جامعة طنطا
كلية الهندسة

الفصل الدراسي الثاني
التاريخ: ٢٠٠٧/٦/٦

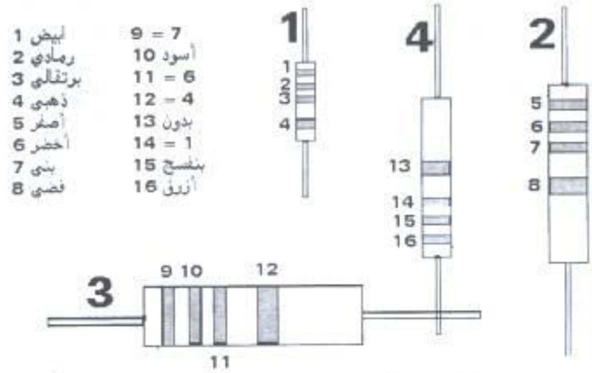
مقرر اختياري تخصصي(١) — **صيانة الأجهزة الإلكترونية** - الفرقة الثالثة (كهرباء)

قسم هندسة الإلكترونيات و الاتصالات الكهربية

زمن الامتحان ٣ ساعات

أجب عن الأسئلة التالية :

السؤال الأول:



١- أكتب قيم المقاومات الموضحة بالشكل .

٢- عرف القيمة الاسمية و القيمة الفعلية للمقاومة ، و كيف يستدل علي نسبة التفاوت بينهما ؟

٣- أكتب أرقام المقاومات تصاعدياً من المقاومة ذات القدرة المستهلكة الأصغر الى المقاومة الأكبر استهلاكاً للقدرة .

٤- ما نوع المقاومات بالشكل ، هل هى كربونية أم سلكية –ثابتة القيمة أم متغيرة القيمة ؟

٥- ما هى أهم وظيفة للمقاومات بالدوائر الالكترونية ؟

٦- هل نظام الألوان المستخدم بالشكل: ثلاثي أم رباعي ؟

السؤال الثاني:

أ- أكتب مواصفات شراء الملف الكهربي .

ب- اكتب نبذة عن الملف الدافع solenoid و ما هى مواصفات شراؤه ؟

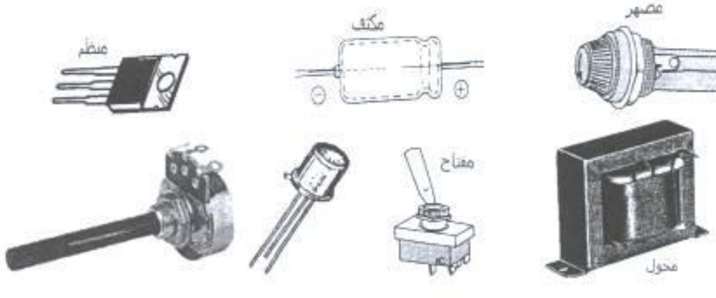
السؤال الثالث:

أ- إذا كان لديك ثنائي توحيد rectifier diode رقمه 1N4006 فما هى قيمة أقصى جهد عكسي PIV له ، اكتب تعريف PIV .

ب- فيما تستخدم الثنائيات التالية : BZX55 - BB212 - 1N5406.

السؤال الرابع:

ارسم الأشكال التالية ثم ارسم الرموز البيانية المناظرة لها ، ثم اكتب نبذة عن وظيفة كل منهم



السؤال الخامس:

١- اكتب ملخص عن نظم التعريف التجارية للترانزستور .

٢- ترانزستور له التعريف BC220 ، ما معنى ذلك ؟

٣- ماذا تعرف عن جداول بدائل الترانزستور ؟

٤- ماذا تعرف عن العناصر ذات التثبيت السطحي SMD ؟

السؤال السادس:

١- ما اسم الدائرة الموضحة بالشكل و ما هى وظيفتها ؟

٢- اكتب خطوات تنفيذ هذه الدائرة عملياً

٣- حدد نوع التوحيد هل هو توحيد نصف موجة أم توحيد موجة كاملة ؟

٤- ما هى العناصر بالدائرة الموضحة و التي يتم تثبيتها على لوح الدائرة المطبوعة ؟

٥- اذكر العناصر التي تثبت على واجهة الجهاز الامامية ، وارسم شكلاً لوجهة الجهاز موضحاً مواضع هذه العناصر

