جامعة قطنا
كلية الهندسة
قسم هندسة القوى الكهربية
قسم الاتصالات الكهربية

امتحان مقرر دراسات بيئية
الفرقة الثانية (لائحة قديمة)
يونيو ٢٠٠٧ الزمن ساعتين

أجب عن الأسئلة الآتية:

١-أ- أذكر أهم مصادر التلوث بالموجات الكهرومغنطيسية والآثار السلبية الناجمة عن مثل هذا النوع من التلوث.

ب- اكتب عن الطرق المختلفة لتوليد الطاقة الكهربية وقارن فيما بينهم هذه الطرق فيما يخص استهلاك الموارد البيئية والتلوث البيئي المصاحب لكل وحدة من المنتج.

جـ- ماهي الاشتراطات البيئية الخاصة بإقامة محطات تقوية الجهد.

٢-أ- أكتب مذكرة وافية عن مصادر الطاقة الجديدة والمتجددة.

ب- اكتب مذكرة وافية عن طرق رفع كفاءة استخدام مصادر الطاقة التقليدية لضمان استدامة الموارد البيئية المشتركة في إنتاجها.

جـ- أكتب مذكرة وافية عن عوامل القدرة وتأثيراته وطرق تحسينه ومردود ذلك على ترشيد وعقلنة استغلال الطاقة الكهربية

د- اكتب مذكرة وافية عن المجالات الكهرومغنطيسية الناجمة عن المحولات والمعدات الثقيلة وخطوط نقل الطاقة الكهربية مع إعطاء أمثلة.

هـ- ارسم مخطط يوضح تسلسل العمليات في محطة توليد للطاقة الكهربية باستخدام الطاقة المتجددة وماهي أهم المحددات لاستخدام الطاقة المتجددة لتوليد الطاقة الكهربية.

TANTA UNIVERSITY

Faculty of Engineering

Power Engineering and Electrical Machines Department

Course	: Electromagnetic fields	**Exam**	: Final
Code	: EPM2104	**Time**	: 3 Hours
Year	: 2nd	**Department.**	: Power Engineering & Electrical Machines
Date	: 15 / 1 / 2007		

Answer All Questions:

Question(1)

a) Using Gauss's law. Derive the electric flux density due to a uniform line charge distribution ρ_l C/m lying along the z axis and extending from $-\infty$ to $+\infty$

b) Determine the electric field intensity **E** at point P(2,0,0) due to three standard charge distribution:

i) A uniform surface charge at x = - 2 m with ρ_s = - 0.2 nC/m^2 ,

ii) A uniform surface charge at x = 5 m with ρ_s = + 0.2 nC/m^2 ,

iii) A uniform line charge at x = 8 m with ρ_l = 4 nC/m.

Question(2)

a) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates.

b) For the potential field V = 2 x^2 y – 5 z in free space, evaluate at point P(-4,3,6):

i) The potential

ii) The magnitude and direction of the electric field intensity

iii) The electric flux density.

iv) The volume charge density.

Question(3)

a) Aided with sketches derive the boundary conditions at surface separating two dielectrics having permittivities ε_1 , ε_2. Derive the relation between electric field intensities $\mathbf{E}_1$ and $\mathbf{E}_2$ and electric flux densities $\mathbf{D}_1$ and $\mathbf{D}_2$ in terms of θ_1 , ε_1 , ε_2 , and θ_2

b) Find the relative permittivity of the dielectric material used in a parallel plates capacitor if:

i) The capacitance, C = 40 nF, separation distance, d = 0.1 mm, and surface area, S = 0.15 m^2

ii) Electric field intensity, E = 500 kV/m, and $\boldsymbol{\rho}_s$ = 10 μC/m^2

iii)Electric flux density, D = 50 μC/m^2 and the energy density is 20 J/m^3.

Question(4)

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 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 , where $h < b < c$ Sketch H versus ρ from 0 to ∞.

b) A filamentary conductor carries current of 10 A is directed from infinity to the origin along the positive x axis and then back out to infinity along the positive y axis. Use Biot-Savart law to find the magnetic field intensity **H** at P(0,0,1).

TANTA UNIVERSITY
Faculty of Engineering [Final Exam. Jan. 2006-2007] Course: Energy Conversion
2nd Year (Dept. Electric Power & Machines Eng.) Old Curriculum
Time: 3 hours

ملاحظات هامة: لاتعوض عن أى من μ_0 و π بقيمتها (المعروفة) بل اترك الأجوبة بدلالتهما
افرض رموزا أو قيما واقعية لأى معطيات لم تذكر و تحتاجها
وضح اجابتك بأشكال توضيحية مرسومة بعناية ومعادلات كلما أمكن ذلك

Attempt all questions
من فضلك لاحظ أن درجات الأسئلة مختلفة

Question 1

a For the machine shown in Fig. 1, derive an expression for the mutual inductance between the two windings taking the fundamental component of stator flux density. (10 points)

b For a slotted armature: i) sketch the flux lines in a slot. Show that there is little force on conductors in slots. ii) show that there is a strong force exerted on the iron teeth by deriving an expression for the mechanical torque applying the principle of conservation of energy. For this purpose, assume no change in stored energy and no electrical or mechanical losses. (5 points)

Questions 2

Fig. 2 shows a section a section of a machine having two identical stator windings aa', bb', in quadrature. The self inductance of the each stator winding is L_{ss} and the rotor wing is L_{rr} and they are constants independent of θ_s. The mutual inductance between a stator winding and the rotor winding is a function of the angular position of the rotor as follows: $M_{s/} = M \cos \theta_s$; $M_{s/} = M \sin \theta_s$, where M is the maximum value of the mutual inductance. The rotor winding is excited with dc I_f. The rotor is revolving at a synchronous speed so that its instantaneous angular position is given by $\theta_s = \omega t - \delta$. The resistance of each of the stator phases is r and that of the field winding is r_f. Derive expressions for the open circuited terminal voltage of each coil in terms of the given data. (10 points)

Question 3

a Draw a developed sketch of winding that produce a pulsating mmf in rotating machine. Show by equations that such mmf can be decomposed into two rotating mmf's . (5 points)

b Derive an expression for the torque developed by a cylindrical synchronous motor having two poles similar to that shown in Fig. 2 but without the winding bb. The rotor windings are excited with dc current I_f, while the stator winding is connected to an ac source with current $i_s = \sqrt{2}\, I_s \cos \omega t$.. L_{ss} and M_{sf} may be assumed as in question 2..
(i) Write an expression for the energy stored in terms of ω and ωangular position θ_s.
(ii) What is the rotor speed ω_s at which an average torque will be produced?
(iii) Find the average torque. (15 points)

Question 4

a For a singly –excited translational system, derive expressions for current, flux linkage, force in the form of stored energy or coenergy. (15 points)

