Elec. Power and Machines Engineering Department

Tanta University

Faculty of Engineering

Course Title : Electromagnetic Fields		Course Code :	EPM2142
Date : Jan 15th 2011 (First term)		Allowed time :	3 hrs
Total Marks : 85	No. of Pages: (2)	Year :	2nd Com.

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

ANSWER ALL QUESTIONS

Question(1)

(a = 5 Marks, b = 12 Marks)

a) Using Gauss's law, derive an expression for the electric field intensity **E** at a point $P(r,\theta,\Phi)$ due to a point charge Q located at the origin.

b) Three concentric cylindrical surfaces have radii : $\rho_1 = 2$ m, $\rho_2 = 4$ m and $\rho_3 = 6$ m carry uniform charge densities of : $\rho_{s1} = 20$ nC/m^2, $\rho_{s2} = -4$ nC/m^2, and ρ_{s3} nC/m^2 respectively.

i. Find **D** at r = 1, 3, and 5 m

ii. Find ρ_{s3} such that **D** = 0 at $\rho = 7$ m

Question(2)

(a = 5 Marks, b = 12 Marks)

a) Aided with clear sketches and defining each term used, derive the potential difference due to an infinite line charge between two points A and B.

b) Two spherical concentric conductors with the inner spherical conductor is solid and has a radius a and its voltage is V_1. The outer spherical conductor has inner radius b and outer radius c and it has a voltage V_2. Find the charges Q_1 and Q_2 for the following conditions:

i. The two conductors are isolated.

ii. The inner conductor is grounded.

iii. The outer conductor is grounded.

iv. The inner conductor is not charged.

Question(3)

(a = 6 Marks, b = 11 Marks)

a) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c. Sketch H versus ρ from 0 to ∞.

P.T.O.

b) Two parallel plates spaced by three different dielectric materials with relative permitivities 5, 8, 12 and thicknesses 2, 5, 3 mm respectively. If each plate has an area of 3 cm and the total applied voltage is 1000 V, calculate:

i. The total capacitance.
ii. The electric field intensity in each dielectric material
iii. The voltage across each dielectric material.
iv. The energy stored in each dielectric material.

Question(4) *(a = 5 Marks, b = 12 Marks)*

a) Defining each term used, express Maxwell's equations in both integral and differential forms.

b) The z = 0 plane is a perfectly conducting surface. A point charge of 5 nC is located at A(4,3,1), and a point charge of – 8 nC is at B(2,-5,4), all in free space. Calculate V at a point midway between the two point charges.

Question(5) *(a = 5 Marks, b = 12 Marks)*

a) Aided with clear sketch, apply the boundary conditions on the surface separating two perfect dielectric materials of permittivity ε_1 and ε_2 to determine the relations between D_1 and D_2 and between E_1 and E_2 in terms of θ_1 , ε_1 , θ_2 and ε_2 .

b) Given the potential function $V = 2x^2y - 5z$

Determine:

i. The potential.
ii. The electric field intensity **E**.
iii. The volume charge density ρ_v at point P(-4,3,6).

Permittivity of free space $\varepsilon_o = 8.85 \times 10^{-12}$ F/m , Permeability of free space $\mu_o = 4\pi \times 10^{-7}$ H/m

Good Luck

Prof. M.A.El-Khazendar

Course Examination Committee

Prof. M.A. El-Khazendar — Prof. E.M. Rashad

Dr. M. Elnemr — Dr. M. Eid

Course Coordinator: Prof. M.A. El-Khazendar

Tanta University

Physics & Engineering Mathematics Department
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Engineering Mathematics (3) a Year: 2nd Electronics and Electrical Communications Engineering.
Course Code: PME2110 Date: / 1 / 2011 (First term) Allowed time: 3 hrs No. of Pages: (2)

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

Problem number (1) (17 Marks)

(a) Determine a polynomial of degree ≤ 4 using Newton Divided Difference Form to interpolate the following data

X	1.2	2.1	3.0	3.6	4.2
y	0.7	8.1	27.7	45.1	60.8

Then estimate the value of y when x = 2.3

(b) Given the table

X	2.0	2.1	2.2	2.3
f(x)	1.5	2.0	3.8	5.1

Approximate f(2.07), f(2.18) and f(2.26) using Natural Cubic Spline approximation.