٦- هل هناك عناصر سيتم تثبيتها على مؤخرة الجهاز ؟ اذكرها مع رسم لمؤخرة الجهاز لتحديد اوضاعها

٧- هل هناك عناصر لها تثبيت ميكانيكي بمفردها ؟

٨- هل يمكنك رسم كابينة الجهاز من أعلى موضحاً وحدات الجهاز و طريقة عمل الضفيرة الخاصة بالتوصيلات بين هذه الوحدات

انظر الدائرة في الصفحة التالية

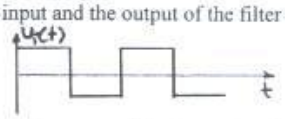
Tanta University
Faculty of Engineering
Time allowed: 3 hours

3[rd] year Electronics & Communication
Electronic Tests and Measurements (b)
Date: 30/5/2007

<u>Question (1):</u>

For the **LPF** shown in fig. 1

a) If the input and the output of the filter are as follow:



then the frequency of the *input signal* was (i- < 5 kHz   ii- 5 kHz   iii- > 5 kHz) <u>choose one answer only</u>. Why this choice?

b) Draw **ONLY** the output of the LPF with C/C's shown in fig.1 if the input was the square wave of the VCO module with the case that ***socket D is open***.

<u>Question (2):</u>

For the **LPF** C/C's shown in fig. 2:

a) Find the cutoff frequency.
b) This LPF filter is active or passive? Why?
c) FM signal is to be converted to AM signal using the filter in fig. 2, suggest its carrier frequency and calculate ΔF.

<u>Question (3):</u>

a) Draw **ONLY**
   1. The circuit diagram of the ring modulator.
   2. The ring modulator at +ve carrier peak.
   3. The ring modulator at –ve carrier peak.

b) For the envelope detector circuit shown in fig.3, $R_1=R_2=10\ k\Omega$. Sketch the output of the circuit if the input is:
   1. DSB-SC AM
   2. DSB-TC AM, with 1 kHz information signal frequency, $R_1C_1=100$ mSec.
   3. DSB-TC AM, with 1 kHz information signal frequency, $R_1C_1=1\ \mu$Sec.
   4. DSB-TC AM, with 1 volt peak carrier amplitude and 0.7 volt peak information signal amplitude.

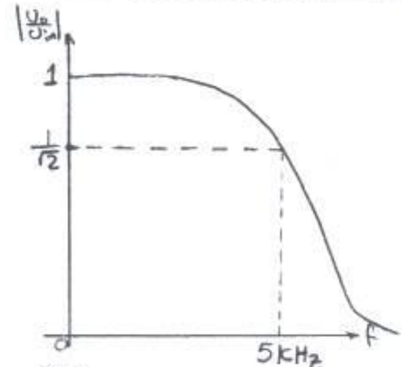


Fig.1

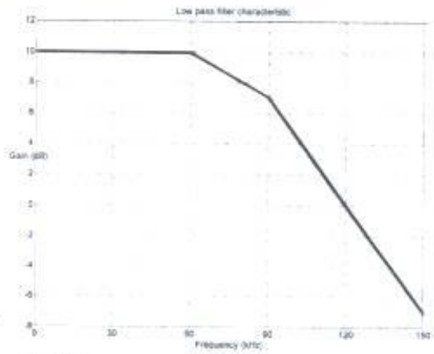


Fig.2

Tanta University
Faculty of Engineering
Time allowed: 3 hours

3rd year Electronics & Communication
Electronic Tests and Measurements (b)
Date: 30/5/2007

Question (4):

a) Draw **ONLY** the block diagram (not the modules connections) of the FM modulation and detection experiment.

b) Indicate by drawing, why we use ***two*** tuned circuits in the ***Round-Travis*** FM detector.

Question (5):

a) The C/C's of an amplifier is shown in fig.4, Sketch the output if the input to the amplifier is 1 volt peak sinusoidal with frequency:

1. 500 Hz
2. 300 kHz
3. 2 MHz

b) The signal shown in fig.5 is ***FM modulated*** using the VCO module. Sketch the VCO output (Hint: you can use K_{FM}=10 KHz/V , f_c=500kHz)