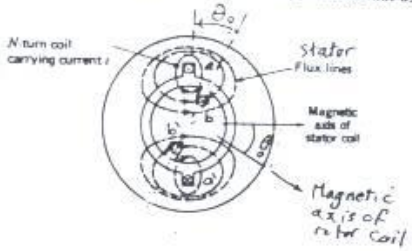
b Show that the energy stored in a rotating magnetic system given by $W_s(\lambda_0,\theta_1) = \int_0^{\lambda_0} i(\lambda,\theta_1)d\lambda$ regardless of how λ varies with θ. ___Hint: Integrate $d\lambda$ over a two-section path: one with $\lambda = 0$ and the other with θ = constant. (5 points)

c Prove an expression for the differential force that acts on a current carrying conductor of differential length dl placed in a magnetic field of density B tesla. (5 points)

Question 5

a State with illustrations three different types of the collectors used with applications of solar electric energy. (10 points)

b Draw a sketch of a domestic application that uses solar heat energy. (10 points)



(a)

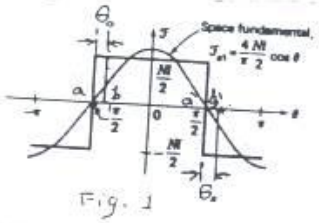


Fig. 1

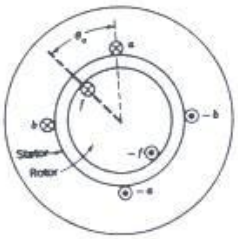


Fig. 2

END OF EXAM **LUCK ◄GOOD► BYE**

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٦/ ٢٠٠٧

الفرقة الثانية حاسبات-اتصالات- قوى كهربية (قديم)
المادة : تحليل الدوائر الكهربية
الزمن : ثلاث ساعات يناير ٢٠٠٧

Answer the following six questions:

Q(1): For the circuit in Fig. Q1

a) Prove that $V_o = \frac{R_f}{R_a}(V_b - V_a)$ when $\frac{Ra}{R_b} = \frac{R_c}{R_d}$

b) For $\frac{Ra}{R_b} = \frac{R_c}{R_d} = \frac{1}{5}$, $V_b = 4.0$ V and $V_{cc} = 10$ V, what range of values for V_a will result in linear operation?

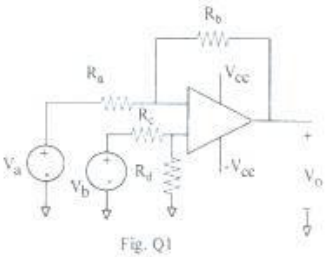


Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of 0.5 μF capacitor:

$V(t) = 0 \quad t \le 0$

$V(t) = 4t \quad 0 \le t \le 1$

$V(t) = 4\,e^{-(t-1)} \quad 1 \le t \le \infty$

a) Derive the expressions for the capacitor current, power, and energy.

b) Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3. There is no energy stored at $t = 0$.

1- Derive the numerical expressions for v(t) for the time intervals $t < 0$, $0 < t < 40$ μs, and 40 μs $< t < \infty$

2- Calculate $v(60^- \mu s)$ and $v(60^+ \mu s)$

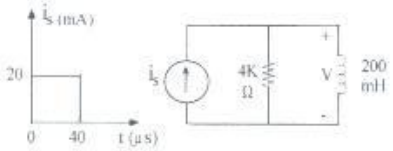


Fig. Q3

Q(4): The switch in the circuit shown in Fig. Q4 has been in position **a** for a long time. At $t = 0$ the switch is thrown to position **b**. Find

a) V_c for $t \ge 0$

b) i(t) for $t \ge 0^+$

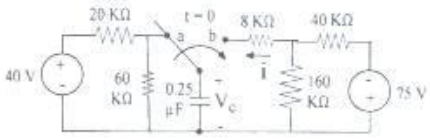


Fig. Q4

Q(5): The uncharged capacitor in the circuit shown in Fig. Q5 is initially switched to terminal **a** of the three position switch. At t = 0 the switch is moved to position **b**, where it remains for 20 ms. After the 20 ms delay, the switch is moved to position **c**, where it remains indefinitely.

a) Derive the numerical expression for the voltage across the capacitor.
b) Plot the capacitor voltage versus time.
c) When will the voltage on the capacitor equal 200 V ?

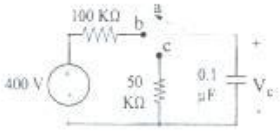


Fig. Q5

Q(6): The initial energy stored in the circuit in Fig. Q6 is zero. At t = 0, a dc current source of 24 mA is applied to the circuit.

a) What is the initial value of I_L and dI_L/dt ?
b) What is the numerical expression for $I_L(t)$ when $t \geq 0$?

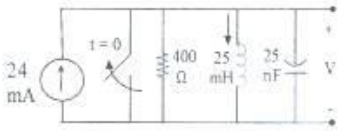


Fig. Q6

مع أطيب الأمنيات بالتوفيق والنجاح

Answer the following questions :-

1-a) Consider the one – dimensional heat equation $u_t = u_{xx}$, $0 \le x \le 1$, $t \ge 0$ with the boundary conditions $u(0,t) = 0$, $u_x(1,t) = 1$

Compute the first two rows of the solution if $h = \frac{1}{3}$, $k = \frac{1}{18}$ and the initial condition $u(x,0) = x$.

1-b) Use Euler's method to find y at $x = 0.2, 0.4$, if $y'' = 4yy' + xy$, $y = 2$ and $y' = 1$ at $x = 0.1$.

2-a) Evaluate $\int_4^{5.2} \ln x \, dx$ correct to 6 decimal by using Simpson's rule .

2-b) Find $f(0.7)$ from the following readings

x	0 . 4	0 . 6	0 . 8	1
y	0 . 3799	0 . 537	0 . 664	0 . 7616

3 –a) Fit the curve $y = a + bx$ to the readings

x	0.5	1.0	1.5	2 . 0	2 . 5	3 .0
y	0 . 3 1	0 . 82	1 . 29	1. 85	2 . 51	3 .0 2

and find the root mean square of the errors .

3- b) Use the simple iteration method to obtain the smallest positive root of the equation $x^3 - 8x + 5 = 0$ correct to five decimal places .

3-c) By the use of Gauss – Seidel method solve the system of linear equations
$5x_1 - x_2 + 3x_3 = -2$, $x_1 + 5x_2 - 2x_3 = 10$, $2x_1 - 4x_2 + 10x_3 = 6$

4-a) To what degree of accuracy can we calculate $\sqrt{115}$ by means of Lagrange's interpolation formula for the function $y = \sqrt{x}$ if we choose the interpolation $x_0 = 100$, $x_1 = 121$, $x_2 = 144$?

4- b) From the following table , find the number of students who obtained less than 45 marks

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of St	31	42	51	35	31

كلية الهندسة	امتحان الفصل الدراسي الأول	المادة : الاقتصاد الهندسي
باسم حنظا	٢٠٠٥ / ٢٠٠٦	السنة : الثالثة (هايجات + إنصالات)
د/ السيد عبد المجيد الشاعر	يناير ٢٠٠٦	الزمن : ساعتان

أجب عن الأسئلة الآتية :-

السؤال الأول

- اذكر العناصر المطلوبة لإقامة منشأة صناعية ؟
- اسم دائرة الانتاج ؟
- اشرح مع الرسم تأثير العوائد المتناقصة ؟
- عامل يتقاضى 12 جنيه لكل ساعة لقاء إنتاج 20 قطعة بالساعة على آلة تبلغ تكلفته الدارجة 48 جنيه بالساعة فإذا وجد عامل آخر اقل كفوقا من الأول بحيث ينتج 18 قطعة بالساعة فما هي التكاليف الكلية للقطعة الواحدة من كلتا الحالتين ثم اذهب التكاليف عندما يقوم بالعمل عامل ثالث ينتج 19 قطعة بالساعة ، ما هي الملاحظات التي يمكنك أن تستنتجها .