Problem number (2) (17 Marks)

(a) " Richardson extrapolation is a technique for approximating derivatives of a function f that will enable us to reduce the truncation error. "
Derive Richardson formula and give a mathematical formula for the corresponding truncation error.

(b) Use Simpson's composite rule to find the value of the integral $\int_0^1 \ln(3+\sin x)\,dx$ with n = 8.

And give the value of the truncation error in evaluating this integral.

Problem number (3) (17 Marks)

(a) Using Fourier Sine Integral, for the function $f(x) = e^{-kx}$, $x > 0$, $k > 0$. Find the value of the integral $\int_0^\infty \frac{\omega \sin \omega a}{\omega^2 + k^2}\,d\omega$ if $a > 0$ and $a < 0$.

(b) Show that if f(x) has a Fourier Transform, so does f(x-a) and

$$F\{f(x-a)\} = e^{-i\omega a}\, F\{f(x)\}$$

P.T.O.

(c) Find the Fourier Transform of

$$f(x) = \begin{cases} (x-3)\,e^{(3-x)} & \text{for} \quad x > 3 \\ 0 & \text{for} \quad x < 3 \end{cases}$$

Problem number (4) (17 Marks)

(a) Derive a formula that can be used to solve a general two point boundary value problem, using Finite Difference Method. What are the conditions for this method to have a unique solution.

(b) Approximate the solution of the following boundary value problem using the linear shooting method.

$y'' + (1-x)\,y' + xy = x\,, \quad y(0) = 1\,, \quad y(1) = 2\,, \quad h = 0.25$

Problem number (5) (17 Marks)

(a) Approximate the solution of the following hyperbolic partial differential equation

$\pi\, U_{xx} = U_{tt} \quad 0 < x < \pi \quad \text{and} \quad 0 < t < 1$, where

$U(0,t) = U(\pi, t) = 0 \quad \text{and} \quad 0 \le t \le 1$

$U(x,0) = 2x/\pi(\pi - x), \quad U_t(x,0) = 0\,, \quad 0 \le x < \pi$, use $h = \pi/5$, $k = 0.2$

(c) Solve Laplace's equation for a square $0 < x < 1$ and $0 < y < 1$, subject to the specified boundary conditions

$U(x,0) = U(0,y) = U(x,1) = 0, \quad U(1,y) = -y(y-1)$ with $h = k = 1/3$

Good luck

Dr. Manal Mohamed Hekal

	TANTA UNIVERSITY FACULTY OF ENGINEERING DEPARTMENT OF ELECTRONICS AND COMMUNICATION EXAMINATION (second YEAR) STUDENTS OF Electronics and Communication ENGINEERING	
DATE: 22/1/2011	COURSE TITLE: Electronic Circuits (1)	COURSE CODE: EEC2103
TERM: FIRST	TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

Answer the following questions

Question 1.(18 Marks)

I. For the network of Fig. 1:
   a. Determine r_e. (2 Marks)
   b. Find $Av_{mid} = V_o / V_i$. (2 Marks)
   c. Determine f_{LS}, f_{LC}, and f_{LE}. (6Marks)
   d. Determine f_{Hi} and f_{Ho}. (4 Marks)
   e. Sketch the frequency response for the amplifier. (4 Marks)

Question2. (18 Marks)

I. Explain briefly the operational amplifier nonlinear limitations. (4 Marks)

II. Consider non-inverting amplifier circuit that has closed loop gain of 10. This circuit was fed by low frequency sine wave of peak v_p and is considered to load resistance R_L. The op. Amp. is specified to have saturation voltage of ±13v and maximum output current of ±20mA
   a. For v_p=1v and R_L=1k Ω. Specify and sketch the signal resulting at the output of the amplifier. (3 Marks)
   b. For v_p=1.5v and R_L=1kΩ. Specify and sketch the signal resulting at the output of the amplifier. (3Marks)
   c. For R_L= 1k Ω, what is the maximum value of v_P for which undistorted signal is obtained? (4 Marks)
   d. For v_p=1v, what is the lowest value of R_L for which undistorted signal is obtained? (4 Marks)

Question3. (18 Marks)

