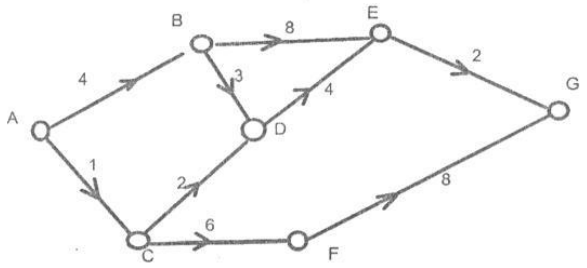
(b) Use the Runge-Kutta method of order 4 to find y and y'at x=0.25 from $y''+4y'+4y=x^2$, $y(0)$= 1 and $y'(0)$= 0.

(c) Use the Adams-Bashforth 4 step method to obtain an approximation to the solution of the IVP $y'=-xy$ in [0, 0.6] with h=0.1 and $y(0)$= 2.

(d) Solve the BVP $y''+(x+1)y'-2y=(1-x^2)e^{-x}$, $0\le x\le 1$ with $y(0)$=-1 and $y(1)$=0, using the finite difference method with h=0.2, compare the results with the exact solution $y=(x-1)e^{-x}$.

Problem number (4) (25 Marks)

(a) Find the shortest path between node(A) and node (G) by use Pruning algorithm in the following graph :



(b) Prove that for any graph G = (V, E) the average quantifies degree equal half of the average degree of G = (V, E) (i.e $\varepsilon(G)=\frac{1}{2}d(G)$).

(c) Decide whether the sequence S: 5, 4, 3, 3, 2, 2, 2, 1, 1, 1 is graphical by use deletion degree theorem

(d) From the numbers 1, 2, 3,….,14 form ordering
(i) binary tree with root (7) and leaves (9),(2) .
(ii)) AVL binary search tree with root (7) and leaves (8),(6).
After building trees delete (13) and then Insert (15) to trees vertices.

With our best wishes

Dr. M.Shokry *Dr. Assem Elshenawy*

Tanta University	Department: Computer and Control Engineering Total Marks: 75 Marks	Faculty of Engineering
Course Title: Microprocessors	Course Code: EC21	Year: 2nd
Date: January 2013 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Answer the following questions

Problem number (1) (18 Marks)

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

1) The code segment is limited to 64 Kbytes in 80386.
2) In real mode, segments can begin at any location in the memory system.
3) PUSH BX is equivalent to PUSH EBX
4) MOV AX, DL
5) STD
6) MOV ES, DS
7) REP STOSB
8) AND AL, BL
9) LES BX, CAT
10) LEA CX,[BL]
11) IN DX
12) PUSH 73_H

[b] Draw the internal architecture of the microprocessor 80286 then describe the use of all registers. (8 Marks)

Problem number (2) (17 Marks)

[a] For the following instructions determine the data addressing mode and define its function. (8 Marks)

1) MOV [1234_H], BX
2) DIV CH
3) ADD CL, [BX + DI]
4) MOV ARRAY[BX], AX
5) MOV [BX], DH

[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.

Problem number (3) (20 Marks)

[a] In a machine language instruction, what is specified by the MOD field, the D and W bits found in some machine language instructions. (6 Marks)

[b] If a MOV DI, [BX +SI+ 30_H] instruction appears in a program, what is its machine language equivalent? (6 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

[c] Describe the operation of each of the following instructions and the content of the destination operand in each instruction after execution assuming the initial values are DS =0200H, BX = 4F82H (8 Marks)

1) INC BX
2) SUB BH, 20_H
3) ROR BX, 2
4) AND BX,$F0FF_H$

Problem number (4) (20 Marks)

[a] Suppose that DS = 0400H, BX = 0300_H, SS = 0200_H, SP = 0001_H, and DI = 0400H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (7 Marks)

1) MOV CX, [1234_H]
2) PUSH BX
3) MOV DX, [BX]
4) INC BYTE PTR[BX]