السؤال الثاني

- اذكر ما تعرفه عن الطلب والعرض والمرونة ؟ ثم وضح العوامل التي تحدد كلا من الطلب والعرض ؟
- اشرح مع الرسم منحنى الحذر والخطأ ؟
- ما هو المبلغ الذي يجب إيداعه في 1 يناير 1984 لكي يكون بمقدور شخص ما في 1 يوليو 1992 أن يتسلم مبلغ 1000 جنيه كل 6 شهور لمدة 5 سنوات تبدأ من 1 يناير 1993 ؟ الربح الاسمي هو 11 % مع التركيب نصف السنوي ؟ استخدم القانون فقط في الحل ثم الجدول فقط في حالة أخرى من الحل ؟

السؤال الثالث

- اذكر فوائد حساب التكاليف ؟ ثم وضح بالشكل عناصر التكاليف ؟
- اشرح مع الرسم ضريبة التعادل ؟
- اقترض مصنع ما مبلغ 20000 جنيه بفائدة بسيطة قدرها 10 % سنويا واتفق مع الدائنة على سدادها خلال خمس سنوات والمطلوب توضيح خطط السداد مستخدما ثلاث طرق مختلفة ؟

TANTA UNIVERSITY	Course:: Electrical Machines
Faculty of Engineering	2nd Year
Dept. of Computer &Control Eng	Time: Three hours

FINAL EXAM. 2005-2006

Question 1

a) Explain how is eddy-current loss in transformers affected by magnitude and frequency of the applied voltage. How can it minimized?

b) By giving reason(s)مع ذكر الاسباب لتدعيم الاجابة mention what will happer the machine laboratory when the mechanical load is remo completely while a dc series motor is running.

c) Aided with ONE equation ONLY, suggest three methods for sp control of dc motors. State the effect(s) of varying each parameter the speed. غير مطلوب اي رسومات

d) Using a variable frequency source to control the speed of a th phase induction motor, if the voltage is kept constant, what will be effect on the machine flux? What is (are) the limitations of freque reduction? Verify your answer with equation(s).

e) Draw ONLY diagram(s) to show how the direction of rotation squirrel-cage induction motor can be reversed.

f) Draw coil connection diagram(s) of a phase of three phase induc motors to show how the number of poles can be changed. What ef does this have on the operating speed.

g) Suppose that, for a given excitation and load, a synchronous m draws a unity pf current. The load is then kept constant while excitation is increased. Aided with a phasor diagram, discuss change in the power factor and armature current.

h) Aided with illustration(s), explain the basic construction تركيب and principle of operation of a selsyn.

i) Aided with illustration(s), explain three applications of li motors.

Question 2

The parameters of the equivalent circuit of a 150 kVA, 2400 -V/2 transformer, are r_1 = 0.2 Ohm, r_2 = 2 Ohms, x_1 = 0.45 Ohm, x_2 = Ohms, R_c = 10 k. Ohms, X_m = 1.55 k. Ohms. Using the approxi equivalent circuit referred to the primary, determine the (a) vol

regulation and the efficiency of the transformer operating at rated loac with 0.8 lagging power factor.

Question 3

In a long-shunt compound generator, the terminal voltage is 230V when generator delivers 150A. Determine i) the induced e.m.f. ii) tota power generated iii) distribution of this power, given that: shunt field series field, diverter and armature resistances are 92, 0.015, 0.03 and 0.032 Ohms respectively.

b) A 250- V, dc shunt motor draws d full-load line current of 100 A a the rated speed of 1200 r/min. The armature circuit resistance R_a is 0.1 ohm and the field winding resistance is 250 ohm;. Determine (a) the gross full-load mechan3ical power output, (b) the electromagnetic torque developed at full load, and (c) the speed regulation, if the no-load armature-winding current is 10 A.

Question 4

A 2300-V, 3-phase, wye-connected, round-rotor synchronous motor has x_s = 2 Ohm per phase and R_a = 0.1 Ohm per phase. The motor operates at 0.866 leading power factor while taking a line current o 350 A. Find the rms value of the induced phase voltage, the power angle, and the developed and maximum torque.

Question 5

A 3-phase slip-ring motor has negligible stator-winding resistance, the total leakage reactance referred to the rotor being 5 Ohms per phase and the rotor-winding resistance 0.45 Ohm per phase. When running with slip rings short-circuited and exerting full load torque the slip is 3%. Determine (i) the external rotor resistance per phase to give ful load torque at starting, and (ii) the external rotor resistance per phase to give a stable speed of 50% of synchronous speed with a torque o 50% of full load torque.

END OF EXAM LUCK◄GOOD►BYE

TANTA UNIVERSITY

Faculty of Engineering

Power Engineering and Electrical Machines Department

Course	: Electromagnetic fields	**Exam**	: Final
Code	: EPM2142	**Time**	: 3 Hours
Year	: 2nd	**Department.**	: Electronics and & Communications
Date	: 15 / 1 / 2007		

Answer All Questions:

Question(1)

a) Using Gauss's law. Derive the electric flux density due to a uniform line charge distribution ρ_l C/m lying along the z axis and extending from - ∞ to + ∞.

b) Determine the electric field intensity **E** at point P(2,0,0) due to three standard charge distribution:

i) A uniform surface charge at x = - 2 m with ρ_s = - 0.2 nC/m^2,

ii) A uniform surface charge at x = 5 m with ρ_s = + 0.2 nC/m^2,

iii) A uniform line charge at x = 8 m with ρ_l = 4 nC/m.

Question(2)

a) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates.

b) For the potential field V = 2 x^2 y – 5 z in free space, evaluate at point P(-4,3,6):

i) The potential.

ii) The magnitude and direction of the electric field intensity.

iii) The electric flux density.

iv) The volume charge density.

Question(3)

a) Aided with sketches derive the boundary conditions at surface separating two dielectrics having permittivities ε_1 , ε_2. Derive the relation between electric field intensities $\mathbf{E}_1$ and $\mathbf{E}_2$ and electric flux densities $\mathbf{D}_1$ and $\mathbf{D}_2$ in terms of θ_1 , ε_1 , ε_2 , and θ_2.

b) Find the relative permittivity of the dielectric material used in a parallel plates capacitor if:

i) The capacitance, C = 40 nF, separation distance, d = 0.1 mm, and surface area, S = 0.15 m^2.

ii) Electric field intensity, E = 500 kV/m, and ρ_s = 10 μC/m^2.

iii)Electric flux density, D = 50 μC/m^2 and the energy density is 20 J/m^3.

