Tanta University		Department: Engineering Physics and Mathematics Total Marks: 85 Marks		Faculty of Engineering

Course Title: Mathematics(3B)	Course Code: PME2211	Year: 2nd(Computer &Control Dep.)
Date: June 8th, 2014 (Second term)	Allowed time: 3 Hrs	No. of Pages: (3)

**Remarks: Answer All of The Following Questions**

Question Number (1) (25 Marks)

(a) Show that the set $A = \int \left(\frac{1}{\sqrt{1+5x}} \right) / x$ is convex

(b) Consider the fuzzy sets F and G defined in interval [0,10] by the memberships

$\mu_F(x) = 2^{-x}$ and $\mu_G(x) = \frac{1}{1+10(x-2)^2}$ .Determine the mathematical formulas and graphs

of memberships functions of (i) $\mu_{\bar{F}}$ and $\mu_{\bar{G}}$ (ii) $\mu_{F \cup G}$ and $\mu_{F \cap G}$

(c) A product with memberships represents, degree of high expensive $\mu_A(x)$, degree of medium expensive $\mu_B(x)$ and degree of cheap expensive $\mu_c(x)$ .Us defuzzification methods to find suitable price, if its medium degree is 0.5 and high degree 0.8 where
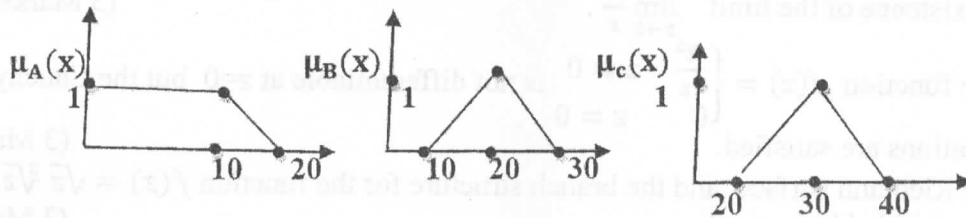

(d) Consider Washing machine with two input and one output . The input :

[1] The dirtiness of the Load which measured by the opacity of the washing water use an optical sensor system {Almost clean(AC), Dirty(D), Soiled(S), Filthy(F)} with fuzzy dirtiness membership $\mu_A(x)$

[2] The weight of the Laundry load as measured by a pressure sensor system {Very light(VL), Light(L), Heavy(H), Very heavy(VH)} with fuzzy weight membership $\mu_B(x)$
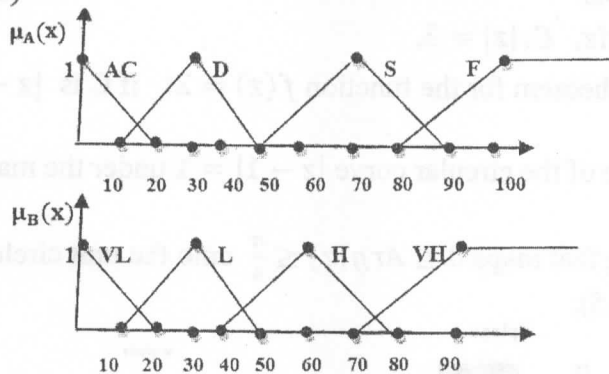
The output is the amount of detergent dispensed {Very little(VL), Liittle(L), Much(M), Very much(VM), Maximum(Max)} $\mu_C(x)$
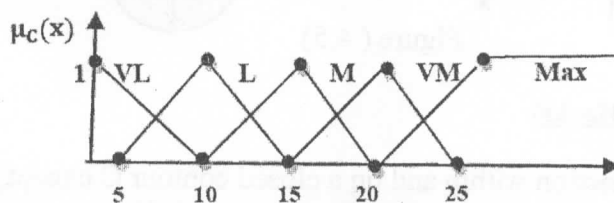
Find the fuzzy detergent dispensed value if laundary has dirtiness values 13 and weight 72

Question Number (2)   **(15 Marks)**

If the method of Frobenius is used to solve the following linear homogenous 2nd order ordinary differential equation (L.H.O.D.E.)

$$x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + (x^2 + 1)y = 0$$

1. Show that the point x=0 is the unique regular singular point.   (3 Marks)
2. Deduce the indicial equation and find the values of λ.   (4 Marks)
3. Deduce the recurrence relation for coefficient of the series solution.   (4 Marks)
4. Deduce the general series solution y(x).   (4 Marks)