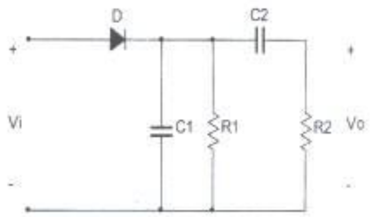


Fig. 3

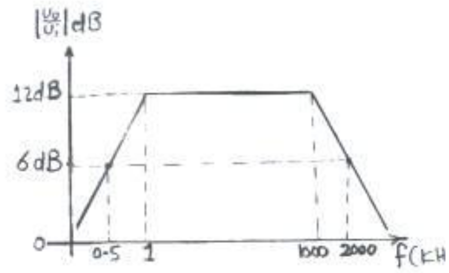


Fig.4

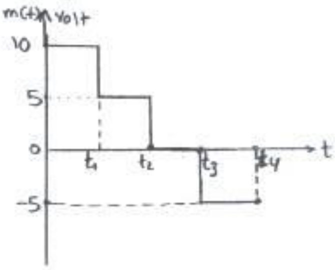


Fig.5

Good Luck

بسم الله الرحمن الرحيم

TANTA UNIVERSITY
FACULTY OF ENGINEERING
THIRD YEAR COMMUNICATION

JUNE 2007

FINAL EXAMINATION — **TIME ALLOWED: 3 HOURS**

SUBJECT: ELECTRONIC COMMUNICATION SYSTEMS

Attempt the following questions :

1- a) For the FM stereophonic system , draw the block diagram of its receiver system showing how to demodulate an FM signal using the frequency discriminator.
   b) Draw the block diagram of the B& W TV transmitter
   c) Derive an expression for the bandwidth of the TV video signal using 525/30 scanning system.
   d) Draw the block diagram of the PAL system.

2- a) Draw the simplified block diagram of the pulse radar. then derive an expression for the radar range showing how to obtain its minimum and maximum values.
   b) Calculate the minimum received power in a pulsed radar receiver which has a B.W= 6 MHz and a 10 dB noise figure. Calculate the maximum range if the radar operates at 6GHz with an average transmitted power of 100 Kwatts, gain of the antenna is 30 dB and the radar cross sectional area of the target is 2 m^2
   c) Find and sketch the modulation plan to form the 60- calls **super group** in the frequency range of 312- 552 KHz., then draw the equipment required to modulate and demodulate the fourth basic group within the CCITT super group.
   d) What are the main categories of the AT&T system. Calculate its bit rate and draw a graph showing the formation of one complete frame, then calculate the bit rate after the third multiplexing level

3-a) Derive an expression for and sketch the space-wave attenuation function due to ground reflection in the UHF frequency limit, then, write down an expression for the maximum line-of-sight (MLOS) distance due to earth's curvature, indicating clearly the correction made to the obtained MLOS distance due to the effect of the tropospheric refraction
   b) Discuss the meteorological conditions that cause the super refraction **(Ducting)**
   c) A 300 MHz radio wave link operating over a distance of 50 km using antenna heights of 16 m at transmitter and 36 m at receiver. For each of the following values of refractivity gradient:

   $i-\frac{dN}{dh}=-0.04 \quad m^{-1}$ $\qquad$ $ii-\frac{dN}{dh}=-0.1 \quad m^{-1}$

   test if line-of-sight (LOS) propagation is possible and if not, calculate a new value of the receiver antenna height that ensures LOS.

4-a) Define the critical frequency , F_c , and the maximum usable frequency , MUF , of an ionospheric layer. What is the range on earth over which the waves can be received due to the reflection from an ionospheric layer.
   b) If the ionization profile of the ionosphere can be approximated by:

   $$N(h)=10^{2}\,tri\frac{h-200}{150}+4x10^{2}\,tri\frac{h-450}{100}$$ where h is the height in Km,

   and a plane wave is incident at an angle $\theta_i=60^{0}$, check if the following frequencies can be reflected or not. If they can, calculate the height of reflection and the range on earth over which the waves can be received
   $i-f_1=15MHz \qquad ii-f_2=28MHz$

5-a) Show briefly how the still paper is scanned within the FAX. system then derive an expression for the bandwidth of the base band signal.
   b) For the INTELSAT system, calculate the required transmitted power to ensure the reception of 10 microwatts through the fifth transponder with the following parameters: the gain of the transmitting earth station $G_1=30dB$, the gain of the receiving earth station $G_2=25dB$, the gain of the receiving antenna of the satellite is $G_{sr}=20dB$, the gain of the transmitting antenna of the satellite is $G_{st}=20dB$ and the effective gain of the satellite system $G_0=40dB$

Dr. Abdelfattah A. Abu-hashem "رب اشرح لي صدري ويسر لي أمري"

