c- If the **transmitted electric field** component of a plane wave that propagates from a medium having $\varepsilon_{r1} = 64$ to another one having ε_{r2} is given by:-

$$\vec{E}_t(y,t) = 10^{-4}\, e^{j(2\pi 10^9 t + 40\pi y)}\, \hat{x} \quad v/m$$

i-Obtain the type of incidence as well as the type of polarization

ii- Obtain the values of α, β, v_g and η for the two mediums .

iii- Evaluate θ_r, θ_t , R, T , incident electric field $\vec{E}_i(y,t)$ and the reflected magnetic field $\vec{H}_r(y,t)$

---

(4) **a-** For the RF transmission line :

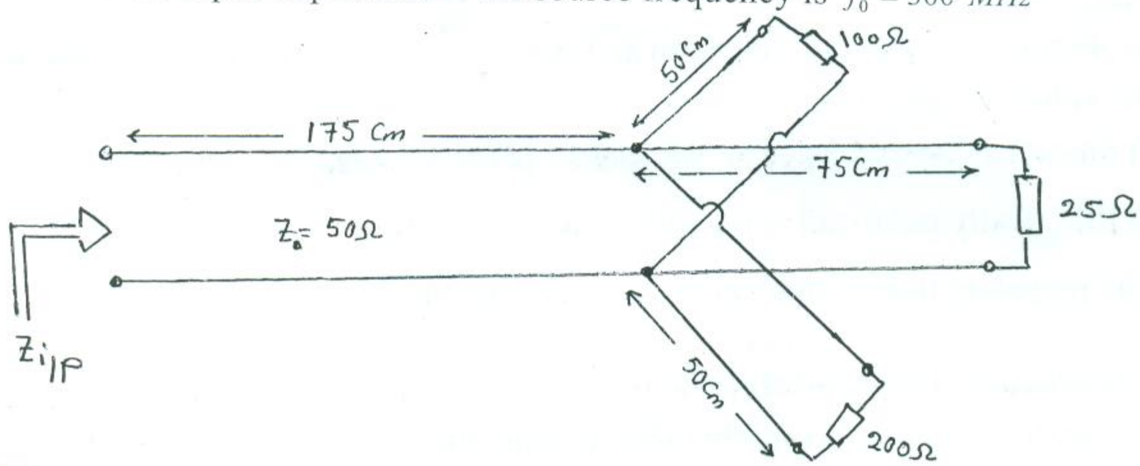
i- Write down the general expressions for both voltage and current distributions $V(x)$, $I(x)$ as well as $V(L)$, $I(L)$ then **for the lossless one derive** expressions for α , β, V_{ph} , and Z_0

ii-**Write down** an expression for the reflection coefficient at the load, ρ_l and then show its relation with the standing wave ratio, σ .

iii-**Write down** an expression for the input impedance of the lossless line, $Z_{i/p}$, then **for** short circuit line **derive** an expression for the input impedance and sketch it showing the main applications of this line then, sketch I(x) ,V(x) and Z(x) along it .

vi- Show how to achieve impedance matching using the quarter-wave length transformer.

b-The shown figure is 4 transmission lines each of $Z_0 = 50\ \Omega$, lengths as shown in figure .calculate the input impedance if the source frequency is $f_0 = 300\ MHz$



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(5) a- For a radio frequency lossless T.L with length 4 m operating at 300 MHz with parameters $L = 10\, mh/m, C = 4\, \mu F/m$ and the reflection coefficient at 25 cm from load $\rho_{\circ} = 0.3 - J0.3\sqrt{3}$

obtain the values of :

$Z_0, Z_L, \sigma, Z_{max}, Z_{min}, d_{1\,max}, d_{1\,min}, Z_{i/p}$ and Z at $2.5\,m$ from load and at $0.5\,m$ from source .

b- When designing the single stub matching for a lossless T.L having $Z_0 = 100\Omega$, $\rho_L = 0.5 e^{j\frac{\pi}{4}}$ and length $L = 4.2m$ operating at 300 MHz , the stub was to be of Length $l_s = 0.1m$ and at $d = 0.2m$ from load. Use the smith chart to obtain its load impedance Z_L then to obtain the following:

$\sigma, d_{1\,max}, d_{1\,min}, \rho$ at $1.2\,m$ from generator, $Z_{i/p}$ and at $0.6\,m$ from source .