Question Number (3)   **(15 Marks)**

1. Sketch the domain of the function $f(z) = \frac{1}{3(z^2 + \bar{z}^2) - 10z\bar{z} + 25}$.   (3 Marks)
2. Prove that $f(z) = \frac{z}{z^4 + 1}$ is continuous at all points inside and on the unit circle $|z| = 1$ except at some points and determine these points.   (3 Marks)
3. Discuss the existence of the limit $\lim\limits_{z \to 0} \frac{\bar{z}^2}{z}$.   (3 Marks)
4. Show that the function $f(z) = \begin{cases} \frac{\bar{z}^2}{z} & z \neq 0 \\ 0 & z = 0 \end{cases}$ is not differentiable at z=0 but the Cauchy-Riemann equations are satisfied.   (3 Marks)
5. Construct the Riemann surface and the branch structure for the function $f(z) = \sqrt{z} \sqrt[3]{z}$ if the angle is embedded in $[-\pi, \pi]$.   (3 Marks)

Question Number (4)   **(15 Marks)**

1. Let f(z) be an analytic in a simple connected domain and let C be a simple closed contour lying entirely within the domain, if z_o is any point interior in C then prove that
$$2\pi i \, f^{(n)}(z_o) = n! \oint_C \frac{f(z)}{(z - z_o)^{n+1}} dz, \quad n = 0,1,2,3, \dots .$$ (3 Marks)
2. Evaluate $\oint_C \frac{Ln(z)}{(z-3)^3 (z+4)^2} dz, \quad C: |z| = 3$.   (3 Marks)
3. Verify Cauchy's integral theorem for the function $f(z) = 2i$ if C is $|z - 3i| + |z + 3i| = 20$.   (3 Marks)
4. Find and sketch the image of the circular curve $|z - 1| = 1$ under the mapping $w = \frac{1}{z}$.   (3 Marks)
5. Find the bilinear mapping that maps $0 \leq Arg\{z\} \leq \frac{\pi}{4}$ onto the unit circle $|w| \leq 1$ as shown in the following figure (4.5).   (3 Marks)
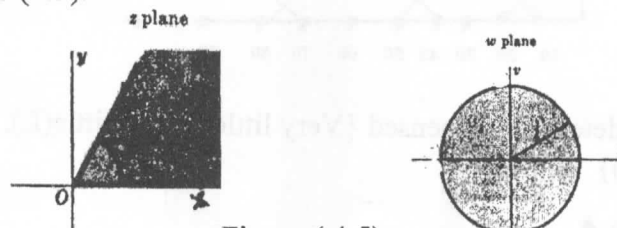

Figure (4.5)

Question Number (5)   **(15 Marks)**

1. Let f(z) be an analytic function within and on a closed contour C except at a finite number of singular points $z_1, z_2, \dots, z_n$ interior to C. Then prove $\oint f(z)dz = 2\pi i \sum_{i=1}^{n} \operatorname*{Res}_{z=z_i}\{(f(z)\}$ where the integral is taken counter clockwise direction around C.   (3 Marks)

| Course Title: Communication systems | Course Code: EEC2247 | Second Year |
| Date: 12-6-2014 | Allowed time: 3 hrs | No. of Pages: (2) |

Answer all the following questions:

Question (1)   (20 degrees)

