Q5/A/ What is DC chopper? List a few industrial applications of DC chopper.(5 marks)

B/ A Single–Phase Bridge Inverter R=2.4Ω and dc input Vs is = 48V .Determine the :

a) rms output voltage at the fundamental frequency,V1.

b) output power Po.

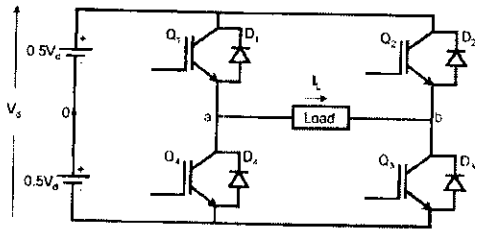
c) average and peak currents of each transistor.

d) peak reverse blocking voltage of each transistor, VB.

e) total harmonic distortion THD.

f) distortion factor DF.

e) harmonic factor and distortion factor of lowest-order harmonic. (20 marks)



Good Luck

بسم الله الرحمن الرحيم

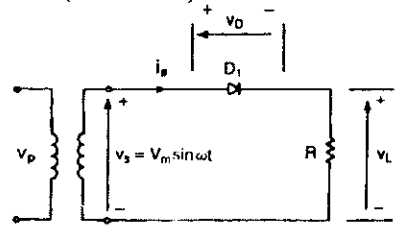
University of Diyala	**Final Exam.2**	**Subject: Power Electronics**
College of Engineering	**2011 – 2012**	**Time:3 hours**
Department of Electrical power	**3rd,4 th stages**	**Date: sept. , , 2012**
Department of Electronic		

Answer only four Questions

Q1 /A / Draw the circuit and wave forms for full-wave rectifier of center tapped transformer with resistive load.(5 marks)

B/

The rectifier shown in figure has a purely resistive load of *R*.
Determine,
(a) the efficiency
(b) the form factor
(c) the ripple factor
(d) the transformer utilization factor
(e) the peak inverse voltage (*PIV*) of diode D_1
(f) the *CF* of the input current (20 marks)



(a) Circuit diagram

Q2/A/ Discuss protection of the thyristor during turn on and turn off. (10 marks)

B/ A Thyristor with a steady state power loss of 30W has a junction to heat sink thermal resistance of 0.7°c/w. Determine the maximum value of Thermal Resistance the heat sink can have if the ambient temperature is 40°C and junction temperature is limited to 125°C. (15marks)

Q3 /A/Discuss the switching time of the MOSFT (5 marks)

B/ A three phase star rectifier has purely resistive load R ohms. Determine: a)Effiency. b) Form factor. c) Ripple factor. d) TUF. e) PIV for each diode. f) I peak through the diode if I_{dc} =30 A at V_{dc} =140 V. (20 marks)

Q4/A/ Draw the three phase / single phase cycloconverter circuit. (5 marks)

B/ A pair of parallel thyristors connected in opposite to control a resistive load =7 Ω, t on=2.5 ms, Vs= 350 sin 315t. Calculate Vo rms, power dissipated in the load. (20 marks)

University of Diyala
College of Engineering
Electronics Department

Final - year Examination
Second attempt / 2011-2012

Class: 4th
Subject:Communication
Time: 3 Hours
Date: Sep. 2012

Note: Answer only five questions.

Q1: For a LBC has generator matrix [G] :

1- Use hamming bound to find error correction capability.
2- Find the parity check matrix.
3- Find the code table.
4-If the received word is [R]=[1011110011], find the corrected word at the receiver.

$$[G] = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 \end{pmatrix}$$

Q2: a ternary source has $P(x_1) = P(x_2) = 0.25$, produces symbols transmitted through a channel having :

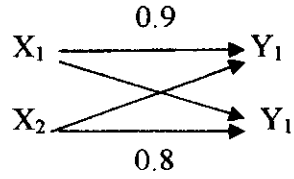
$$P(y_j/x_i) = \begin{cases} 0.9 & \text{if } i=j \quad i=0,1,2 \\ P & \text{if } i\neq j \quad j=0,1,2 \end{cases}$$

Find the source entropy, the transinformation and conditional entropies.

Q3: Develop ternary Huffman code for the following set of messages, then find coding efficiency .

	x_1	x_2	x_3	x_4	x_5	x_6
p(x) = [	0.4	0.25	0.15	0.1	0.07	0.03]

Q4: Find the channel capacity for the channel shown below .