I. Explain the main benefits of negative feedback? (6 Marks)

II. For the op-amp amplifier, shown in Fig. 2, with open loop gain A_o and input differential resistance R_{id}=10kΩ and output resistance r_o=1k Ω , R_L=1k Ω,R_2=10k Ω , r= 1000 Ω. Determine closed loop gain A_f, input impedance and output impedance for the following two cases:
   a. $A_o = 10^5$ and R_1=100 Ω. (6 Marks)
   b. $A_o = 10^4$ and $R_1 = \infty$, what is the type of the feedback configuration? (6Marks)

Question4. (18 Marks)

I. Discuss the effect of pole location on the frequency and transient response. (8 Marks)

II. Two-pole amplifier with open loop gain 10^4 and R_1=R_2=10k Ω, was used in a circuit to give closed loop gain of 10:
   a. Find c_1 and c_2 so that the break frequencies are at f_1=f_2=100 kHz. (2Marks)
   b. Draw the transient and frequency response of this amplifier if its input was 1v pulse of 1μsec duration. (8 Marks)

Question5. (18 Marks)

I. Explain with the aid if sketches how negative feedback affects pole location of three-pole amplifier. (5 Marks)

II. Deduce the maximum value of feedback ratio β that causes four-pole amplifier with open loop gain of 10^4 to oscillate. (5 Marks)

III. Define gain margin and phase margin indicating how they are used to control amplifier stability. (4Marks)

IV. Discuss two ways to compensate for amplifier instability.(4 Marks)

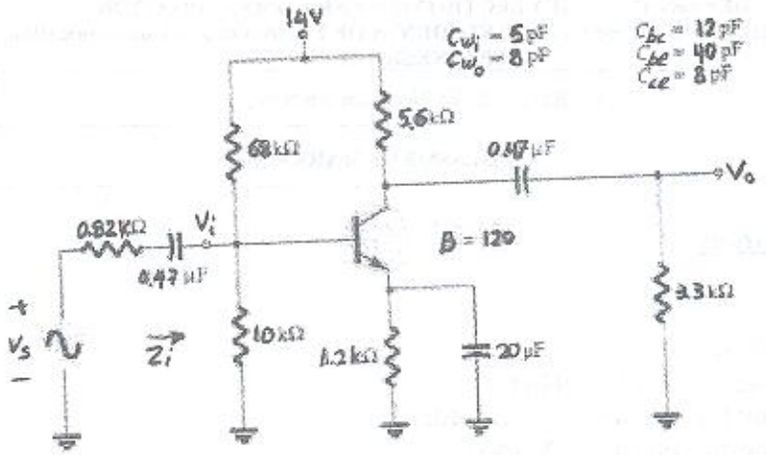

Fig. 1

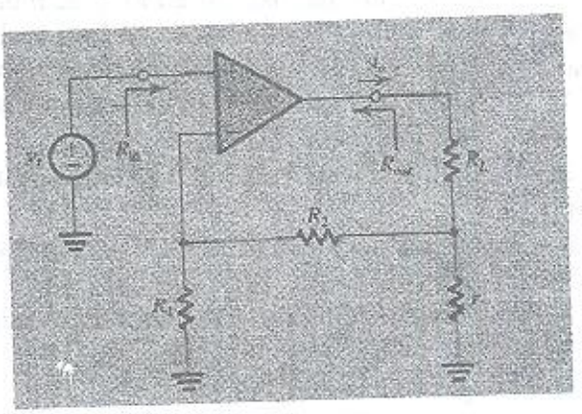

Fig. 2

Good Luck,

Dr. Salwa Serag Eldin

Tanta University | Department: Electronics and Communications Eng. | Faculty of Engineering
Total Marks: 90 Marks

Course Title: Electronic Measurements (1)	Course Code: EEC2105	Second Year
Date: January 24rd 2011 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Answer all the following questions:

Question (1) (10 degrees)

(1) Define the following terms: error, precision, accuracy, and sensitivity. (4 deg.)
(2) Given the circuit shown in Figure (1), where a voltmeter with a sensitivity of 1 KΩ /V is used to measure the voltage across R_b, calculate:
(a) The true voltage across R_b. (2 deg.)
(b) The reading of the voltmeter. (1 deg.)
(c) The percentage of error. (2 deg.)
(d) The accuracy of the voltmeter. (1 deg.)