Question(4)

a) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity **H** from ρ = 0 to ρ = ∞ of an infinitely long coaxial transmission line carrying a uniformly distributed total 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 , where h ⟨ b ⟨ c. Sketch H versus ρ from 0 to ∞.

b) A filamentary conductor carries current of 10 A is directed from infinity to the origin along the positive x axis and then back out to infinity along the positive y axis. Use Biot-Savart law to find the magnetic field intensity **H** at P(0,0,1).

University of Tanta
Department of Electrical Engineering
Electronics and Communications

Second Year
Electronic Measurements (2)

Final-Term Exam
Time Allowed: 3 Hours

Answer the following questions:

[1-a] Explain the necessary requirements that must be satisfied for a circuit to sustain oscillation. Compare between the different types of oscillators according to: (a) Circuit diagram, (b) Frequency of Oscillation, (c) Feedback Factor, and (d) Advantages and Disadvantages

[1-b] Draw a Hartley oscillator circuit. Determine the frequency of oscillation and the minimum value of R_f to sustain oscillation for a Hartley oscillator given that: $R_i = 15\ k\Omega$, $C = 0.001\ \mu F$, $L_1 = 10\ \mu H$ and $L_2 = 270\ \mu H$.

[2-a] What are the main advantages of electronic voltmeters (EVM) compared to volt-ohm-milliameters (VOM)? Explain how does a true RMS responding voltmeter measure the RMS value of an AC waveform signal?

[2-b] Explain the main principles and two modes of operation of electronic counters and describe the types of errors associated with electronic counters.

[3-a] List three instruments that are used for frequency-domain analysis and compare between their primary functions for different applications.

[3-b] Describe the causes of harmonic distortion and how to design a distortion analyzer instrument. Compute the total harmonic distortion of a signal that contains a fundamental signal with an rms value of 10 V, a second harmonic with an rms value of 3 V, a third harmonic with an rms value of 1.5 V, and a fourth harmonic with an rms value of 0.6 V.

[4-a] State the function of a transducer and explain why transducers are important in electronic instrumentation? Explain what is meant by photoelectric transducers. Explain three different types of photoelectric transducers.

[4-b] Describe a Strain Gauge. A resistant strain gauge with a gauge factor of 2 is fastened to a steel member, which is subjected to a strain of 1×10^{-6}. If the original resistance value of the gauge is 130 Ω. Calculate the change in resistance.

---

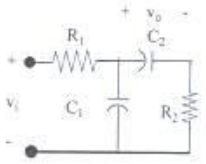
[5] A simple shunted ammeter with $Rm = 1500\ \Omega$ and $I_{fsd} = 100\ \mu A$ is connected in a circuit and gives a reading of 3.5 mA on its 5 mA scale. This reading is checked with a recently calibrated ammeter which gives a reading of 4.1 mA. The first ammeter gives an error because it has a faulty shunt on its 5 mA range. Calculate: The actual value of faulty shunt and the correct shunt for the 5 mA range.

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الثاني للعام الجامعي ٢٠٠٦/٢٠٠٧

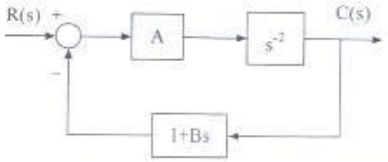
المادة : تحكم آلي
الفرقة : الثانية اتصالات (لائحة قديمة)
الزمن : ثلاث ساعات

Answer the following questions:

Q1: a) Find the transfer function of the following system.



b) The block diagram of a servomechanism is shown below.



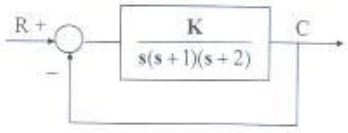
Determine the value of A and B so that the peak time is 5 sec, and the maximum overshoot is 50% in unit-step response.

Q2: a) For each of the following characteristic equations, find the root distribution and determine whether the system is stable, marginally stable, or unstable:

i) $S^3 + 8S^2 + 19S + 12 = 0$
ii) $S^4 + S^3 + 2S^2 + S + 3 = 0$
iii) $S^6 + S^5 + 3S^4 + 3S^3 + 2S + 1 = 0$

b) For the open loop gain $G(S)H(S) = \dfrac{K(S+3)}{S(S+5(S+6)(S^2+2S+2)}$ .Find the range of K that the system is stable.

Q3: For the system shown, draw the root locus plot, then determine the value of k so that the damping ration is 0.5.



Q4: a) Find a state space model for a control system having the transfer function:

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

in the pole-zero form and OCF representation.

b) Transform the following system to diagonal form.

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

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

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

Q5: Sketch the Bode diagram for a system having an open loop transfer function given by

$$G(s) = \frac{200(1+0.2s)}{s(s+2)(s+10)^2},$$

then determine the gain margin and phase margin.

مع أطيب الأمنيات بالتوفيق والنجاح

Tanta University
Faculty of Engineering
Electronics & Communications Dept.
Second Year

Subject : E/M Waves
Final Term Exam
Date : 4 / 5 / 2007
A. A. Shaalan

Attempt in all Questions

1-a) Two dielectric media with permitivities ε_1 and ε_2 are separated by a charge free boundary as shown in Fig. 1. the electric field intensity in medium 1 at P_1 has magnitude E_1 and makes an angle α_1 with the normal. Determine an expression for magnitude E_2 and direction α_2 of the electric field intensity at point P_2 in medium 2 [6 Marks]

b) Calculate the magnitude of E_2 and α_2 if ε_1 =1, ε_2 =3, $\alpha_1=30^\circ$, E1=1mv/m [6 Marks]

2-a) Explain with figures and equations the different types of polarization [4 Marks]

b) A narrow band signal propagates in a lossy dielectric medium which has a loss tangent 0.2 at 550 kHz, the carrier frequency of the signal. The dielectric constant of the medium is 2.5 .

i- Determine α, β, η, v_p, λ, [8 Marks]

ii- Find the distance at which the amplitude of E is 1% of its value at x=0 [8 Marks]

---

3 -) The open –circuit and short – circuit impedances measured at the input terminals of a lossless T.L of length 1.5m which is less than a quarter wavelength are –j54.6 Ω and j103 Ω respectively.

i- Find Z_o and β of the line [5 Marks]

ii- Without changing the operating frequency, find the input impedance of a open circuited line that is twice the given length [5 Marks]

iii- How long should the short- circuited line be in order for it to appear an open circuit at the input terminals [5 Marks]

4-a) Use the smith chart to find the input impedance of a section of 50 Ω lossless line that is 0.1 wavelength long and is terminated in a short circuit Repeat part a analytically. [12 Marks]

b) 50 Ω transmission line is connected to a load impedance ZL =35-j47.5 Ω. Find the position and length of a short-circuited stub required to match the line. [15 Marks]

5-) The standing wave ratio on a lossless 50 ohm transmission line terminated in an unknown load impedance is found to be 3.0. The distance between successive voltage minima is 20 cm, and the first minima is located at 5 cm from the load. Determine

(a) the reflection coefficient [5 Marks]

(b) the load impedance Z_L [5 Marks]

(c) The equivalent length and terminating resistance of a line such that the input impedance is equal to Z_L [5 Marks]

