b) The characteristic equation of a linear control system is given as **[7 Marks]**

$$s(s^3+2s^2+s+1)+K(s+1)=0$$

Apply the Routh-stability criterion to determine the values of K for system stability.

Problem number (4) **(20 Marks)**

a) A pair of complex-conjugate poles in the s-plane is required to meet the various specifications that follow. For each specification, sketch the region in the s-plane in which the poles should be located. **[6 Marks]**

(i) $\zeta \geq 0.707$ $\omega_n \geq 2$ rad/sec

(ii) $0 \leq \zeta \leq 0.707$ $\omega_n \leq 2$ rad/sec

(iii) $\zeta \leq 0.5$ $1 \leq \omega_n \leq 5$ rad/sec

b) A position control system has the **closed loop** transfer function given by **[14 Marks]**

$$\frac{Y(s)}{U(s)}=\frac{25}{s^2+4s+a}$$

(i) Find the parameter a for critically damped stable system.

(ii) Determine the parameter a for steady state error (e_{ss}) to a unit step input equal to zero.

(iii) If $a = 20$, find

- The rise time
- The settling time t_s for 2% tolerence
- The overshoot MOS
- The Peak time t_p

Problem number (5) **(20 Marks)**

a) For the following system **[12 Marks]**

$$\dot{x}(t)=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}x(t)+\begin{bmatrix}0\\ 1\end{bmatrix}u(t)$$

$$y(t)=\begin{bmatrix}1 & 1\end{bmatrix}x(t)$$

Find,

(i) The state transition matrix.

(ii) The transfer function.

(iii) The response of the system $y(t)$ for initial condition $x(0) = [\,1 \;\; 0]^T$ and zero input.

b) For the system that have the following transfer function **[8 Marks]**

$$\dot{x}(t)=\begin{bmatrix}-1 & 0\\ -3 & -3/2\end{bmatrix}x(t)+\begin{bmatrix}2\\ 2\beta\end{bmatrix}u(t)$$

$$y(t)=\begin{bmatrix}1 & 2\alpha\end{bmatrix}x(t)$$

Calculate

(i) for what values of α and β is the system controllable.

(ii) for what values of α and β is the system observable.

GOOD LUCK

Dr. Ali Abu Tahoun

Course Title: Signals and Systems | Course Code: CCE2210 | Year: 2nd
Date: June 9th 2012 (Second term) | Allowed time: 3 hrs | No. of Pages: (2)

Remarks: (Answer the following questions)

Problem number (1) **(15 Marks)**

a) Define the following terms **[10 Marks]**

(i) System order and system type
(ii) Dynamic and static systems
(iii) Open-loop and closed-loop systems
(iv) Stable and unstable systems
(v) Time-variant and time-invariant systems

b) Express the signal $x(t)$ shown in Figure 1 in terms of impulse and/or step and/or ramp functions. **[5 Marks]**

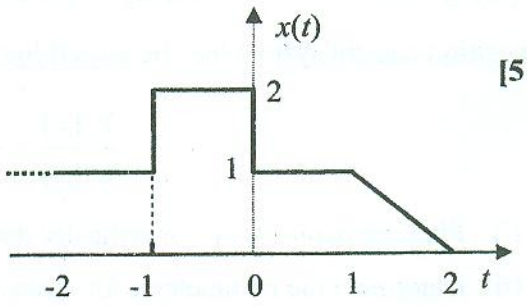


Figure 1

Problem number (2) **(20 Marks)**

a) For the system shown in Figure 2, **[10 Marks]**

(i) Find the differential equations,
(ii) Draw the block diagram, then,
(iii) Find the transfer function ($I_2(s)/E_i(s)$).