"ربِّ اشرح لي صدري ويسر لي أمري"

Dr. Abdel-Fattah A. Abu-Hashem

ع المجالات

TANTA UNIVERSITY *JUNE 2012*
FACULTY OFENGINEERING *TIME ALLOWED: 3 HOURS*
ELECTRONICS&COMMUNICATIONS DEP. *2nd YEAR COMMUNICATION*

FINAL EXAMINATION

SUBJECT: WAVE PROPAGATION I

Attempt all questions:

1- a- Write down expressions for the wave equations in the case of the **lossy dielectric medium**, then, obtain the expressions of the parameters, α, β, V_g, V_{ph} and η of this medium.

b- If the **electric field** component of a plane wave is given by:

$$\bar{E}(y,t) = 10^{-4} e^{-\alpha y} \cos(2\pi \, x10^9 t + \beta y) \hat{Z} \quad \text{v/m}$$

that propagates in a medium having $\sigma = 10^{-5}\ \upsilon/m$ and $\varepsilon_r = 36$

(1) Evaluate the ratio $\frac{\sigma}{\omega \varepsilon}$ for the medium, then ,Estimate its **type** and the wave polarization

(2) Evaluate $\alpha, \beta, v_{ph}, v_g$ and η, then write down the expression for $\vec{H}(y,t)$

2- If the electric field component of a plane wave propagating in a lossless medium is given by:

$$\bar{E}(x,t) = 10^{-2} e^{j(2\pi x10^8 t - 20\pi x)} \hat{y} + E_{02} e^{j(\omega_0 t - \beta x + \theta_0)} \hat{z} \quad \text{v/m}$$

determine :

i- The direction of wave propagation and the values of ϖ_0 and β

ii- The values of E_{02} and θ_0 for :

(1) linearly polarized wave at 60^0 with $\hat{z}$ (2) clock wise circular polarization

(3) Elliptically polarized wave following the ellipse $\frac{y^2}{16} + \frac{z^2}{9} = 10^{-}$

iii- The magnetic field component. iv- The average value of the poynting vector P_{av}

3- a- If a **Perpendicular (horizontal) polarization** plane wave is obliquely incident at θ_i from a dielectric medium with ε_{r1} to another dielectric medium having ε_{r2}, **write down** expressions for θ_r, θ_t, R and T

b- If the **reflected magnetic field** component of a plane wave that propagates from a medium having ε_{r1} to another one having $\varepsilon_{r2} = 16$ is given by:-

$$\vec{H}_r(x,y,t) = \sqrt{3}x10^{-4} e^{j(6\pi 10^9 t - 50\pi x - \beta_y y1} \hat{x} - 10^{-4} e^{j(\varpi_0 t - \beta_x x - \beta_y y1} \hat{y} \quad \text{A/m}$$

i-Obtain the type of incidence as well as the type of polarization and find the values of $\beta_x, \beta_y, \omega_0$ and ε_{r1}.

ii- Obtain the values of α, β, v_g and η for the two mediums .

iii- Evaluate θ_r, θ_t , R, T , *incident electric field* $\vec{E}_i(x,y,t)$ *and the transmitted magnetic field* $\vec{H}_t(x,y,t)$

iv- Check the occurrence of both total reflection and total transmission.

