الاجابات

Tanta University | Department of Electronics and Electrical Communication Engineering | Faculty of Engineering

Course: **Electromagnetic Waves (1)** | Course Code: **EEC2208,** | Students: **2nd year**
Date: **Wed., 08-June-2016** | Time Allowed: **Three hours,** | No. of Pages: **2,**

Final Exam
(Total marks: 85 Marks)

Answer the following questions:

Problem 1: (20 marks)

a) If a magnetic field can be represented as $\mathbf{H} = \frac{E_o}{\eta}\cos(\omega t - \beta x).a_y$.
   i. Find all other field components in a source free medium with permeability μ_r and permittivity ϵ_r.
   ii. Find the Poyenting vector of that wave.

b) The magnetic field component of a EM wave propagating through a nonmagnetic medium ($\mu_r = 1$) is $H = 10\sin(2\times10^8 t + 8x)\,a_y\ mA/m$, Determine:
   i. The direction of wave propagation
   ii. The permittivity of the medium
   iii. The electric field intensity
   iv. The power density

Problem 2: (20 marks)

a) Starting from the general equations of γ and η, Find an approximation of the parameters: α, β, η, skin depth (δ), the propagation velocity u, for a plane wave propagating in a lossy dielectric medium then, write the forward wave for $E(z,t)$ and $H(z,t)$ fields.

b) An electric field of a plane wave with the value
$$\mathbf{E}(y,t) = 100\times10^{-6}e^{-\alpha y}.\cos(4.8\pi\times10^9 t - \beta y)\,a_z\ V/m$$
is propagating in a medium with $\sigma = 7\times10^{-3}\ \Omega^{-1}/m$, $\epsilon_r = 5$.
   i. Determine the behavior of the medium (dielectric or conductor) at that frequency
   ii. Find the values of $\alpha, \beta, \eta, \delta$, propagation velocity u.
   iii. Find the direction of the electromagnetic wave propagation
   iv. If the frequency changed to $10\pi\times10^6\ rad/sec$, check if the medium changes its behavior or not

Problem 3: (15 marks)

a) There are different types of plane wave polarization. How can you define wave polarization? Show the equations relating the magnitude of electric field components for each type.

b) An electric field is propagating in a medium that is found to be,
$E(x,t) = 8\times10^{-3}e^{-10x}\cos(4\pi\times10^9 t - 5\pi x)\,a_y + E_o e^{-\alpha x}\cos(\omega t - \beta x + \theta_o)\,a_z\ V/m$

Find E_o, θ_o if:

i. The wave is linearly polarized and inclined by 22^o on the y-axis
ii. The wave is circularly polarized
iii. The wave is elliptically polarized

Problem 4: (15 marks)

a) Drive expressions for the reflection and transmission coefficients and the Brewster angle for a plane wave that is incident obliquely on an interface between two dielectric materials (consider $\sigma = 0$ for both the dielectrics). Assume the wave is parallel polarized.

b) A 2.4 GHz uniform plane wave $\mathbf{E_{is}} = 10e^{-j\beta z}\, a_x\, V/m$ in free space is incident normally on a large plane lossless dielectric slab ($z > 0$) having $\epsilon = 5\epsilon_o, \mu = \mu_o$. Find:

i. Transmission and Reflection Coefficients
ii. $\mathbf{E_{rs}}$, $\mathbf{E_{ts}}$
iii. $\mathbf{H_{is}}$, $\mathbf{H_{rs}}$, $\mathbf{H_{ts}}$

Problem 5: (15 marks)

a) A distortion-less transmission line has characteristic impedance, $Z_o = 100\ \Omega$, propagation velocity, $u = 0.7c$, (c is the speed of light in free space) and $\alpha = 16\ mNp/m$ and the operating frequency is 200 MHz. Find:

i. Wavelength λ
ii. Line parameters R, L, G, C

b) A three meters length transmission line has a characteristic impedance , $Z_o = 300\ \Omega$. If the operating frequency is 200 MHz and propagation velocity of $0.6c$. Find the input impedance, reflection coefficient and standing wave ratio if:

i. The line is terminated by a short circuit
ii. The line is terminated by an open circuit
iii. The line is terminated by an impedance, Z_l, of $100 + j100\ \Omega$

Constants:
Permeability of free space, $u_o = 4\pi \times 10^{-7} H/m$,
Permittivity of free space, $\epsilon_o = \frac{1}{36\pi} \times 10^{-9}\ F/m.$
Light velocity in free space, $c = 3 \times 10^8\ m/s.$

With best wishes of success

Dr. Sameh A. Napoleon

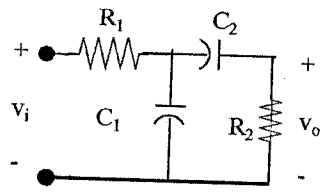
Tanta University

Department: Electronics and Electrical Communication Engineering
Total Marks: 75 Marks

Faculty of Engineering

Course Title: Control Engineering	Course Code: CCE2251	Year: 2nd
Date: June 2016	Allowed time: 3hr	No. of Pages: (2)

Q(1) **[a]** Find the transfer function for the following circuit $V_0(s)/V_i(s)$ (6 Marks)



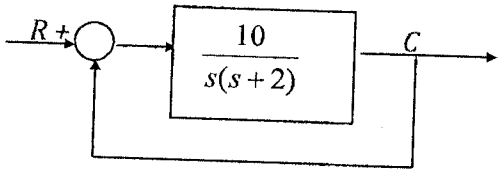
[b] The characteristic equations of linear control systems are given below. Apply Routh-Hurwitz criterion to determine the root distribution and the system stability. (9 Marks)