Q5 : A systematic cyclic code with generator polynomial $p(x) = x^4+x^3+1$ is used to protect data grouped in blocks of 6 bits :

1- Using the encoder logic circuit, find the transmitted word for data word D=[100011].
2- Find the syndrome for double errors in the first and last positions.

Q6: Nongaussian noise with PDF given by $p(n) = K(4-n^2)$, $|n| < 2$, affects the bipolar ±15 Volts signal. Find the constant K and the optimum threshold decision level if $p(0_T) = 2/3$.

Note : 12 Marks for each question

Good luck

Examiner : Mr. Dheyaa Tareq

University of Diyala
College of Engineering
Dep. Of Communication.
Final Exam/2st Attempt

Class: fourth stage
Subject: Microwave
Year: 2012-2013
Time:3 hour

Note:-Answer four question only

Q1	A) If the separation between two adjant nulls is 3.5 cm and between twice minimum power points is 2.5 mm. Determine the value of VSWR. B) Show that E and H are mutually perpendicular in any TE or TM wave (as with ordinary plane waves).	15 mark
Q2	A) The location of successive minimum slotted line section is found 4.4 cm and 7.36 cm. What is incident frequency for TE_{10} mode if cut – off wavelength is 7 cm . B) Write down the Maxwell's equation in integral form.	15 mark
Q3	A TE_{11} mode is propagating through a circular waveguide, the radius of the guide is 5 cm and guide contain an air dielectric. Determine its cut – off frequency, guide wavelength for an operating frequency of 3GHz, also find its wave impedance. ($\delta_{mn} = 1.841$).	15 mark
Q4	A) Calculate the resonant frequency of rectangular cavity resonator of dimension a = 2 cm, b = 1 cm, d = 3 cm for TE_{101} . B) Prove that: Normal component of the magnetic flux density is also continuous a cross the boundary .	15 mark
Q5	A 1 cm * 2 cm waveguide is filled with deionized water with $\epsilon_r = 81$. If the operating frequency $f_o = 4.5$ GHz Find: a) All possible propagating mode and their cut – off frequency. b) Intrinsic impedance of the highest mode. c) Group velocity of the lowest mode.	15 mark

Good Luck

Head of Dept.

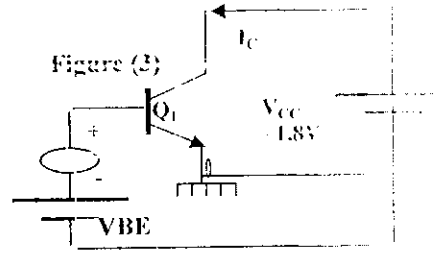
Name: Dr. Saib Thiab Alwan

Lecturer.

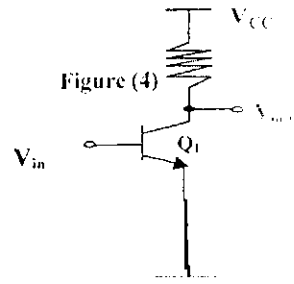
Name: Dr. Saib Thiab Alwan

Q4.

a-For the circuit shown in Figure (3) draw the equivalent small signal model of it, then find the value of g_m and r_π, if $I_s = 3 \times 10^{-16}$ A, ß=100, and prove each formula used .
Hinte:suppose the circuit done with new IC technology.
b-Repeat the solution of (a) for discrete device technology.
c-Give your comments for the obtained results in (a) & (b).



Q5. In the common emitter amplifier shown in the Figure(4) below, the voltage gain (A_V) equal 20.Assume the base is biased such that VBE = 0.8V.Calculate the allowable supply voltage (V_{CC}) if VCB=0 & Q_1 must remain in the active mode, for :
VA= ∞.



Q6. Answer of the following.

A diode biased at currents of 1 m A .
i. Determine the current change if V_D changes by 1 mV.
ii. Determine the voltage change if I_D changes by 10%.
Derive the formula used in solving i and ii.