Tanta University	*Final Exam.*	*Course : Electronic Measurements*
Faculty of Engineering		*Examiner : Dr. M.M. Abdel Aziz*
Third Year Comm.	*May 2007*	*Time : 3 Hours*

Answer the following questions :

1. a) Explain how to compensate for the ambient temperature effect in a thermocouple power meter (PM).

b) Explain how to extend the power-meter measuring range to the KW level.

c) Draw and explain briefly the calorimetric power measurement method .

d) A calorimetric PM is used to measure the output of a high power pulsed radar transmitter, having f_0 = 3GHz, bandwidth = 300MHz, pulse repeatition frequency (PRF) = 1200p/s, and pulse width τ =36μs. The differential thermometer reads temperature difference 150K, and the coolant flow rate = 15.2 L/min. The specific heat and gravity of the coolant used are 0.23 J/g.K, and 1.2 g/cm^3 respectively. Calculate the transmitter average power and the pulsed peak output power. **(16 pts.)**

2. a) What are the three techniques used for extending the frequency range of a digital frequency meter (DFM). Aided with block diagrams , explain the automatic heterodyning technique.

b) An automatic heterodyning DFM has 7 hramonic generator outputs with total coverage range from 1GHz to 4GHz in 500MHz steps, and a 500MHz counter. (assume f_{count}= f_h -f_x)

i-What is the input signal frequency, if the counter reads 234 MHz when the fourth harmonic is selected ?

ii- What is the counter reading if the input frequency is :**i-** 450MHz, **ii-** 3.6 GHz.

c) Determine in which measuring device the following cicuits are used ..Explain the operation of each circuit, indicating its function in the device :

i- Wein-bridge oscillator.

ii- Transimpedance amplifier.

iii- Coaxial resistive reflectometer brigde. **(22 pts.)**

3. a) What are the three tehniques used for signal analysis in spectrum analyzer(SA) ? Aided with block diagrams, explain the implementation of one of them.

b) Discuss the factors affecting the passive intermodulation (PIM) level in a cellular base station transmitter.

c) Define the Intermodulation Intercept Point, aided with block diagram, explain how to measure it for an amplifier . Draw the spetrum analyzer response.

d) An amplitude modulated signal is analysed in a SA, draw the response on the CRT . If the carrier amplitude is –5 dBm, and the sideband amplitude is –25 dBm, what is the % modulation depth? **(20 pts.)**

4. a) Define the noise figure and the equivalent noise temperature of a component . Derive the relation between them.

b) Derive an expression for the total noise figure of a system consisting of three cascaded components. Find also an expression for the system equivalent noise temperature.

c) Aided with block diagrams and equations , explain the principle of operation of the automatic noise figure indicator (ANFI).

P.T.O

d) An ANFI has ENR = 15 dB is used to measure the noise figure of an amplifier , if the measured power level difference = 12 dB , what is the noise figure of this amplifier.?

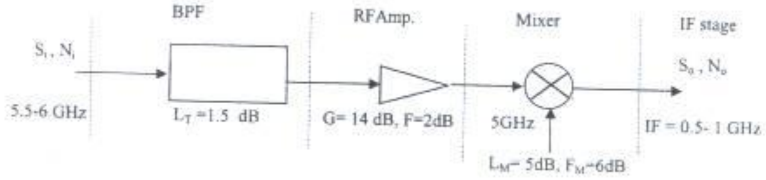
e) A microwave receiver has the block diagram shown below. If the system is balanced at ambient temperature (T_0 = 290 K), calculate :

i- the overall gain in dB .

ii- the overall noise figure in dB.

iii- the output noise N_0.

iv- rearrange the components in order to improve the system noise figure . **(28 pts.)**



5- a) Draw and explain the block diagram of a stbilized laser source.

b)An optical fiber communication link has the following paramters : link length = 12 km, estimated attenuation =0.25 dB/km, connector loss = 1 dB/ connector, laser diode power = 0dBm, splices loss = 0.5 dB/splice. The splices are separated at 4km.

i- Calculate the total attenuation of the system.

ii- Find the receiver sensitivity, assuming 3 dB system margin loss.

iii- Draw and lable the loss diagram as appeared on the display of the optical time-domain reflectometer.

(14 pts.)