[b] Explain the meaning of the following instructions: (13 Marks)

1) . MODEL SMALL
2) PUSHA
3) MOV BX, OFFSET DATS
4) CMOVS BX, DX
5) OUT DX, AX
6) OUTSB
7) DATAS DW 20 DUP(?)
8) MUL DI

مع أطيب الأمنيات بالتوفيق

Tanta University	Department: Computer and Control Engineering Total Marks: 75 Marks	Faculty of Engineering
Course Title: Microprocessors	Course Code: EC21	Year: 2nd
Date: January 2013 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Answer the following questions

Problem number (1) (18 Marks)

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

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12) PUSH 73_H

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7) DATAS DW 20 DUP(?)
8) MUL DI

مع أطيب الأمنيات بالتوفيق

Tanat University | Department: Computer and control engineering | Faculty of Engineering

Title: Data Structures and Algorithms **Course code:** CCE2106 **Year:** Second year
Final exam, Date:24/1/2013, **Total marks:** 100 **Allowed time:** 3 hours **Number of pages:** 3

Work out the following questions

1. Differentiate between the following (10 marks)
   - Sequential access and random access linear data structures
   - Hierarchical and grouped non-linear data structures

2. Write a C# console program that creates an array of 10 numbers all are of type double. The program then fills the array with random double numbers each of them is a positive double that is less than 100. Then it prints the array to the screen, sorts the array in descending order using Selection sort algorithm and reprints the sorted array to the screen. It is preferable to do array printing and sorting using dedicated functions or methods.(10 marks)

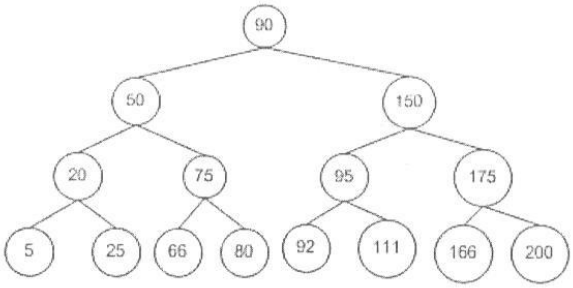
3. a) What is the big O complexity of sequential and binary search algorithms?(5 marks)
   b) Write a C# console program that creates an array, initializes it with 20 integer values sorted in ascending order. The program then searches the array for a value asked by the user using the binary search algorithm. If the value is in the array, the program displays the index where it's found, otherwise it displays -1 as a code for not found data. Implement the binary search in two forms: iteratively and recursively (15 marks)

4. a. Manually calculate the following postfix mathematical expression by applying the evaluation algorithm you studied (10 marks).
      - 25 2 - 3 +4 + 15 –
      - 2 10 5 / +15 16 2 / - + 3 -
   b. Write a C# program that converts an infix mathematical expression to a postfix expression. Your program should accept an infix expression from the user and prints the postfix expression on the screen. Implement the conversion in an isolated function(10 marks).

5. Derive a Priority queue from the standard queue in the .NET class library. The derived queue should store items. Each item is specified by a name and a priority. The derived queue should implement two modified de-queue and peek functions that peek and extract items from the queue according to their priorities (the smallest is the highest priority), in addition to de-queue and peek standard functions. Write a C# console program that implement and test your derived queue. (10 marks)

6. Write three c# function each accept a binary tree node and does according the following (15 marks):
   - The first function lists the values of the tree in Pre-order sequence in printing out them on the screen
   - The second function lists the values of the tree in In-order sequence in printing out them on the screen
   - The first function lists the values of the tree in Post-order sequence in printing out them on the screen

   Write a complete C# console program that demonstrate the operation of the tree functions on the tree shown below



7. For the same binary tree given in problem 6, Write the node values in the tree in traversing the tree in the following manners (15 marks):

   a) Preorder traversal
   b) Inorder traversal
   c) Postorder traversal

Best wishes...

The examination committee