1. Find the exponential Fourier series for the periodic waveform $g_p(t)$ shown in Figure (1) and plot its amplitude spectrum. (A=1)
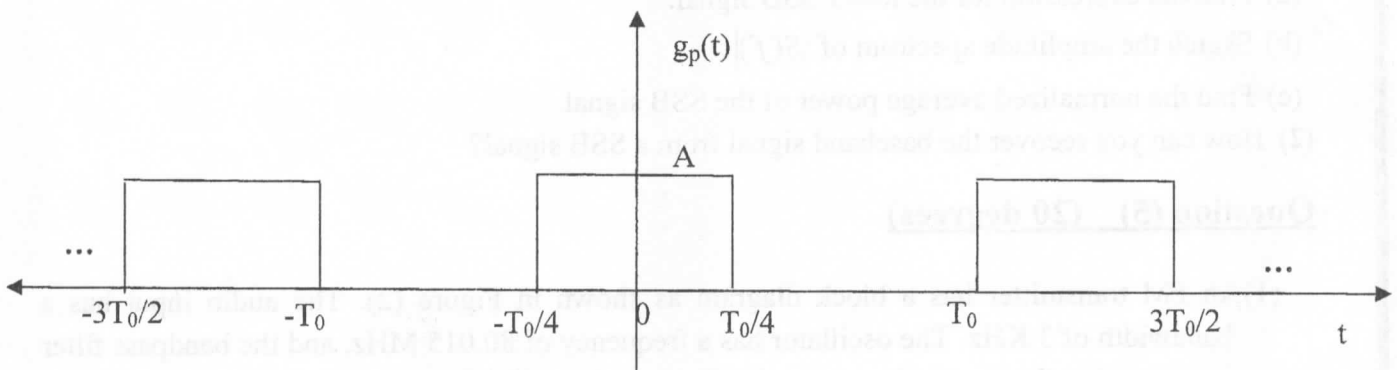

Figure (1)

2. Proof that the normalized power of a periodic waveform *g(t)* is given by :

$$P_w = \sum_{m=-\infty}^{\infty} |C_n|^2$$

Question (2)   (20 degrees)

(1) If the Fourier transform of a signal $g(t)$ is denoted by $G(f)$. Prove the following property of the Fourier transform:

$$\int_{-\infty}^{\infty} g(t)dt \Leftrightarrow \frac{1}{j2\pi f}G(f) + \frac{G(0)}{2}\delta(f)$$

(2)   Find the Fourier transform for the following functions:

(a) $w(t) = rect.(\frac{t-5}{10}) + 8\sin(6\pi t)$

(b) $x(t) = 5 - 5e^{-2t}u(t)$.

(c) $x(t) = \Lambda(\frac{t}{2})$

Question (3)   (20 degrees)

(1) An AM signal is generated by modulating the carrier wave f_c=800 kHz by the signal
   $m(t) = -0.2 + 0.6\sin(4000\pi t)$, $A_c = 1$, $k_a = 1$

   a. Find the AM wave in the time domain and sketch the spectrum of it.

   b. Determine the average power in the total carrier and in the sidebands.

   c. What is modulation index?

   d. What is the peak power delivered to the 50 Ω load?

(2) A signal $m(t)=2\cos(4000\pi t)$, is transmitted by DSB-SC modulator by using a carrier $c(t) = 4\cos(10000\pi t)$, determine the following:

 (a) The spectrum of the DSB-SC signal.

 (b) How can you demodulate the signal using coherent detector?

 (c) Show, how can you recover the baseband signal from the DSB-SC wave by using the squaring loop receiver.

 (d) What is the transmitted bandwidth?

Question (4)   (20 degrees)

(1) A SSB-AM transmitter is modulated with the baseband signal $m(t) = 0.5\cos(300\pi t)$, the carrier signal has $A_c = 3$ $Volt$, and $f_c = 4kHz$.

 (a) Find the expression for the lower SSB signal.

 (b) Sketch the amplitude spectrum of $|S(f)|$.

 (c) Find the normalized average power of the SSB signal.

(2) How can you recover the baseband signal from a SSB signal?

Question (5)   (20 degrees)

 (1) An FM transmitter has a block diagram as shown in Figure (2). The audio input has a bandwidth of 3 KHz. The oscillator has a frequency of 80.015 MHz, and the bandpass filter is centered at the carrier frequency that is located at 143 MHz. The FM exciter has a carrier frequency 20.9957 MHz and a peak deviation of 0.694 KHz when the audio signal is applied. Calculate the carrier frequency and the peak deviation of the FM signal at points B, C, D, E, and F.
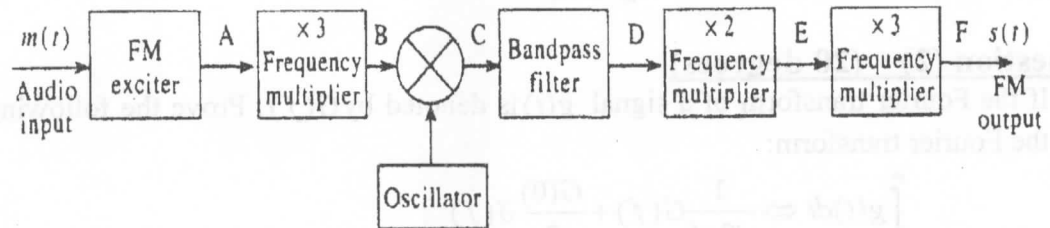

Figure (2)

 (2) Explain how the Phase Locked Loop (PLL) can be used to demodulate the FM wave.