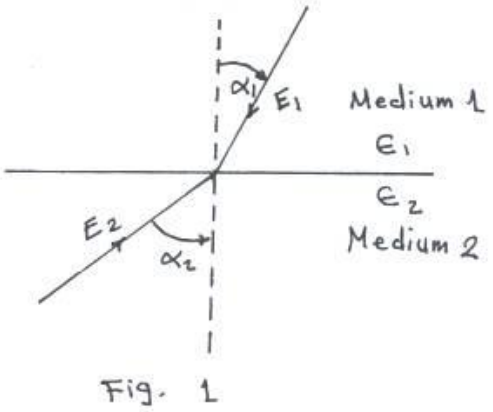


Fig. 1

بسم الله الرحمن الرحيم* لا اله إلا الله محمد رسول الله

جامعة طنطا — كلية الهندسة — قسم الاتصالات والالكترونيات — الفرقة الثانية

مـادة :تحويـل طاقـة (لائحـة ق) — امتحـان الفصـل الدراسـي الثـاني: مـايو/ ٢٠٠٧ م

اليوم : الاثنين ٢٠٠٧/٦/٤م — الزمن: ١٨٠ دقيقة — النهاية العظمي: ٨٥ درجة

Answer all the following questions (24 D. for each)

1.) A-Explain briefly the main sources of electrical energy.

B-What do you know about permanent magnet? A simple permanent magnet cell has a constant cross section area A=110 / 7 cm^2 and an air gap lg = 5mm. Calculate the permanent magnet length if the operating point on its B-H curve is (0.8 T., - 500 KA/m) and the remainder soft iron core has infinite permeability.

2.) A-The solar array generator can be represented as a DC supply has internal voltage Vs internal resistance rs, draw its equivalent circuit. To obtain the V-I curve of this generator an external variable load is connected to it. If V_s = 120 v. , rs = 60 ? , Rl is varying as (0, 0.5, 0.75, 1, 2, 20, 200) * rs , calculate the load current and voltage and then draw the V-I curve.

B- Design a solar generator to give its optimum power transfer to the load (60 V. , 36 A) where the available units of solar array has (120 V. at no load) and (2 A. at short circuit).

3.) Figure 1 shows an electromagnetic cell. All dimensions in mm and its depth is 80 mm. The flux density in all cross sectional areas are equals.

- **a- draw the magnetic equivalent circuit.**
- **b- determine the m.m.f required to produce a flux density of B= 1.4 T in the iron core, if H corresponding this B from the B-H curve is 40 A/m.**
- **c- calculate the magnetic force between the fixed and movable parts.**

4.) a- Why all AC magnetic cores have laminated iron sheet.

b- Write the stator winding factor for a distribution winding of an AC, three phase synchronous generator.

c- A transformer has the following data;

Primary voltage = 380 v., secondary voltage = 80 v., iron losses =600 w. load current = 500A. at unity power factor, r1 = 1? and r2 = .02? . Find: 1- the turns ratio. 2- the transformer efficiency. 3-the secondary flux linkage.

5) a- Write down the main parts of the induction motor construction and its function.

b- A 8 Kw, 400V, 6 pole DC generator runs at 1250 rpm. If the machine has 250 conductors, lap wound and full load cupper loss is 120 W. Calculate: 1- the frequency of the induced E.M.F. 2- the induced E.M.F. 3- the useful flux per pole.

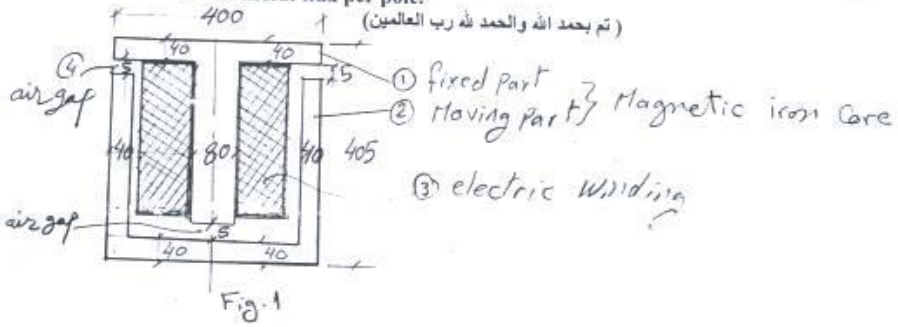


Fig. 1

(تم بحمد الله والحمد لله رب العالمين)

Tanta university
2nd Year Comm. Dept.
Electronic Circuits

Faculty of Engineering
Final Term Exam
Date: 11/6/2007

Time allowed: 3 hours

Answer all the following questions:

Q. 1- Find the critical frequency of the input RC circuit for the FET amplifier in Fig. 1. The transistor data sheet shows that, $C_{iss} = 8\ pF$, $C_{rss} = 3\ pF$, and $g_m = 6500\ \mu S$.

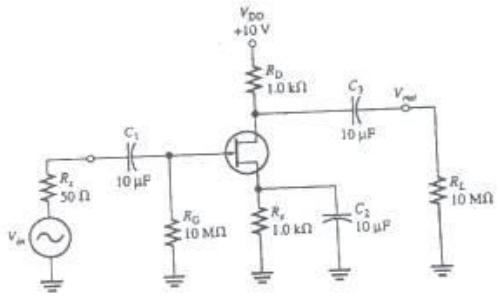


Fig. 1

Q. 2- $f_T = 200\ MHz$ is taken from the data sheet of a transistor used in a certain amplifier. If the midrange gain is determined to be 38 and if f_{C2} is low enough to be neglected compared to f_{C1}, what bandwidth would you expect. What value of f_{C1} would you expect.

Q. 3 Determine the total low frequency response of the BJT amplifier shown in Fig. 2. Draw the bode plot.

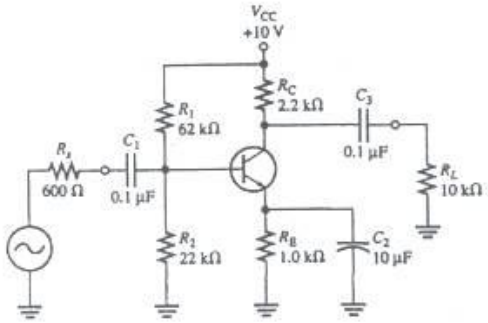


Fig. 2

Q. 4 Design a noninverting amplifier to have a closed loop gain of 35 dB and an output resistance of no more than 0.2Ω. The only op amp available has an output resistance of 250 Ω. What is the minimum open loop gain of the op amp that will meet the design requirements.

Q. 5 Show that the amplifier in Fig. 3 produces an output whose magnitude is the mathematical average of the input voltages.

من فضلك اقلب الصفحة

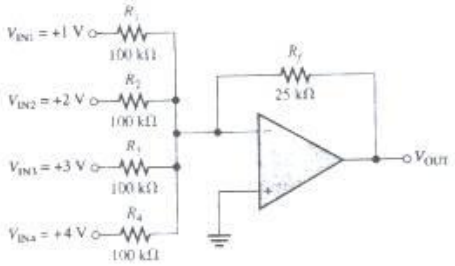


Fig. 3

Q. 6 (a) Draw the circuit of Colpitts oscillator using FET. Find an expression for the output and feedback signals. Drive an expression for the feedback ratio, minimum gain, and frequency of oscillations of the circuit.