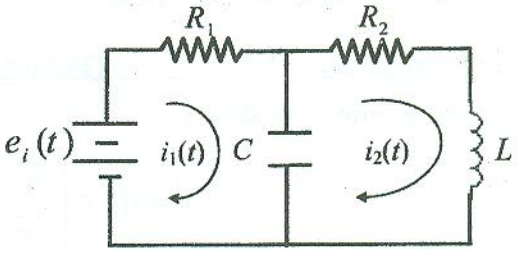


Figure 2

b) Find the overall transfer function (Y(s)/X(s)) of the system that has the signal flow graph shown in Figure 3. **[10 Marks]**

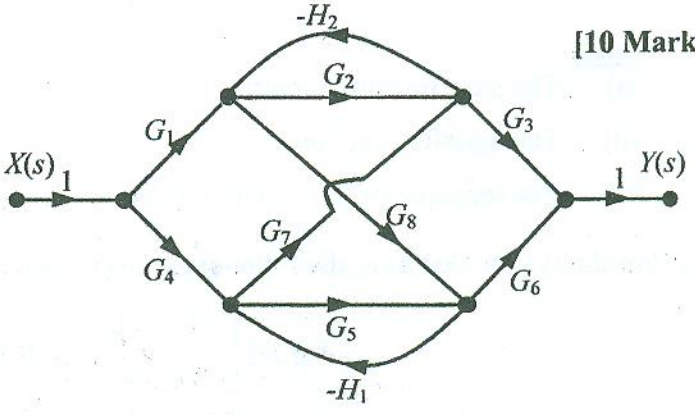


Figure 3

Problem number (3) **(15 Marks)**

a) Check the stability and the causality of the systems with the impulse responses of: **[8 Marks]**

$(i)\ h_1(t) = e^{-t}u(t-2)$

$(ii)\ h_2(t) = e^{t}u(t-1)$

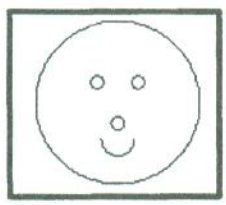
b) What is the purpose of each of the following OpenGL function calls? Explain how the parameters are used, if any. (10 marks)

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);

Question 4 (15 marks)

a) What is the difference between interactive and non-interactive computer graphics program? What are the components/libraries required to implement an OpenGL interactive computer program? (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.. (10 marks)



Question 5 (15 marks)

a) Mention some possible reasons that could lead to flickering or to the appearance of artifacts when executing an OpenGL program (5 marks)

b) If you know the following:

The two-dimensional point (in a Cartesian coordinates):$x = cos(\theta)$, $y = sin(\theta)$ lies on a unit circle regardless of the value of θ. Also, the three points (- sin (θ), cos (θ)), (- cos (θ), - sin (θ)), and (sin (θ), - cos (θ)) lie on the unit circle. These four points are equidistant along the circumference of the circle. By connecting the four points we get a square that has a side length of $\sqrt{2}$. This is true for any value of θ.

Write an OpenGL program that draw a rotating square using the above information

Good Luck

Course Coordinator: Dr. Hamed Hemeda

And the examination committee

Title: Computer graphics
Final exam, Date: 3/6/2012, **Total marks:** 75
Course code: CCE2211 **Year:** Second year
Allowed time: 3 hours **Number of pages:** 2

Workout the following questions

Question 1 (15 marks)

a) Mention some application areas of computer graphics. (5 marks)

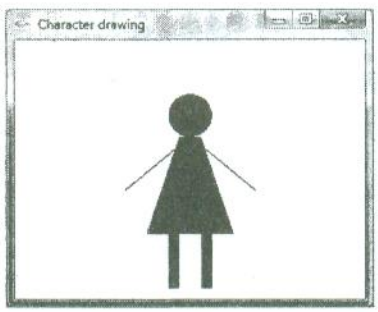
b) Explain why images are better displayed than text on CRT monitors while text is better displayed than images on LCD monitors. (5 marks)

c) 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)

Question 2 (15 marks)

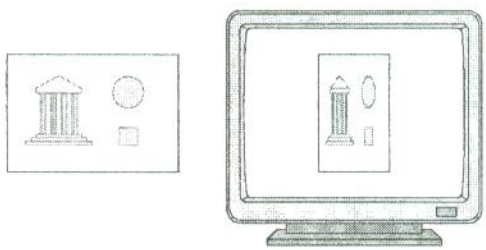
a) Explain with examples when possible: "OpenGL graphics library functions can be generally classified into primitive functions, attribute functions, viewing functions, transformation functions, input functions, control functions and query functions." (5 marks)

b) Write an OpenGL program to draw the symbolic characters shown below. (10 marks)



Question 3 (15 marks)

a) The following figure shows a scene that appears deformed when displayed on the output screen of an OpenGL program
   i. Discuss possible reasons that could lead to the shown deformation
   ii. How you can avoid such deformations?