Good luck

مدرس المادة

رئيس القسم

Dr. Eng. Khalid Awaad

University of Diyala
College of Engineering
Dept. Of Electronic Engineering

Final - Year Examination
Second attempt / 20011-2012

Class: 4th year
Subject: Microelectronic
Time: 3 hour

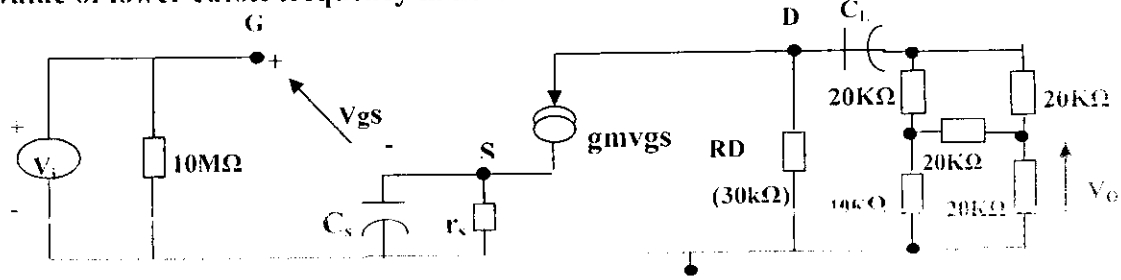
Date: 9 / 9 / 2012

Note:- Answer five questions including (Q_1&Q_4), 12 marks for each question .

Q_1. For the circuit shown in Figure (1), determine the following:

1- The voltage gain (v_o / v_i) :(i). When C_S & C_L are removed.(ii). When C_S is short & C_L is removed. (iii). When the transistor operated at mid band frequency.(iv). For the above three results, in which one the circuit can be consider as an amplifier, why.

2-Find the value of lower cutoff frequency in hertz's/sec.



gm= 5m mho, r_s = 100 ohm
Cs=100μ F,C_L= 5μ F

Figure (1)

Q_2. A cell phone incorporates a 2 GHz oscillator whose frequency is defined by the resonance frequency of an LC tank (Figure (2)). If the tank capacitance, Cj=0.265 fF/ A ($\mu m^{2)}$ at V_R=0. Calculate the change in oscillation frequency while reverse voltage goes from 0 to 3 volts. Assume the circuit operates at 2 GHz at a reverse voltage of 0 volts, & the junction area is 2000 μm^2.

Hint: Take built in voltage (V_0) equal to 0.73 volts, f=1*10^{-15}

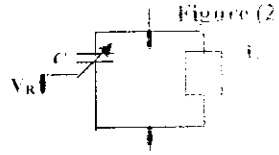


Figure (2)

Q3- Answer only one of the following.

a. For the following information's, if you are sure that the information's are correct write YES if its not write NO .If you are not sure leave it otherwise you are loss mark of a correct answer for each wrong answer.

1. Early effect cause undesirable results for BJT amplifier applications.
2. In deep saturation, the BJT can not be consider as vces.
3. Silicon & carbon can not be doped with other elements to change its electrical conducting properties.
4. It can not be harness V_o to use the pn junction as a battery.
5. When the BJT base area is increased by a factor n of the I_s decreased by the factor of 1/n.

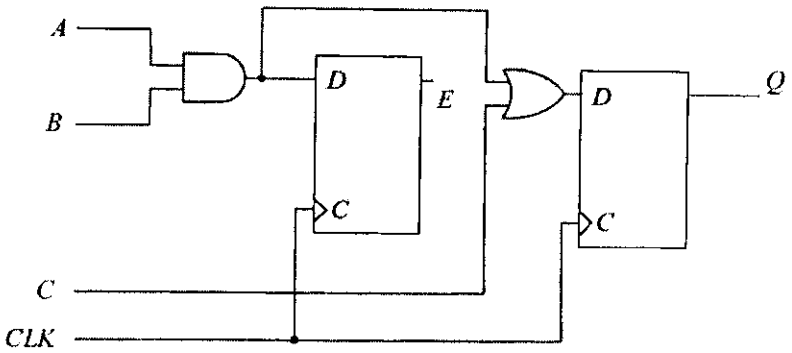
b. Consider a Si sample of length 10μm & cross-sectional area 1 μm^2 , uniformly doped with 10^{18} cm^{-3} arsenic(As) maintained at T = 300K. 1 Volt is applied across its length. Hint: Take n_i^2 =1x$10^{20}$$cm^{-6}$, μ_n =300 cm^2 / V.s .

(i).What are the density of each carriers in this sample?.(ii). Estimate the resistance of this sample.