(b) Determine what the gain of the amplifier stage must be in Fig. 4 in order to have sustained oscillation.

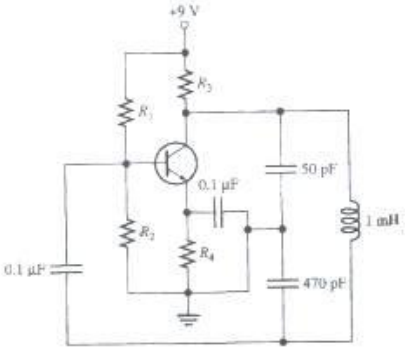


Fig. 4

Q. 7 (a) With the aid of circuit diagram explain the operation of a monostable multivibrator. Drive an expression for LTP, UTP, and the pulse width W. Draw the schematic diagram of the monostable 555 circuit showing all connection pins on your diagram.

(b) Determine the frequency of oscillation for the 555 astable oscillator in Fig. 5.

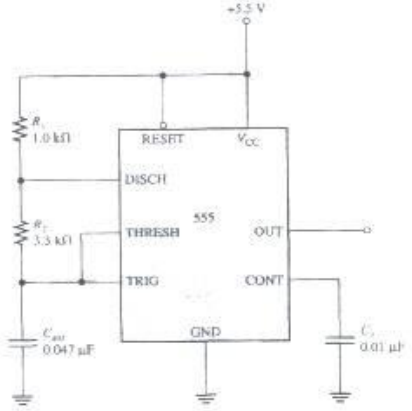


Fig. 5

Tanta University
Faculty of Eng.
Comm. Dep.
Second Year Digital & Logic System January 2007 3.Hours

Answer should be included as you can:
{Drawing Diagram ; Truth table ; Boolean Relations}

I.Draw the electronic circuit Diagram , and realizing Truth table:
(a) 3-input OR gate (b) 4-input AND gate (c) NOT-gate (d)Tri-State Logic gate

II.Draw logic diagram for:
(a) 1-of-10 Decoder (b) 4-to-1 Multiplexer (c) 1-to-4 Demultiplexer

III.Draw Logic Diagram for:
(a) 4-bits odd parity generator (b) 4-bits Comparator (c) Decimal-to-Binary Encoder

IV.(a)Given Truth-table(fig.3.a) using Karnaugh map to derive Logic gates
(b) Draw Block Diagram for 4-bits ALU
(c) Draw logic gate for truth table (fig.3.b)
(d) Draw logic gates for truth table (fig.3.c)

V.Prove that :
(a) 3-input bubbled AND = 3-input NOR
(b) 4-input bubbled OR = 4-input NAND

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

fig(3.a)

A	Y
X	1

fig(3.b)

A	Y
X	0

fig(3.c)

Tanta University — Class: Second Year

Faculty of Engineering — Subject: Communication Systems

Time: 3 hours — Date: 31/5/2007

Answer the Following:

1. a. Explain briefly the purposes of digitization of communication systems?

   b. Find the value of C_{12} which will minimize the error between $f_1(t)$ and $f_2(t)$ if $f_1(t) \cong C_{12} f_2(t)$?

   c. What are the relations between trigonometric and exponential Fourier series?

2. a. Find the Fourier transform of $\sin \omega t$?

   b. Explain the sampling theory and how to recover the signal from its Samples?

   c. What are the characteristics of distortionless transmission systems?

3. a. Define the bandwidth of a system?

   b. Find the energy density spectrum of $f(t)$ where $f(t) = \sin \omega t$ and the duration of $f(t)$ is T ?

   c. What is the difference between energy signal and power signal?

4. a. Find the relation between output signal to noise ratio and input signal to noise ratio for Figure 1 ?

Figure 1

b.Calculate the bandwidth of the video (picture) signal in TV, where a television picture is composed of approximately 300,000 small picture elements. Each of these elements can assume 10 distinguishable brightness levels (such as black and shades of gray) for proper contrast if we assume that for any picture element, the 10 brightness levels are equally likely to occur. There are 30 picture frames being transmitted per second. It is also given that for a satisfactory reproduction of the picture a signal-to-noise ratio of 1000 (30 db) is required.

5. a. Find the equation of the transfer function of the matched filter that maximized the signal to noise ratio at the sampling instant?

   b. Find the output of the matched filter if the present state of the input of matched filter is ***sin 200 t*** and absent state is ***zero***. Calculate the optimum decision threshold value ***a*** ?

   c. Draw the structure of the optimum receiver if the present state of the input of the receiver is $s_1(t)$ and absent state is $s_2(t)$?

Dr/Mona Shokair

TANTA UNIVERSITY

Faculty of Engineering	Depart. of Elec. & Comm. Eng.
Subject: Electronic circuits	Final 1ST term Exam.
Date: 28/12/2006	Time Allowed: 3 Hours

Answer All The Following

1-a-Draw the collector characteristics of a bipolar npn junction transistor for I_B varies from 0 to 100μA with 20 μA step, showing on your characteristics the value of I_C corresponding to each I_B and the three main operating regions of the transistor. Construct also the active region dc model of the transistor. You may consider that β_{dc}=100.

b-An npn transistor with β_{dc}=49 is used in common emitter amplifier circuit shown in Fig. (1) with V_{CC}=10V and R_L=2KΩ. If a 100KΩ resistor is connected between the collector and the base of the transistor, calculate the quiescent collector current and the collector to emitter voltage drop.

2-a-Draw the ideal variation of the collector to emitter voltage and the collector current versus base current of an npn bipolar junction transistor, indicating on your graph the positions of the base and collector saturation currents.

b-What is the output voltage across the load resistor of Fig. (2) if β_{dc}= β_{ac}=200. Ignore r_e in your calculations.

3-a-Draw the equivalent circuit of the common emitter BJT using r-parameters. Drive an expression for the ac emitter resistance of the transistor.

b-Calculate exactly the voltage gain of the emitter follower shown in Fig. (3). If β_{ac}=150, what is the ac load output voltage.

4-What is the total output voltage of the unloaded JFET amplifier in Fig. (4). You may consider I_{DSS}=12mA, and $V_{GS(off)}$=-3V. If a 4.7KΩ load is ac coupled to the output of the amplifier. What is the resulting peak output voltage.

5-4-For the class AB push-pull power amplifier shown in Fig. (3):

a-Determine the dc parameters $V_{B(Q1)}$, $V_{B(Q2)}$, V_E, I_{CQ}, $V_{CE(Q1)}$, and $V_{CE(Q2)}$.

b-Assuming the peak value of the input voltage is 5V, determine the power delivered to the load resistor.

c-Draw the output waveform if: (i)capacitor C_1 opened, (ii)capacitor C_2 opened, (iii)both C_1, and C_2 opened together.