	TANTA UNIVERSITY FACULTY OF ENGINEERING DEPARTMENT OF ELECTRONICS & ELECTRICAL COMMUNICATION EXAMINATION (*SECOND* YEAR)		
	COURSE TITLE: Electronic Circuits II		COURSE CODE: EEC 2206
DATE:2/6/2012	TERM: SECOND	TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

Answer the following questions

PROBLEM # ONE (20mark)

State whether the following statements are true or false, comment on your Answers

a. Positive Feedback is used in amplifier circuits.
b. Negative Feedback is more sensitive for noise than positive feedback.
c. Series feedback circuits increase amplifier input impedance.
d. Two pole amplifiers can't be driven to instability.
e. Gain margin and phase margin are used to investigate amplifier stability.
f. Each pole contributes by 45 degree at maximum in phase bode plot.
g. Passive filters are limited in frequency domain whereas active filters are not.
h. Active filters could be completely specified by only four parameters.
i. Butterworth filter is an all pole filter.
j. Chebychev filter provides a less efficient approximation than Butterworth filter.

PROBLEM # TWO (18 mark)

I. Given a circuit consists of 1H coil, 2 ohm resistance and 1/101 farad capacitor. The output is to be taken at capacitor voltage:
   a. Derive an expression for circuit transfer function hence; locate its poles & zeros.
   b. Sketch circuit transient and frequency response.

II. For identical six pole amplifier of 10^6 dc gain;
   a. Explain how negative feedback will affect pole location.
   b. Estimate the ultimate value of negative feedback ratio that will derive amplifier to instability.
   c. Explain how you can compensate for instability and maintain stability.

PROBLEM # THREE (26 mark)

I. Find the order of Butterworth and Chebychev low pass filter that meet the characteristics, f_p=10kHz, A_{max}=1dB, f_s=15kHz, A_{min}=25dB and unity dc gain then comment on your answer.

II. Synthesize the following functions using only one suitable form:
   a. $z(s) = (s+2)(s+5)/(s+1)(s+3)$
   b. $z(s) = (s^2+1)(s^2+9)/s(s^2+4)$

PROBLEM # Four (26 mark)

I. Design all pass active filter then explain its main usages.
II. Using multiple feedback circuit, design a second order Bandpass filter.
III. With .01 μF capacitors and using Sallen key circuit, design Bandpass filter which has cutoff frequencies of 100Hz and 10kHz and has Butterworth characteristics.

Good Luck,

Dr. Salwa Serag Eldin

Tanta University	Physics & Mathematics Dept. Total Mark : 70	Faculty of Engineering

Course Title: Engineering Mathematics (3)B **Course Code: PME2210** **Year: Second year communications**

Date: 9/6/2012 (Final Second Term Exam) **Allowed time: 3 Hours** **No. of Pages: (1)**

Answer all the following questions:

Question 1 — 18 Marks

a- If $u(x, y) = x^2-4x-y^2+2y$, find an analytic function $f(z)$ as a function of z only given that $f(0)=i$.

b- Under what conditions the function $u(x, y) = ax^3+bx^2+cxy^2+ky^3$ is harmonic function.

c- Find the Maclurine expansion of the function $f(z) = \tan^{-1}z$, given $f(0) = 0$.

d- Find the mapping of the triangle with vertices $1/2, -1/2, i$ by the mapping $w = \left(1 + i\sqrt{3}\right)z$

Question 2 — 18 Marks

a- Evaluate the integral $\oint_c \frac{6e^z}{2z-1}dz$ where is

i) $|z| = 1$, ii) $1 \le |z| \le 2$

b- Evaluate the integral $\oint_c \cot z\, dz$, $c: |z-1| = 3$.

c- Evaluate the integral $\oint_c \frac{(z+4)^3}{z^4+5z^3+6z^2}dz$ where $c: |z| = 1$

d- Evaluate the integral $\oint_c (z+1)e^{1/z}dz$, where c is the unit circle.

Question 3 — 22 Marks

a- Evaluate the integral $\int_0^{2\pi} \frac{d\theta}{1+\frac{1}{2}\cos\theta}$

b- Evaluate the integral $\int_{-\infty}^{\infty} \frac{\sin \pi x}{x-x^5}dx$

c- Fin the image of the rectangular $\frac{1}{2} \le x \le 1$, $\frac{1}{2} \le y \le 1$ by the mapping $w = z^2$.

d- Find all possible Laurent expansions for the function $f(z) = \frac{3}{z(2-z-z^2)}$ with center at $z_o = 0$.