Question (2) (20 degrees)

(1) Explain the operation of an ac electronic voltmeter using half wave rectifier. (6 deg.)
(2) Compare between d'Arsonval meter movement, electronic voltmeter (EVM), and digital voltmeter (DVM). (6 deg.)
(3) Given the EVM of the source follower type, find the relation between ammeter current and input voltage. If r_d=100 KΩ, g_m=0.003 Siemens, R_s=15 KΩ, and R_m=1800 Ω find the value of the ammeter current. (8 deg.)

Question (3) (15 degrees)

(1) Show, how a true rms voltmeter can measures the rms value of a waveform. (5 deg.)
(2) Describe the working of the following digital voltmeters:
(i) Linear ramp DVM. (5 deg.)
(ii) Staircase ramp DVM. (5 deg.)

Question (4) (10 degrees)

(1) Explain with the block diagram how the R-C phase shift oscillator achieves the criteria required for oscillation. If the value of R=5 KΩ and C=0.01 μF, calculate the frequency of oscillation. (5 deg.)
(2) Determine the peak-to-peak amplitude and the frequency of the output signal V_o as shown below in the Figure (2), then draw V_o. Given: R=200 KΩ, R_1=10 KΩ, R_2=50 KΩ, C=100 *p*F, V_{cc}=10 v. (5 deg.)

Question (5) (20 degrees)

(1) Derive an expression for the vertical deflection on the screen of a cathode ray tube. (5 deg.)
(2) The length of the deflection plates is 25 mm, and the distance between the deflection plates is 10mm. If the distance from the centre of the deflection plates to the CRT screen is 20 cm, the accelerating voltage is 4 V, determine the deflection sensitivity of the CRT. (5 deg.)
(3) Draw the block diagram of the vertical amplifier and the horizontal amplifier of an oscilloscope. State the basic functions of each amplifier. (5 deg.)
(4) Using a diagram, describe the different parts of the **trigger** circuit and the sources of the trigger input. (5 deg.)

Question (6) (15 degrees)

(1) State the undesirable effects if the probe is not properly compensated. (4 deg.)
(2) Describe the different functions of the dual-trace oscilloscope. (6 deg.)

(3) A trigger pulse is applied to the sweep generator in Figure (3) every 20 ms, compute the amplitude of the output voltage Vo across the capacitor when the triggered pulse is applied, then if the output voltage across the capacitor reaches to 10 % of its maximum value, what is the voltage across the capacitor after 50 μs, if the saturated resistance of a transistor is 500 Ω. (5 deg.)

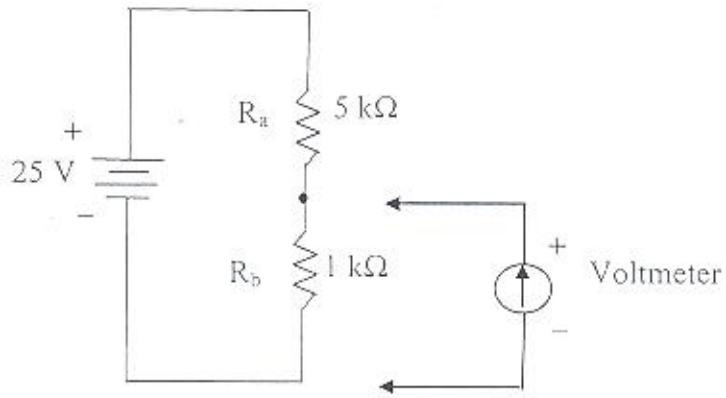

Figure (1)

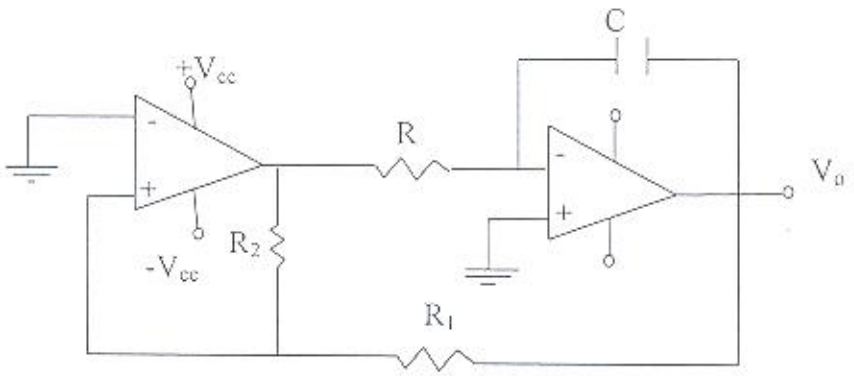

Figure (2)