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Good Luck   *Dr. Entesar Said*

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Tanta University
Faculty of Engineering
Department of Computer & Control Eng.
Subject: Society of Information Technology (2nd year)

Date: 15/6/2014
Time allowed: 30 Min.
Full Mark: 40 Mark
Final Term Exam (2nd Semester)

Answer All the Following Questions
The First Question (20 Marks)
Select the best answer from the following choices

1. According to Metcalfe's Law, the value of a network grows roughly by a power of _____ of the number of its users or nodes
   A. three
   B. four
   C. two
   D. five

2. This business model represents an arrangement in which businesses can turn other businesses into their virtual commissioned sales force.
   A. affiliate marketing
   B. viral marketing
   C. direct marketing
   D. virtual marketing

3. CRM stands for
   A. Customer Relationship Management
   B. Customer Responsibility Management
   C. Customer Reliability Management.
   D. Consumer Relational Management

3. _____ are intra-organizational Web-based secure networks that facilitate information access and collaboration.
   A. Extranets
   B. Virtual Private Networks
   C. Intranets
   D. EDI networks

4. Businesses in an alliance may
   A. share resources
   B. establish permanent supplier-company relationships
   C. create joint research efforts
   D. all of the above

5. "A set of programs that enable the hardware to process data" best describes
   A. Software
   B. Telecommuting
   C. Virtual corporations
   D. Database objects.

6. The architecture for EC is known as _____ computing, which connects computers and other electronic devices via telecommunication networks
   A. Networked
   B. PC
   C. Mainframe
   D. Internet

7. Assuming that price is the only consideration, in a reverse auction, the highest bid wins.
   A. True
   B. False

8. In general, in order to respond to the many market, technology, and societal pressures surrounding the modern organization, the organization devises a set of critical response activities supported by information technology.
   A. True
   B. False

9. _____ refers to the conduct of e-commerce via wireless devices.
   A. E-commerce
   B. L-commerce
   C. M-commerce
   D. I-commerce

10. A company that performs most of its business functions electronically in order to enhance its operations and competitiveness is
    A. E-Business
    B. Electronic Commerce
    C. Information technology
    D. Intranet

11. A use of web-based systems to support buying selling and customer service exemplifies
    A. E-business
    B. E-Commerce
    C. Network
    D. Distributed computing

12. Connects computers and other electronic devices via telecommunication networks
    A. Intranet
    B. Internet

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C. Networked Computing
D. Extranets

13. _____ are self-contained, self-describing business and consumer modular applications, delivered over the Internet, that users can select and combine through almost any device, ranging from personal computers to mobile phones.
A. XML
B. Web Services
C. Object Services
D. Information Services

14. _____ includes the system hardware, development software, networks and communications facilities, databases, and information systems personnel.
A. Physical data model
B. Information infrastructure
C. Systems architecture
D. Information architecture

15. A _____ handles the day-to-day, routine, repetitive tasks that are essential to the operation of the organization. Activities supported include the monitoring, collection, storage, processing and dissemination of the organization's basic business transactions.
A. Transaction Processing System
B. Management Information System
C. Knowledge Management System
D. Office Automation System

16. ____ is a group of programs that manipulate the database and provide an interface between the

database and its users and other application programs.
A. DBMS
B. DBA
C. IS
D. DBS

17. A(n) ____ is a description of the entire database.
A. ERD
B. DBMS
C. table
D. schema

18. A(n) ____ is a collection of related data fields.
A. character
B. computed field
C. record
D. file

19. A(n) ____ is the basic building block of information, consisting of uppercase letters, lowercase letters, numeric digits, or special symbols.
A. character
B. field
C. record
D. file

20. ____ is a visual approach to developing database queries or requests.
A. DDL
B. QBE
C. DML
D. DAL

The Second Question (7 Marks)
a) Briefly define information technology, mobile computing, and m-commerce.
b) What is information system and list its main components.
c) Compare between a networked computing and networked organizations.