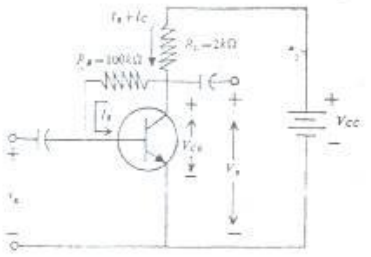


Fig.(1)

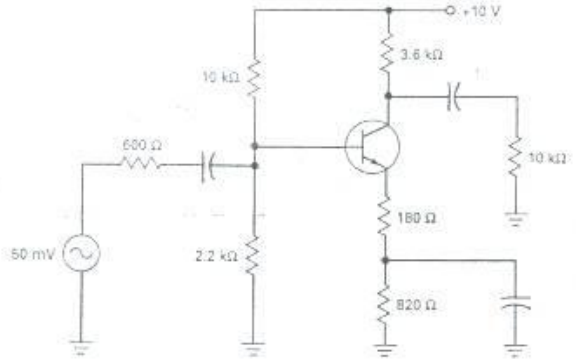


Fig.(2)

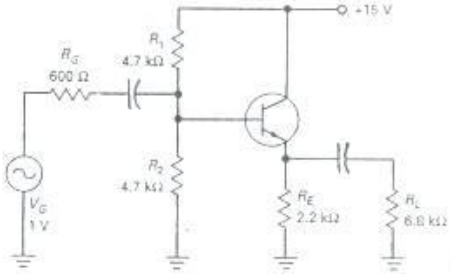


Fig.(3)

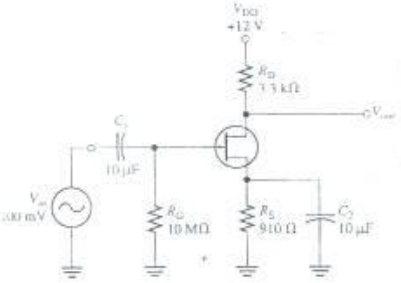


Fig.(4)

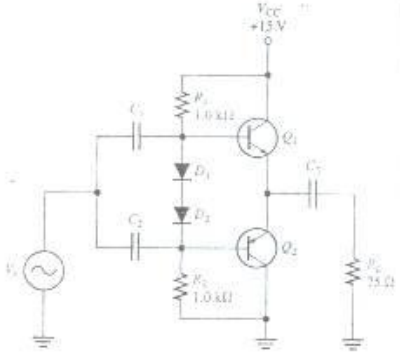


Fig.(5)

TANTA UNIVERSITY

Faculty of Engineering — **Dep of Electrical Commun. Eng.**
Electronic Measurements — **2nd Year- Final Term Exam.**
Date: 18/01/2007 — **Time Allowed: 3 Hours**

Answer All The Following

Q1-a-A symmetrical π resistors attenuator with $R_2=mR_1$ has a characteristic resistance R_o and attenuation A. Drive an expressions for the attenuator resistors.

b-A voltage divider containing two resistors R_1, and $R_2$of values 90 KΩ and 10 KΩ is used as an attenuator in an instrument. Find the voltage gain and the attenuation in decibels. If the transistor and stray capacitance C_2 across the 10 KΩ resistor is of 50 pF, find the value of C_1 across 90 KΩ resistor that compensates for C_2.

Q2-a-Draw the circuit diagram of the bridge RC notch filter. Drive an expression for the notch frequency. Sketch the notch filter gain versus the frequency.

b-Find the pass-band gain and the cutoff frequency of a high pass RC filter with R=100KΩ, C=500pF, R_s=20KΩ, and R_L=150 KΩ.

Q3-a-Draw the block diagram of the function generator. Explain on your diagram the different output waveforms indicating the relation between their frequencies.

b-Draw the circuit diagram of the phase shift oscillator using field effect transistor and RC feedback network. Drive an expression for the oscillation frequency of the oscillator.

Q4-a-With aid of circuit diagram, explain the function of the differential amplifier. Draw it's equivalent circuit. Give an expression for the CMRR of the amplifier.

b-Construct a circuit containing a peak and a base clippers (slicer circuit) to generate a square pulses if the input to the circuit is a sinusoidal wave.

Q5-a- What are applications of an operational amplifier. With aid of circuit diagram explain how this can be used as a summer, integrator, and differentiator.

b- With aid of circuit diagram, explain the working of the wave analyzer. Drive an expressions for the deflection and maximum deflection of the dynamometer.

Tanta University **Time allowed 2 hr**
Faculty of Engineering **2006-2007**
2nd Communication Department

Technical Writing

Question 1

1-What are the stages of the report preparation?
2-What are the points required to review the rough draft of technical report
3- How to write references and why is required?

Question 2

1- What are the basic parts and subsidiary parts of a formal report? Discuss briefly three basic parts and two subsidiary parts of them.
2- Write a letter to accept a job and another one to decline? it.
3- Writ the main parts which appendix involved.

Question 3

1- How to write a useful abstract?
2-Mention the important points for a good Graphs, Drawing and? Photographs in technical report?
3- How are the data presented in the results?

Question 4

1- What is a Spreadsheet?
2- What are the advantages of using a Spreadsheet?
3- What is the oral report?
4- Write the dimensions of A0, A1, A2, A3, A4, A5,A6 and applications of using it?

بسم الله الرحمن الرحيم

TANTA UNIVERSITY
FACULTY OF ENGINEERING
2nd YEAR COMMUNICATION

JANUARY 2007
FINAL EXAMINATION *TIME ALLOWED 3 HOURS*

SUBJECT: COMMUNICATION THEORY

Attempt all questions:

1-a-If the base band signal $m(t) = 40\cos(2\pi.10^4 t)$ is used to modulate the carrier $100\cos(2\pi.10^6 t)$ via **DSB-TC system**

(1) Write down an expression for and sketch the time domain of the modulated signal.
(2) Sketch the spectrum of the modulated signal as well as its power spectral density
(3) Evaluate the total transmitted power and deduce the transmission B.W, and evaluate the modulation efficiency
(4) Draw and explain briefly the operation of the **modulator and demodulator**

b- Repeat the above required in (a) for the **SSB-SC** case

c- Aided with the circuit diagram, explain the operation of both the **ring modulator and the envelope detector.**

d- Make a comparison between the different AM techniques.

e- If the signal m(t) is used to modulate the carrier $200\cos(2\pi.10^6 t)$ via **SSB-TC** technique and the transmitted power is 20.8 kw. Evaluate the transmitted power if the same signal is used to modulate the carrier $80\cos(2\pi.10^7 t)$ via **DSB-TC**

2- a-Draw the block diagram of the **F.D.M system** for the transmission and reception of the following signals and estimate the required B.W:

i- $m_1(t) = 8\cos(2\pi.10^4 t)$ with a carrier $80\cos(2\pi.10^6 t)$ (standard AM)

ii- $m_2(t) = 6\cos(2\pi.5.10^4 t)$ with a carrier $60\cos(2\pi.2.10^6 t)$ (DSB-SC)

iii- $m_3(t) = 4\cos(2\pi.8.10^4 t)$ with a carrier $40\cos(2\pi.4.10^6 t)$ (SSB-SC)

b-Draw the block diagram of the super – heterodyne receiver indicating the signal spectrum at the output of each block when receiving an AM broadcasting signal modulating the carrier $A_c\cos(1.8\pi.10^6 t)$.