Question 4 — 12 Marks

a- Evaluate the integral $\int_0^1 \sqrt{\ln\left(\frac{1}{x}\right)}\, dx$

b- Evaluate the integral $\int_0^\infty x^3e^{-2x}\cosh x\, dx$

c- Evaluate the integral $\int_0^1 \sqrt{\frac{1}{x} - 1}\, dx$

Dr. Fahoom Abd-El hamead

(b) The Schering bridge balances under the following conditions: $R_1 = 10k\ \Omega$, $R_2 = 1k\ \Omega$, $C_1 = 100$ pF and $C_3 = 400$ pF . The bridge is driven by a 1 kHz sinusoidal source.

(i) Find the values of R_S , C_S , and Dissipation factor of the capacitor

(ii) If the series combination of R_S and C_S is to be replaced by a parallel combination of R_P and C_P , find their values.

Question number (5) (15 Marks)

(a) Explain the construction and operation of Digital phase meter. State the advantageous and disadvantageous of the method.

(b) Explain the construction and operation of Real time Spectrum analyzer. Explain its various applications.

Good Luck

Course Coordinator: Prof. Mustafa Mahmoud Abd Elnaby

Tanta University

Department: Electronics & Comm. Engineering
Total Marks: 75 Marks

Faculty of Engineering

Course Title: Electronic Measurements (2)	Course Code: EEC2209	Year: 2ndYear
Date: June 2012 (Second term)	Allowed time: 3 hrs	No. of Pages: (2)

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

Question number (1) (15 Marks)

(a) ***Choose the right answer:***

1. In a CRT the focusing anode is located between pre-accelerating and accelerating anodes. ***( ) True ( ) False***
2. The horizontal amplifier should be designed for high amplitude signals with a slow rise time. ***( ) True ( ) False***
3. Probe capacitive loading introduces measurement errors that are frequency dependent. ***( ) True ( ) False***
4. The effective reactance of an inductive coil decreases because of stray capacitances as the frequency increases. ***( ) True ( ) False***
5. A differential probe with a high CMRR at a high frequency is better than a differential probe with the same CMRR at a lower frequency. ***( ) True ( ) False***
6. Schering bridge is used to measure capacitance and its insulating properties. ***( ) True ( ) False***

(b) Explain the principles of operation and the functions of the basic units of Dual slope integrating type DVM. State the advantageous of this techniques.

Question number (2) (15 Marks)

(a) Explain with suitable diagrams the construction and working principles of digital storage oscilloscope and explain its operation.

(b) (i) Calculate the sampling rate for 1kHz and the 5 kHz signal if the time base setting is adjusted to display 10 cycles on the CRO screen.

(ii) Find the bandwidth of the CRO, if a signal having 15 μs rise time is displayed with 20 μs rise time in the CRO.

Question number (3) (15 Marks)

(a) Explain the construction and the features of the following CRO probes:

1. High resistance passive divider probe
2. Differential probes

(b) (i) A high impedance probe with 9 MΩ resistance and 6 pF capacitance is connected to an oscilloscope with an input impedance of 1MΩ . If the effective capacitance decreased to 4.5pF when the probe was connected . What is the capacitance of the oscilloscope alone.

(ii) Explain the working principles and the effect of stray capacitance of Q meter. Explain a technique used in stray capacitance measurements

Question number (4) (15 Marks)

(a) The quality factor Q of a coils is ≥ 10 . Suggest a bridge to measure the values of inductor and its series resistance .Express these values in terms of Q, and explain the working principles of the bridge.

(i) Find a suitable local oscillator frequency and the multiplication factor of the second multiplier.

(ii) Calculate the center frequencies and frequency deviation as the signal progresses through the frequency multipliers and mixer.

(iii) Will this transmitter meet the frequency specifications for commercial FM station? Why?

Problem number (5)

(a) Explain how the design of receivers allows enhancing selectivity.

(b) Sketch the block diagram of Stereophonic FM (transmitter and receiver). Sketch clearly the spectrum of signal at the output of each block.