Problem number (3) (30 Marks)

(a) Find Taylor and Laurent expansions represent the function f (z) and determine the regions of convergence for each with *center at* $z_0 = 0$ *and* $f(z) = \dfrac{z}{5-z}$

(b) Evaluate the following integrals using complex integration, Gamma and Beta functions:

(*i*) $\displaystyle\oint_{|z|=1} \frac{coz\,2z}{z^4}\,dz$

(*ii*) $\displaystyle\oint_{|z|=3} \frac{e^{2z}\sinh z}{z^2+4}\,dz$

(*iii*) $\displaystyle\oint_{|z-2|=5/2} \frac{z}{\sin z\ (1+\cos z)}\,dz$

(*iv*) $\displaystyle\oint_{|z-2|=1} \frac{\ln z\,\sinh z^2}{z^4\,(z^2+\pi^2)}\,dz$

(*v*) $\displaystyle\oint_{|z|=3} \frac{e^{iz}+\sin z}{(z-\pi)^9\,(z-\pi/2)}\,dz$

(*vi*) $\displaystyle\int_0^{\infty} \frac{\cos 5x}{x^4+16}\,dx$

(*vii*) $\displaystyle\int_0^{\pi/2} (\tan^{3.5}\theta+\tan^{5.5}\theta)\,e^{-\tan^2\theta}\,d\theta$

(*viii*) $\displaystyle\int_0^{2} x^5\sqrt{8-x^3}\,dx$

(*ix*) $\displaystyle\int_0^{\infty} \frac{x^{3/2}}{(1+x^2)^7}\,dx$

Good luck

Prof. Dr. Abdel Aziz Abo khadra

Dr. Manal Mohamed Hekal

Course Title: Engineering Mathematics (3) b Year: 2nd Computer Engineering and Automatic Control.
Course Code: PME2211 Date: / 6 / 2012 (second term) Allowed time: 3 hrs No. of Pages: (2)

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

Problem number (1) (25 Marks)

(a) Given $A = 0.2/1+0.5/2+0.6/3+1/4+0.7/5+0.3/6+0.1/7$

(i) Calculate the weak $\alpha-cuts$ for $\alpha = 0.4$, 0.6, 0.8

(ii) Find $\overline{A}$, $CON(A)$, $A \cap \overline{A}$ *and* $A \cup \overline{A}$.

(b) Prove that: If A and B are two fuzzy subsets of the universal set X. Then, the following properties hold for all $\alpha, \beta \in [0,1]$: –

(*i*) $\alpha \le \beta$ *implies to* $A_\alpha \supseteq A_\beta$

(*ii*) $(A \cap B)_\alpha = A_\alpha \cap B_\alpha$.

(c) Given a fuzzy relations P from A to B defined by :

$$M_P = \begin{bmatrix} 0.4 & 0.8 & 0.5 \\ 0.8 & 0.7 & 0.2 \\ 0.1 & 0.9 & 0.3 \end{bmatrix}$$, and Q from B to C defined by $$M_Q = \begin{bmatrix} 0.1 & 0.8 & 0.2 \\ 0.7 & 0.3 & 0.9 \\ 0.8 & 0.6 & 0.2 \end{bmatrix}$$

Find $M_{P \circ Q}$.

(d)Give two deviations between operations on ordinary sets and fuzzy sets. Illustrate your answer by examples.

Problem number (2) (30 Marks)

(a) If $u(x,y) = x^3 + 6x^2 y - 3xy^2 - 2y^3$ Find an analytic function $f(z) = u(x,y) + i\,v(x,y)$

(b) Solve the equation $\cosh z = 0.2$

(c) Prove that " If $f(z)$ is analytic function in a simply connected domain D and if $f'(z)$ is continuous at each point within and a closed contour C in D, then $\oint_c f(z)\,dz = 0$

(d) Find the general solution of the differential equation:
$x^2 y'' - xy' + (x^2 + 1)y = 0$

Tanta University
Faculty of Engineering
Computer and Control Dep.
Second Year

Second Term – Final Exam
Subject: Computer Architecture
Allowed Time: 3 Hours
Date: June 02, 2012

Answer the following questions and assume any missing data; the exam consists of 3 questions.