3-a- **An angle** modulated signal is given by:

$V(t) = 10\cos(2\pi.10^8 t + 4\sin(2\pi.10^4 t))$

(1) If the signal is an **FM signal** with $k_{FM} = 2\pi.10^3$ rad /sec/volt, deduce the modulating signal g(t) and calculate the maximum frequency and phase deviations, $((\Delta w)_{max}$ *and* $(\Delta\varphi)_{max}$, and deduce the required BW.

(2) Repeat the above required in (1) if the signal is an **PM** signal with k_{PM} =2 rad /volt

b- **For the NBFM system**: Write down an expression for the time domain of the modulated signal indicating the condition required to ensure the NBFM case and the required BW and draw the block diagram of both the modulator and demodulator of the system

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4- a-Draw the block diagram concerning the indirect method for FM generation **(Armstrong method)**

b- If the above modulator is used to transmit a single tone signal with f_m=20 KHz and the modulation index of the NBFM modulator is 0.2 while its crystal controlled oscillator frequency is 400 KHz. The used mixer is supplied with a crystal oscillator whose frequency is $f_{c_1} = 5MHz$ **What are the values of the frequency multipliers N1 and N2** that result in an output WBFM signal with carrier frequency f_{co} =40 MHz and a maximum frequency deviation of 200 KHz

c- Explain briefly how to generate the FM signal using the variable capacitor method.

d- Aided with the block diagram, explain how to demodulate the FM signal using **the feed back method indicating the function of frequency discriminator** aided with its circuit diagram. What are the main advantages of this method.

رب اشرح لي صدري ويسر لي أمري

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Second Year

Final Term Examination
Course : Electronic Circuits (2)
Time : 3 Hours
Date : -1-2006

هندسة طنطا تخلفات

Answer All Questions

1-a) Given the information provided in Figure 1a,determine R_C, R_E, R_B, V_{CE}, and V_B [β=100].

b) Given the information provided in Figure 1b, determine I_C, I_E V_{CC}, V_{C1}, V_B, and R_1 [β=100].

2-a) What is the significant difference between the construction of an enhancement MOSFET and a depletion type MOSFET.

b) Determine V_{GSQ}, I_{DQ}, V_{DS}, V_S, V_G, V_D for the circuit shown in Figure 2b. The data sheet gives I_{DSS} = 8mA, V_P = 6V.

3-a) Determine V_{GSQ}, I_{DQ}, V_{DS}, V_S, V_G, V_D for the circuit shown in Figure 3a. The data sheet gives I_{DSS} = 12mA, V_P= 6V.

b) Determine V_{GSQ}, I_{DQ}, V_D for the circuit shown in Figure 3b. The data sheet gives I_{DSS} = 8mA, V_P = 8V.

4-a) Redraw the network of Figure 4a for the ac response with r_e model and hyprid model

b) For the circuit shown in Figure 4b, determine r_e, Z_i, Z_o, and A_v .

5) For the circuit shown in Figure 5, determine r_e, Z_i, Z_o, A_i, and A_v .

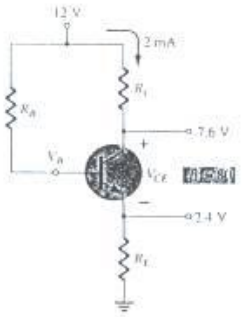

Fig. 1a

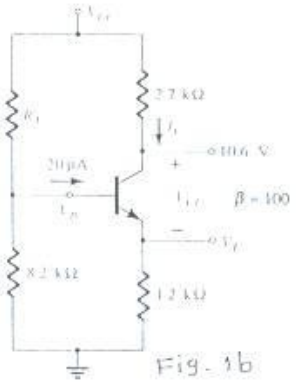

Fig. 1b

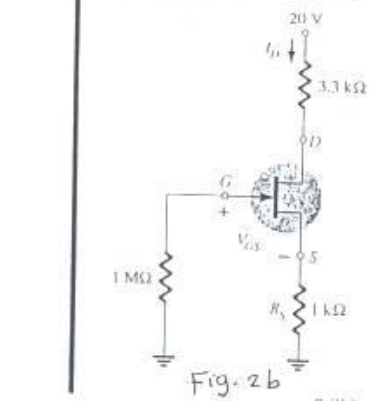

Fig. 2b

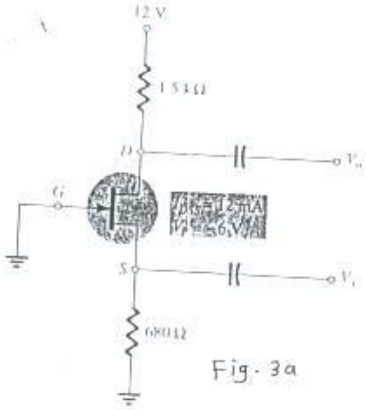

Fig. 3a

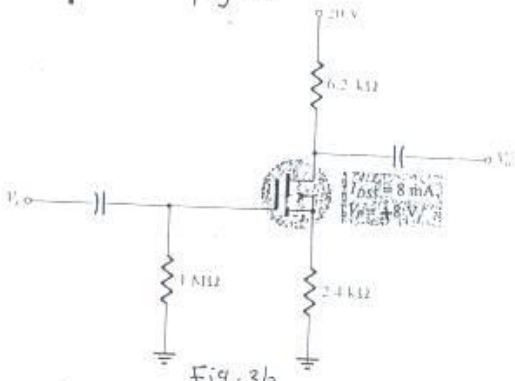

Fig. 3b

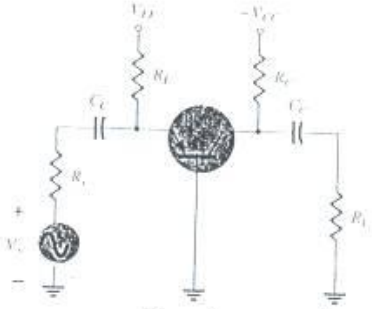

Fig. 4a

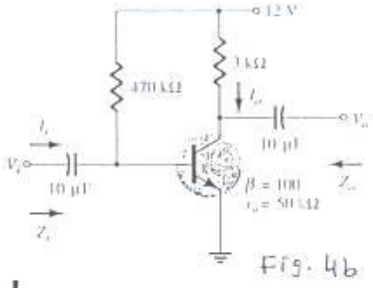

Fig. 4b

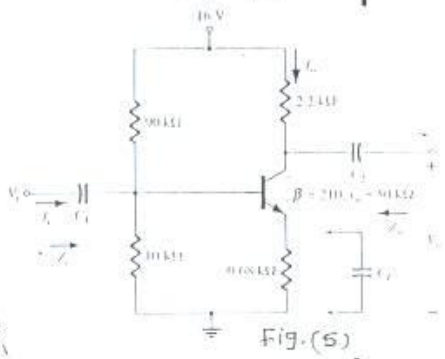

Fig. (5)

مع أطيب التمنيات بالتوفيق والنجاح

د. عبدالحميد شعلان