The Third Question (7 Marks)
a) Define data, information, knowledge, TPS, and MIS.
b) What information systems support the work of groups?
c) Distinguish between a mainframe and a distributed environment.

The Fourth Question (6 Marks)
a) Briefly describe differences and relationships between intranets and extranets.
b) What are major benefits and limitations of working in groups.
c) Compare between corporate portals and information portals.

With my best wishes

Tanat
University

Computer and control engineering dept.

Faculty of Engineering

Title: Computer graphics
Final exam, Date: /6/2014, **Total marks:** 75

Course code: CCE2211   **Year:** Second year
Allowed time: 3 hours   Page (1 /2)

Workout the following questions

1) a) We can generally classify graphics utilities and libraries in two main types: the first is two dimensional drawing utilities / libraries and the second is three dimensions utilities / libraries that utilizing scene/viewer/projection model. Explain the main differences between the two types in stressing the role of the graphics creator when using each of them. (5 Marks)

   b) Movies are generally produced on 35-mm film that has a resolution of approximately 2000 x 3000 pixels. What implication does this resolution have for producing animated images for a video show on a computer as compared with film? (5 Marks)

2) a) Write a C++ program that draws the following symbolic character using OpenGl library (10 Marks)
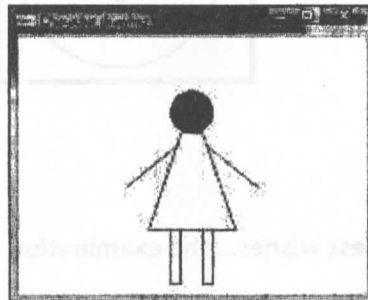
   b) OpenGL output is strictly specified and will predictable when we model our objects using *simple, convex and flat* polygons. What is a flat polygon? What is a simple polygon? What is a convex polygon? Give example in drawing when possible (5 Marks)

3) a) In OpenGL, we can associate a color with each vertex. If the endpoints of a line segment have different colors assigned to them, OpenGL will interpolate between the colors as it renders the line segment. It will do the same for polygons. Use this property to display the Maxwell triangle: an equilateral triangle whose vertices are red, green, and blue. Explain using code. (7 Marks)

   b) Write an OpenGL program to draw a damped cosine functions four times, each in a separate quarter in the output graphics window. Hint; use the viewport setting to change the location and size of the output graphics area with respect to the output graphics window (8 Marks)

4) a) What is the purpose of each of the following OpenGL function calls? Explain how the parameters are used, if any. (8 Marks)
   i) glClear(GL_COLOR_BUFFER_BIT);
   ii) glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);
   iii) glEnable(GL_DEPTH_TEST);
   iv) glOrtho(-50. 0,50.0 ,-50.0, 50.0, -50.0, 50.0);

   b) The manner by which input devices provide input to an application program can de described in terms of two entities: a measure process and a device trigger.(7 Marks)
   i) Explain what is the measure process and what the trigger may be
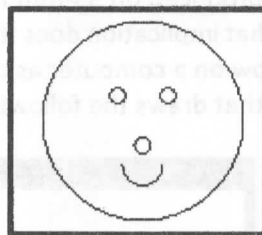   ii) What are the three distinct modes by which an application can get a measured value from an input device

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5) a) What is hierarchical modeling? What are its advantages? Give some examples. (5 Marks)

   b) Write an OpenGL program that draw a face. Model the face simply by one circle for the outline, two circles for the two eyes, one circle for the nose, and one half-circle for the mouse (see the figure below). Your program should use hierarchical modeling implemented by display lists to draw the face.

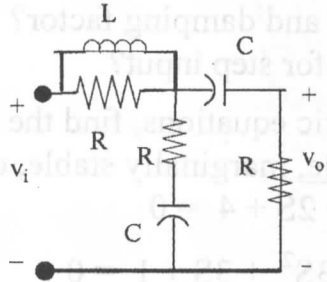**Best wishes… the examination committee**

| Tanta University | | Department: Computers and Automatic Control
Total Marks: 90 Marks | | Faculty of Engineering |