Question 1: [Computer Arithmetic] — 40 Marks

1. Design 8-bit carry look-ahead adder with minimum gate delay that adds x_{0-7} to y_{0-7} then produces s_{0-7} and c_8 assuming that the fan in of the logic gates is 6, then find the logic gate delay of s_7 and c_8 in each case. (10 Marks)
2. Multiplying 01110110× 11010010 using: (10 Marks)
   a. Booth Algorithm
   b. Bit pairing recording of multipliers
3. Proof that the non-restoring and restoring divisions algorithms are equivalent then suggest hardware circuit for 8-bit binary division and explain its operation. (10 Marks)
4. Use 32-bit IEEE standard for floating point numbers to represent the following numbers in binary: (10 Marks)
   a. $(+23.25)_{10}$
   b. $(-144.125)_{10}$
   c. ∞
   d. $(-0.010110 \times 2^{-126})_2$

Question 2: [Input/Output Organization] — 24 Marks

1. Discuss the sequence of events involved in handling an interrupt request from a single I/O device, then show how two or more simultaneous interrupt requests can be handled. (8 Marks)
2. Explain the handshake control signals of data transfer over asynchronous bus during an output operation. (8 Marks)
3. Design a centralized bus arbitration system that applies daisy chain between 4 I/O devices assuming that all control devices are active high. Then draw the time sequence of signals that transfer the bus mastership to device number 2. (8 Marks)

Question 3: [Basic Processing Unit] — 26 Marks

1. Design an interface circuit between the processor and a printer assuming that the computer has 32-bit address bus, 16-bit data bus, status flag bit is transferred over line D_{10} of the data bus, and address line A_{31} is used as control signal, then design the logic circuit that can generate the status flag bit properly. (10 Marks)
2. Why is the *Wait-for-memory-function-completed* step needed when the processor is reading from or writing to the main memory? (4 Marks)
3. Assume single-bus processor, find out the control sequence for executing the following instructions:
   a. Move R3, R1
   b. Increment R2
   c. Add R1, (R2)
   d. GoTo L1

   If the memory access time is twice the processor clock time and both the processor and the memory are controlled by the same clock, estimate the total execution time of each sequence. (12 Marks)

Good Luck

Dr. Tarek El.Ahmady El.Tobely

- Single-Tasking Systems Versus Multitasking Systems,
- Versions & Release,
- Wi-Fi & Bluetooth,
- Physical Security and Data Security.

4- How you can select LAPTOPS?

5- What are the Characteristics of a server computer?

6- State the different services offered by internet?

Dr. Galal Atlam

Tanta University
Faculty of Engineering
Computer and Control Eng. Dept.

Time: 2 Hours

2nd term Exam.
2nd Year. 18/06/2012
Society of Information Techonology

Answer All Questions:

1- Put √ for true and × for false:

a) Information usually refers to the input of a Management Information System (MIS),

b) Data consists of data that has been retrieved, processed, or otherwise used for informative or inference purposes, or as a basis for forecasting or decision making,

c) Computer Law is concerned with controlling and securing information stored on and transmitted between computers,

d) The CPU is measured by its processing capacity, speed in terms of MHz, word size, and Million Instructions Per Second (MIPS),

e) Utility programs are used to help end users with a "tool box" to fine-tune hardware components or modify system software functions, and they are normally associated with the operating system,

f) Query languages enable nonprogrammers to use certain easily understood commands to search and generate reports from a database,

g) Freeware is software that is available free of charge through the Internet or computer user groups,

h) Public domain software is software that is not protected by copyright law and may be duplicated by anyone,

i) The Star topology is a linear channel with many connected nodes. There is no central server. Each node transmits messages to all other devices.

2- Define

- Malware
- Spyware
- AI
- Expert Systems
- MIS
- Adware
- www.tolooze.edu.fr

3- In table write the differences between:

- Single-User Versus Multiuser Systems,

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

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

(3) Find the Fourier Transform of the waveform given by:

$$w(t) = \sum_{n=-\infty}^{\infty} \delta(t - nT_o)$$

Question (3) (20 degrees)

(1)Show, how the square-law modulator can be used to generate the AM wave.