(c) A signal with bandwidth, W of 4 KHz is transmitted using indirect FM, with carrier frequency, $f_c = 1\, MHz$ and $f_\Delta = 12\, KHz$. If $(\Phi_\Delta / 2\pi\, T) < 100$ and $f_{c1} = 100\ KHz$, how many doublers will be needed to achieve the desired output parameters? Draw the block diagram of the system indicating the value and location of the local oscillator such that no frequency exceeds 10 MHz.

Best Wishes of Success

Tanta University

Department: Electronics and Electrical Communication Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Communication Engineering	Course Code: EEC	Year: 2^{nd}
Date: 18 / 6 / 2012 (Second term)	Allowed time: 3 hours	No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches, equations, neat answers and boxed results are appreciated)

Problem number (1)

(a) List the benefits of a Superheterodyne over a TRF receiver.

(b) For an AM broadcasting, where the range of the radio frequency (f_{RF}) is 600 kHz to 1600 kHz, with intermediate frequency, f_{IF} of $455\,K\,Hz$. Determine

(i) The possible range of local oscillator frequency.

(ii) How to choose between these ranges practically.

Problem number (2)

(a) Sketch the block diagram of PLL and describe how loop acquisition is accomplished with PLL from an initial unlocked condition until frequency lock is achieved.

(b) A transmitter transmits an AM signal with carrier frequency, f_c of $1500\,KHz$, when a radio receiver is tuned to $1500\,KHz$, the signal is heard clear and loud. The same signal is also heard at another setting. State with reasons, at what frequency you will hear this station. (Given that, $f_{IF} = 455\,K\,Hz$).

Problem number (3)

(a) Describe the operation of quadrature detector as FM detector.

(b) A Superheterodyne receiver must cover the range from 220 to 224 MHz, as shown in Figure 1. The intermediate frequency of the first stage, $f_{IF} = 10.7\,MHz$. Determine the following:-

(i) The first local oscillator tuning range.

(ii) The second oscillator frequency, for AM broadcast.

(iii) The image frequency range for the receiver.

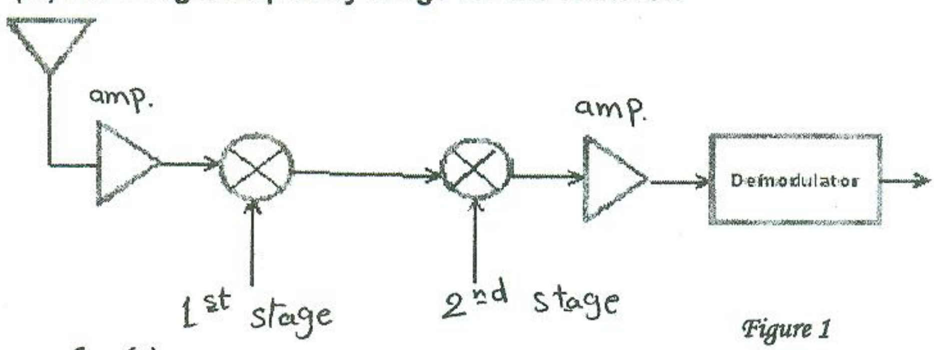

Figure 1

Problem number (4)

In an indirect FM transmitter, the carrier frequency f_c is 250 kHz, with the frequency deviation $\Delta f = 50\,Hz$. This signal is to be frequency multiplied in two stages (with a mixer between them) to bring the carrier frequency to 120 MHz, with maximum frequency deviation. Stage one has a multiplication factor of 64.

Problem number (3) (14 Marks)

[a] Consider unity negative feedback systems with a forward transfer function G(s), Draw the root locus of the following systems

[1] $G(s) = \dfrac{k(s+5)}{(s-1)(s+4)(s+6)}$.