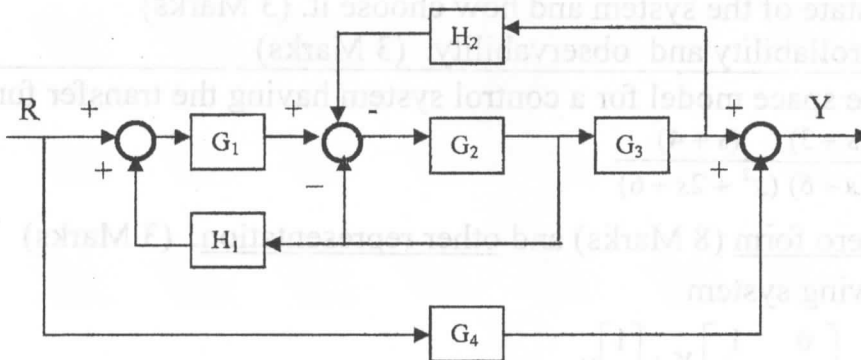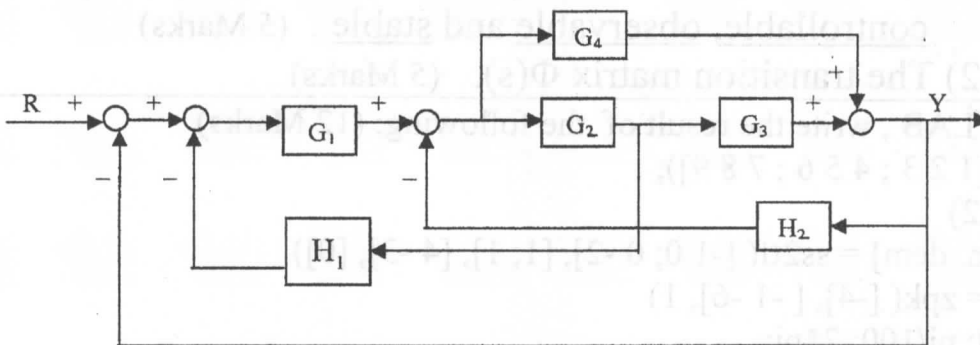| Course Title: Signals and Systems
Date: June 2014 | Course Code: CCE 2210
Allowed time: 3 hrs | Year: 2nd
No. of Pages: (2) |

Q1) a) Find the mathematical model (transfer function) of the following system. (8 Marks)
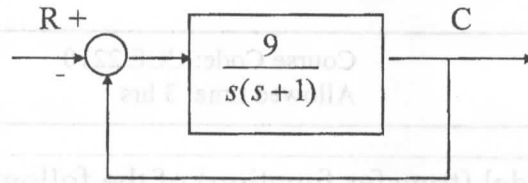

b) Determine the transfer function using signal flow graph. (8 Marks)

c) Determine the transfer function using block diagram reduction. (8 Marks)

Q2) [a] For the following system: (10 Marks)

R + $\xrightarrow{\quad}$ ⊗ $\xrightarrow{\quad}$ $\boxed{\dfrac{9}{s(s+1)}}$ $\xrightarrow{\quad}$ C

1) Find the type of the system and the order?
2) Determine the natural frequency and damping factor?
3) Determine the steady state error for step input?

[b] For each of the following characteristic equations, find the <u>root distribution</u> and <u>determine whether the system is stable</u>, marginally stable, or unstable: (12 Marks)

    i) $S^6 + S^5 + 2S^4 + 2S^3 + 3S^2 + 2S + 4 = 0$

    ii) $S^7 + 3S^6 + 3S^5 + S^4 + S^3 + 3S^2 + 3S + 1 = 0$

    iii) $S^5 + 2S^4 + 2S^2 + 3S + 7 = 0$

Q(3): 1- Explain three properties of the system and give an example for each. (5 Marks)
         2- Define the state of the system and how choose it. (3 Marks)
         3- Define controllability and observability. (3 Marks)

Q(4): **[a]** Find a state space model for a control system having the transfer function:

$$G(s) = \frac{(s+3)\,(s+4)}{(s+5)\,(s^2+2s+6)}$$

     in the <u>pole-zero form</u> (8 Marks) and <u>other representation</u>. (3 Marks)

[b] For the following system

$$\underline{\dot{X}} = \begin{bmatrix} 0 & 1 \\ -5 & -6 \end{bmatrix} \underline{X} + \begin{bmatrix} 1 \\ 2 \end{bmatrix} u$$

$$y = \begin{bmatrix} 4 & 1 \end{bmatrix} \underline{X}$$

Find : 1) Determine whether the system in (b) is completely state <u>controllable</u>, <u>observable</u> and <u>stable</u> . (5 Marks)
         2) The transition matrix Φ(s). (5 Marks)