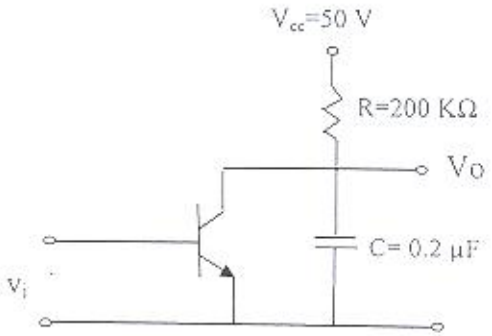

Figure (3)

Good Luck

Dr. *Entessar Said*

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TANTA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENG

EXAMINATION (2nd YEAR) STUDENTS OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

	COURSE TITLE: Technical Reports		COURSE CODE: EEC2 1H3
DATE: 26/1/2011	TERM: FIRST	TOTAL ASSESSMENT MARKS: 40	TIME ALLOWED: 2 HOURS

Notes:
Systematic arrangement of calculations and clear neat drawings are essential.
Any data not given is to be assumed – Answer as many questions as you can.
Answer as brief as possible.

QUESTION # ONE (15 mark)

(a) Write a paragraph describing what you think is the most significant problems in your town and how you can solve it. **(8 marks)**

(b) Write sample checklists for completing a final technical report draft, explain each item. **(7 marks)**

QUESTION # Two (15 mark)

(a) " Ethics is a significant factor in three main areas in technical communications", Explain in details each of these areas . **(8 marks)**

(b) Create a checklist for the following types of documents:
(i) Internal and External Proposals
(ii) Progress reports
(iii) An experimental report **(7 marks)**

QUESTION # Three (10 mark)

(a) Describe common types of graphs and charts you may use in a technical reports . **(5 marks)**

(b) Correct the following statements:
1. I except that I will never truly understand physics.
2. Lead in gasoline effects the environment.
3. My solutions is different than yours.
4. The engine needs to be fixed, irregardless of cost
5. The shift in data is because there was a sharp change in temperature.

(5 marks)

Prof. Mustafa Mahmoud

Good Luck.....

Faculty of Engineering	Electronics and Comm. Dept. Comm. Theory Exam 2nd year	Date: 12/1/2011 Time allowed: 3 Hours	Tanta University

Answer the following questions

Question 1.

For the periodic signal $m_p(t) = 20\sum_{n=-\infty}^{n=\infty} rect(10^5 t - 4n)$

i. Sketch the signal in time domain.
ii. Find and sketch its spectrum.
iii. Deduce the null-to-null bandwidth.
iv. Find and sketch its power spectral density.
v. Estimate Dc power P_{dc}, total power P_T, Ac power P_{ac}.

Question2.

If it is required to transmit baseband signal $m(t)=30\cos(2\pi \times 10^4 t)$ via DSBSC and AM systems with carrier $c(t)=100\cos(2\pi \times 10^6 t)$:

i. Draw block diagram for both systems (tx. And Rx.)
ii. Evaluate the total transmitted power in both systems.
iii. Estimate the bandwidth required for transmission.

Question3.

a. Define the SSB modulation process. Explain how to generate AM-SSB wave using phase discriminator method.
b. Define the VSB modulation process. Explain how to generate the signal showing the characteristics of the filter used.
c. Compare between these two modulations techniques showing when each of them is used.

Question4.

a. Discuss one method for modulation and detection of wide band FM signal.
b. Define instantaneous frequency, modulation index, frequency deviation, and linear and nonlinear modulation.
c. Calculate the FM signal bandwidth where the frequency deviation=8 kHz and f_m=4 kHz. Write the FM equation if A_c=18v and f_c=3MHz. estimate the power of this signal.

Question5.

a. Evaluate the figure of merit of SSB coherent receiver model.
b. Estimate figure of merit of AM receiver using envelop detector model.
c. Compare between the previous two systems and comment on your results.

Good luck,

Dr. Salwa Serag Eldin