Boltzman constant K = 1.38 x 10^{-23} J/K

Good Luck

Tanta University
Department of Communications and Electronics
Course: Digital Signal Processing
Examiner: Dr. Mohamed Abd EL-Rahman

Faculty of Engineering
Time allowed: 3 hrs.
Year: 3rd
Date: June., 2007

Academic Year 2006/2007, Final Exam

Answer the following Questions — Neat answers and boxed results are appreciated

Question(1)

Consider the linear time invariant system characterized by: $y(n)=\frac{1}{2}y(n-1)+x(n)+\frac{1}{2}x(n-1)$.

i)Determine the system function $H(z)$

ii)Determine impulse response $h(n)$.

iii) Determine its response to the input $x(n)=5+10\cos\left(\frac{\pi n}{2}+\frac{\pi}{4}\right)$, $\quad -\infty \prec n \prec \infty$

Question(2)

a)Compute and sketch its magnitude and phase response of a filter with system function:

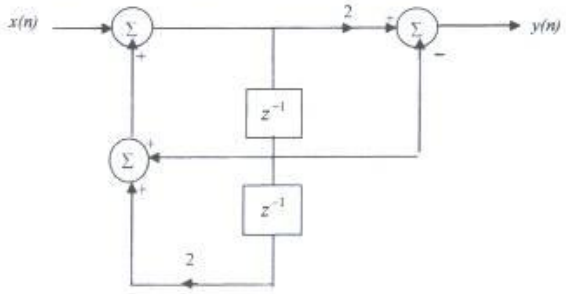
$$H(z)=1+z^{-1}+z^{-2}+.............+z^{-8}$$

If the sampling frequency is $F_s=1\,\text{kHz}$, determine the frequencies of the analog sinusoids that can not pass through the filter.

b)Consider the recursive digital filter whose realization, shown in Figure, with $y(-1)=-1$, $y(-2)=4$ and $x(n)=6u(n)$. Find the following:

i) the zero state response $y_{zs}(n)$

ii) the zero input response $y_{zi}(n)$and the total response $y_{tot}(n)$.



Question(3)

Consider a Bessel filter described by:

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

Design a digital filter, whose magnitude at $f=3\text{kHz}$ equals the magnitude of $H(s)$at $\Omega_a=4$ rad/sec if the sampling rate $F_s=12\,\text{kHz}$. Also realize the obtained H(z)

Question(4)

A band-pass filter is required to meet the following specifications:

i) Complete signal rejection at dc and 250 Hz.

ii) a narrow pass band centered at 125 Hz.

iii) a 3 dB bandwidth of 10 Hz.

Assuming a sampling frequency of 500Hz, obtain the transfer function of the filter by suitably placing z-plane poles and zeros. Also plot the pole-zero pattern and realize the obtained H(z).

Question(5)

A certain digital signal processing system operating at a sampling rate of 1kHz is subjected to an undesirable interfering component at a frequency close to 100Hz. A simple band rejection algorithm is desired to eliminate the component. It appears that the following specifications will perform the task:

i) 3 dB band edge frequencies = 95 Hz and 105 Hz.

ii) Two poles in final transfer function.

Determine the transfer function H(z) of such filter and realize it.

Question(6)

Design an FIR digital filter whose magnitude response approximates that of an ideal differentiator

$$A_d(f) = \omega \quad \text{for } -\frac{F_s}{2} \le f \le \frac{F_s}{2}$$

The function is to be limited to a 12^{th} order approximation, and the Hamming window function is to be used. Assume that the sampling time T = 1 second. Determine the transfer function $H(z)$ and draw a direct form I realization of the filter.

$$\left[\text{Hint : Hamming window is defined as} : w(t) = 0.54 + 0.46\cos\left(\frac{2\pi t}{\tau}\right) \quad \textit{for} \ |t| \le \frac{\tau}{2}\right]$$

$$= 0 \quad \text{elsewhere}$$

Hint: The design equations for Band Rejection Filter using the bilinear z-transform can be expressed as:

$$p = D\left[\frac{1 - z^{-2}}{1 - Ez^{-1} + z^{-2}}\right], \quad D = \lambda_r \tan(\pi b/2),\ \lambda_r = 1,\ b = \Delta f / f_o,\ f_o = F_s/2$$

$$E = 2\cos(\pi v_2), \quad \tan^2(\pi v_2/2) = \tan(\pi v_1/2) \times \tan(\pi v_3/2), \text{ and}$$

$$\frac{\lambda}{\text{D}} = \frac{\sin(\pi v)}{\cos(\pi v) - \cos(\pi v_2)}$$

BEST OF LUCK FOR ALL