(2) An amplitude modulated (AM) wave is represented by the expression

$s(t) = 5[1 + 0.6\cos(6280t)]\cos(2\pi \times 10^4 t)$ *volts*, Find the following:

(a) Modulation the depth and f_m.

(b) The power of AM wave and sketch the AM waveform.

(c) Determine the frequencies in the USB and LSB spectra.

(d) Explain one type of the demodulators that can be used to recover the baseband signal from the AM wave.

Question (4) (20 degrees)

(1) Describe with the block diagram, how the Costas receiver can be used for demodulating the DSB-SC wave.

(2) An SSB-AM transmitter is modulated with a sinusoidal signal $m(t) = 4\cos(1000\pi t)$,, with carrier amplitude $A_c = 2, and \quad f_c = 2\,kHz$.

(a) Find the expression for an upper SSB signal.

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

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

Question (5) (20 degrees)

(1) Explain with the block diagrams the method that can be used to generate a narrow-band FM wave.

(2) Illustrate the working of the PLL FM detector.

(3) A single-tone FM signal is given by $s(t) = 10\sin[16\pi \times 10^6 t + 20\sin(2\pi \times 10^3 t)]volts$. Determine the modulation index, frequency deviation, the instantaneous frequency $f_i(t)$, and calculate the bandwidth of the FM signal using Carson's rule.

.....

Good Luck

Dr. *Entessar Said*

Course Title: Communication systems	Course Code: EEC2247	Second Year
Date: 9-6- 2012 (second term)	Allowed time: 3 hrs	No. of Pages: (2)

Answer all the following questions:

Question (1) (20 degrees)

(1) Find the complex Fourier series of the periodic square waveform shown below in the Figure

(1) over the time interval $0< t <1$, $v(t)$ is described by e^{t}, and find the normalized average power..

(2) Find the trigonometric Fourier series of the periodic waveform shown in Figure (2).

(3) State that, the average power of the periodic signal over a 1-ohm is given as:

$P = \sum_{n=-\infty}^{\infty} |C_n|^2$, where C_n is the complex Fourier coefficient.

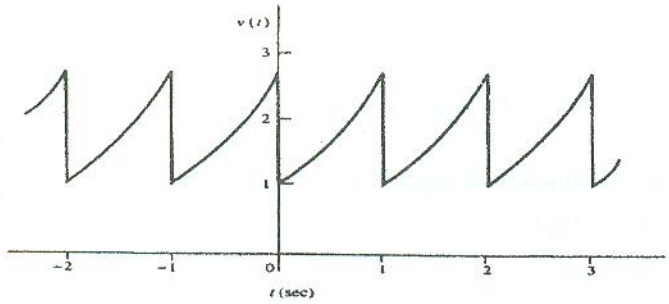


Figure (1)

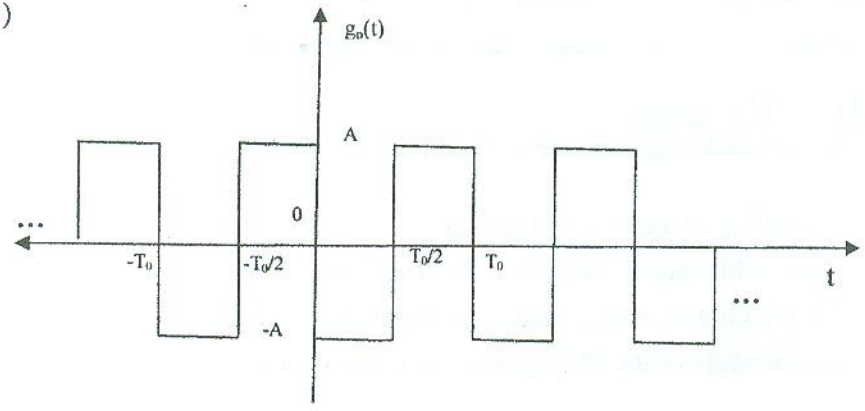


Figure (2)

Question (2) (20 degrees)

(1) Determine the Fourier transform of the following functions:

(a) $x(t) = \begin{cases} e^{-t/2}\sin(2\pi f_o t) & t > 0, T > 0 \\ 0 & t < 0 \end{cases}$

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