1) $s^5+8s^4+2s^3+4s^2+2s+4=0$

2) $s^6+s^5+2s^4+s^3+3s^2+2s+2=0$

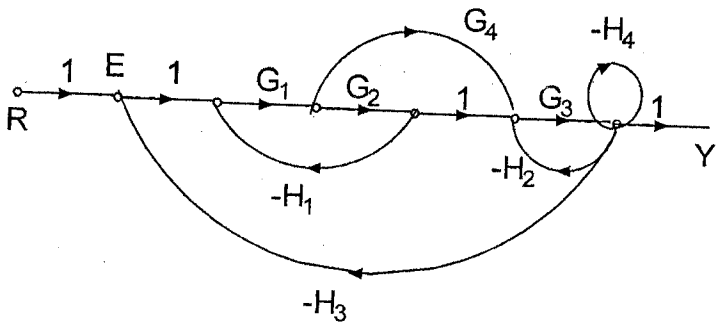
3) $s^5+2s^4+2s^2+3s+7=0$

Q(2) [a] For the following system: (9 Marks)



1) Find the type of the system and its order?
2) Determine the natural frequency and damping factor?
3) Compute the rise time and the percentage overshoot for the step input?

[b] Using signal flow graph, find the transfer function of the system $\mathbf{Y(s)/R(s)}$ (7 Marks) and $E(s)/R(s)$. (2 Marks)



Q(3)[a] Find a state space model for a control system having the transfer function:

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

in the pole-zero form (7 Marks) and other representation. (3 Marks)

[b] For the following system

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

$$y=\begin{bmatrix}2 & 4\end{bmatrix}\underline{X}$$

Find : 1) Determine whether the system in (b) is completely state controllable, observable and stable . (4 Marks)

2) The transition matrix Φ(s). (3 Marks)

Q(4) (12 Marks)

The open loop T.F. of a system is given as:

$$G(s)\,H(S)=\frac{\mathrm{K}\,(S+2)(S+3)}{S\,(S+1)}$$

(i) Sketch the root locus.

(ii) Determine the range of K for system stability.

(iii) Find the value of K at critically damped response.

Q(5) (13 Marks)

A unity feedback control system has an open loop T.F as follows:

$$G(s)\,H(S)=\frac{100}{S^2+11\,S+10}$$

(i) Sketch the bode diagram for the system.

(ii) Determine the gain margin (GM), phase margin (PM), the phase crossover frequency (w_{pc}), the gain crossover frequency (w_{gc}).

(iii) State whether the system is stable or not.

(iv) Which is better: a system with GM=1000 dB or a system with GM=100 dB? Why?

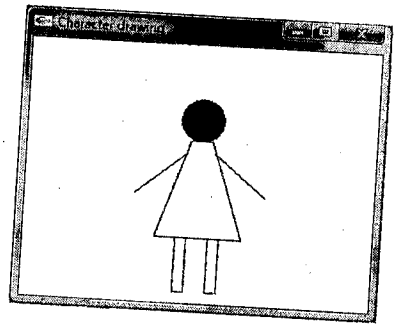
مع أطيب الأمنيات بالتوفيق والنجاح

د/ محمد شعيب واللجنة

Title: Computer graphics
Final exam, Date: 11 /6/2016, **Total marks:** 75 **Course code:** CCE2211 **Year:** Second year
Allowed time: 3 hours

Note: Workout all the questions, each part in its own single page

1. (25 Marks: 5, 5, 5 and 10)
   (a) Give at least four computer graphics applications in briefly explaining each of them.
   (b) The memory in a frame buffer must be fast enough to allow the display to be refreshed at a rate sufficiently high to avoid flicker. A typical workstation display can have a resolution of 1280 x 1024 pixels. If it is refreshed 72 times per second, how fast must the memory be? That is, how much time can we take to read one pixel from memory? What is this number for a 480 x 640 display that operates at 60 Hz but is interlaced?
   (c) Explain how the pinhole camera is used as a base for computer graphics system model. How the inversion of the image produced by pinhole camera is handled in computer graphics system model?
   (d) Write only the display function that draws the following figure assuming the drawing area is a square of side length 2 in the xy plane centered at the origin and an orthonormal projection for a camera located at the origin and looks at the negative z axis.



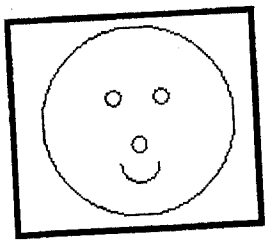
2. (25 marks: 5, 10, 10)
   (a) Schematically show how the 2D graphics is a special case of the general 3D graphics in OpenGl, give the required setting for the OpenGl to draw in 2D by writing the library functions needed and clarifying the function parameters.
   (b) Write an OpenGL program to draw a damped cosine functions four times, each in a separate quarter in the output graphics window. Hint; use the view-port setting to change the location and size of the output graphics area with respect to the output graphics window.
   (c) Writing text using OpenGL can be done using stroke or raster text drawing. Differentiate between the two types in stressing the advantages and disadvantages of each of them. Write only the c++ function sufficient to create a font for writing the phrase " POP TEXT" using stroke text technique.

3. (25 marks: 5, 10, 10)
   (a) Explain the work done by each of the following OpenGL functions and when they should be used
      i. glPushAttrib(GL_ALL_ATTRIB_BITS);
      ii. glPushMatrix();
      iii. glpopAttrib();

Note: Workout all the questions, each part in its own single page

iv. glPopMatrix();

(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.



(c) Answer the following briefly

i. In the context of computer graphics, what is picking, What is its role in interactive modeling?
ii. What are the feature of a good interactive program?
iii. Give some reasons for the appearance of artifacts and flickering in a computer graphics program, especially that contains animation. Give also some techniques to reduce these bad effects.

Best wishes....
The examination committee