[2] $G(s) = \dfrac{k}{(s+1)(s+3)(s+7)}$,

And find the values of gain k does the system become unstable? **(10 Marks)**

[b] In figure (4), define a state variable X_3, then find the corresponding state

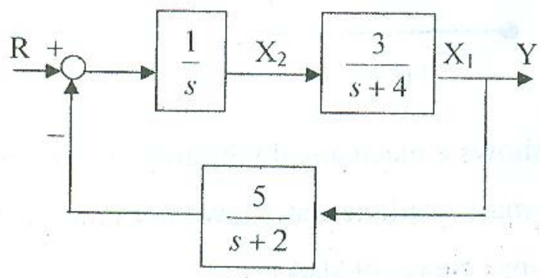

Fig.(4)

space model. (4 Marks)

Problem number (4) (20 Marks)

[a] For the system that have the following transfer function

$$T(s) = \frac{(s+2)}{(s+3)}\frac{(s+4)}{(2s^2+s+6)}$$

Give the state space in pole-zero form (7 Marks) and in controllable form. (3 Marks).

[b] Draw the state diagram.

$$\dot{\underline{X}} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}\underline{X} + \begin{bmatrix} 1 \\ 1 \end{bmatrix}u$$

$$y = [1 \quad 0]\underline{X}$$

Then, determine whether the given system in (b) is completely state controllable and observable or not. (4 Marks)

[c] For the following system

$$\dot{\underline{X}} = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix}\underline{X} + \begin{bmatrix} 1 \\ 0 \end{bmatrix}u$$

$$y = [2 \quad 1]\underline{X}$$

Find: 1) The characterstic equation, and the eigen values of matrix A (3 Marks)

2) The matrix $\Phi(t)$. (3 Marks)

مع أطيب الأمنيات بالتوفيق

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

Total Marks: 70 Marks

Course Title: Control Engineering Date: June 2012 (Second term)	Course Code: CCE2251 Allowed time: 3 hrs	Year: 2^{nd} No. of Pages: (2)

Answer the following questions

Problem number (1) (17 Marks)

[a] Assume the electric system shown in figure (1), find the transfer function (8 Marks)

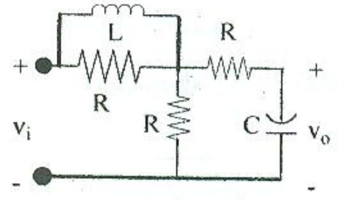

Fig. (1)

[b] The figure (2) shows a mechanical vibratory system, when 8.9 N of force is applied to the system, the mass oscillates, as shown in Figure. Determine M, B and K of the system from this response curve. (9 Marks)

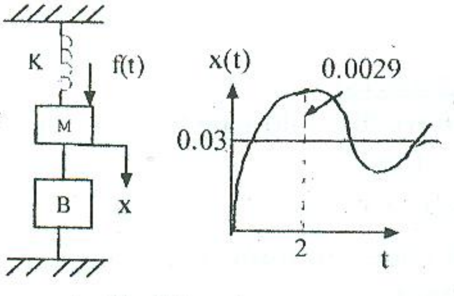

Fig.(2)

Problem number (2) (19 Marks)

[a] The characteristic equations of linear control systems are given below. Apply Routh-Hurwitz criterion to determine the root distribution and the system stability. (10Marks)

1) $s^6 + s^5 + 2s^4 + 2s^3 + 3s^2 + s + 1 = 0$

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

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

[b] In figure (3), using a signal flow graph to find the transfer function of the following

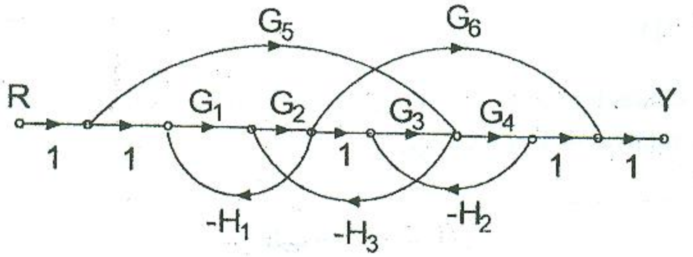

Fig.(3)

system **Y(s)/R(s)** (9 Marks)