Q(5): In MATLAB , write the result of the following: (12 Marks)
   a) >> A =[1 2 3 ; 4 5 6 ; 7 8 9]);
     >> A(:,2)
   b) >> [num, dem] = ss2tf([-1 0; 0 -2], [1; 1], [4 -3], [0])
   c) >> sys = zpk([-4], [-1 -6], 1)
   d) >> x= 0: pi/100: 2*pi;
     >>y =sin(x);
     >>plot(x,y)
     >> xlabel ('x = 0 : 2\pi ');
     >> title ('plot of the sine function')

Course Examination Committee

Dr: Mohamed Ahmed Shoaib

Tanta University
Faculty of Engineering
Dept. of Computer & Control Eng.
Subject: Computer Architecture

Date: 26/6/2014
Time allowed: 180 Min.
Full Mark: 100 Mark
Final Term Exam (2nd Semester)

الفرقة الثانية

Answer The Following Questions (ملحوظة هامة: الأسئلة في ورقتين)

The First Question

(a) What is wrong with the following register transfer statements:
   1. $xT: AR \leftarrow AR', AR \leftarrow 0$
   2. $yT: R_1 \leftarrow R_2, R_1 \leftarrow R_3$
   3. $zT: PC \leftarrow AR, PC \leftarrow PC + 1$

(b) Design an arithmetic circuit with one selection variable S and two n-bit data inputs A and B. The circuit generates the following four arithmetic operations in conjunction with the input carry C_{in}. Draw the logic diagram for the first two stages.

S	$C_{in} = 0$	$C_{in} = 1$
0	$D = A + B$ (add)	$D = A + 1$ (increment)
1	$D = A - 1$ (decrement)	$D = A + \bar{B} + 1$ (subtract)

(c) The 8-bit registers AR, BR, CR, and DR initially have the following values:
   AR = 11110010, BR = 111111, CR = 10111001 , DR = 11101010.
   Determine the 8-bit values in each register after the execution of the following sequence of microoperations.

   $AR \leftarrow AR + BR$ Add BR to AR
   $CR \leftarrow CR \wedge DR, BR \leftarrow BR+1$ AND DR to CR, increment BR
   $AR \leftarrow AR - CR$ Subtract CR from AR

The Second Question

(a) What is the difference between a direct and an indirect address instruction? How many references to memory are needed for each type of instruction to bring an operand into a processor register?

(b) A computer uses a memory unit with 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part.
   1. How many bits are there in the operation code, the register code part, and the address part?
   2. Draw the instruction word format and indicate the number of bits in each part.
   3. How many bits are there in the data and address inputs of the memory?

(c) A computer uses a memory of 65,536 words with eight bits in each word. It has the following registers: PC, AR, TR (16 bits each), and AC, DR, IR (eight bits each). A memory-reference instruction consists of three words: an 8-bit operation-code (one

word) and a 16-bit address (in the next two words). All operands are eight bits. There is no indirect bit.

1. Draw a block diagram of the computer showing the memory and registers.
2. Draw a diagram showing the placement in memory of a typical three-word instruction and the corresponding 8-bit operand.
3. List the sequence of microoperations for fetching a memory reference instruction and then placing the operand in DR. Start from timing signal T_0.

The Third Question

(a) How many times does the control unit refer to memory when it fetches and executes an indirect addressing mode instruction if the instruction is
   1. A computational type requiring an operand from memory;
   2. A branch type

(b) Convert the following numerical arithmetic expression into reverse Polish notation and show the stack operations for evaluating the numerical results.

$$(3 + 4)[10 (2 + 6) + 8]$$

(c) An instruction is stored at location 300 with its address field at location 301. The address field has the value 400. A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is (a) direct; (b) immediate; (c) relative; (d) register indirect (e) index with R1 as the index register.

The Fourth Question

(a) What is the purpose of the IP/EIP register?

(b) Find the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following CS:IP combinations:
   1. CS = 1000H and IP = 2000H
   2. CS = 2000H and IP = 1000H

(c) Protected mode memory addressing allows access to which area of the memory in:
   1- The **80286** microprocessor
   2- The Pentium II microprocessor.

With my best wishes

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