Continued

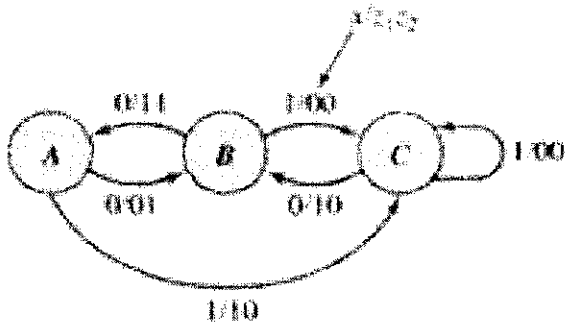
B I) Show the main functions of ***SPLDs*** and ***CPLDs***?

II) A sequential circuit with two *D* flip-flops, three inputs ***A,B*** and ***C,*** and two outputs ***E*** and ***Q,*** is specified by figure below, design it using first GAL**22V10** (show ***OLMC*** connection)and second PAL**16P8** and flip flops (show output logic connection)? (12 marks)



Q_4 / Convert the state graph, it has two inputs (X) and two outputs (z_1z_2), shown in figure below to ASM chart, then realize it by using **PLA** and **D**-Flip flop?

(12 marks)



Q_5 / Draw ASM chart for a clocked sequential network which investigates an input sequence X and which will produce an output of Z = 1 for ending of input sequence 010 and chanced to 0 after two consecutive 1 or 100 in input sequence? (12 marks)

University of Diyala
College of Engineering
Electronics Department

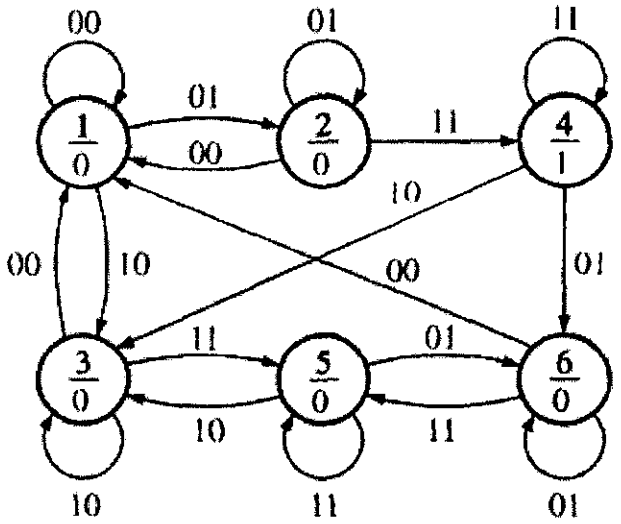
Final - year Examination
Second attempt/ 2011-2012

Class: 4rd
Subject : D.S.D.
Time: 3 Hour
Date: /9/2012

Note: answer all questions

Q_1 / A Mealy sequential network has two inputs and one output. If the total number of 1's received is ≥4 and at least 3 pairs of inputs have occurred, then the output should be 1 coincident with the last input pair in the sequence. Any way, if the total number of 0's received is ≥3 in two consecutive pairs of inputs have occurred, then the system should be reset the number of 1's that's counted and began new count. Derive a state graph and state table? (12 marks)

Q_2 / Design an asynchronous state machines whose state diagram is shown below. Locate all the essential hazard conditions and show how to eliminate them?



(12 marks)

Q_3 / answer ***A*** or ***B*** only:

A I) Define ***GAL***. Show the main different between ***GAL*** and other ***PLDs***?

II) Implement the functions (F_1 and F_2) by using **PAL12P8** (show output logic connection)? **$F_1=\sum(0,1,4,11,14)$, $F_2=\pi(1,3,4,6,9,12,14)$**

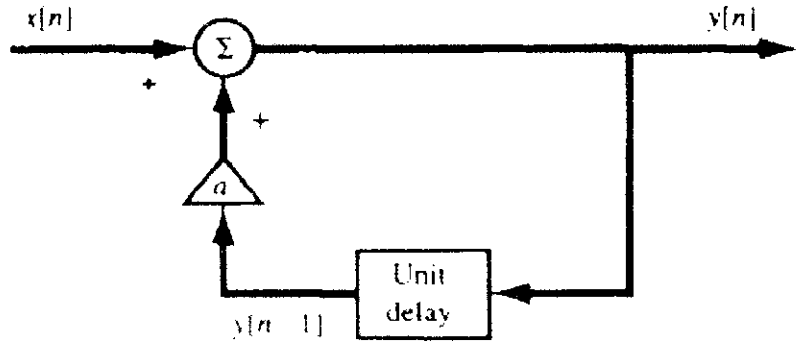
University of Diyala
College of Engineering
Dep. Of Electronic
Date: / /2012

Final - Year Examination
second attempt/ 2011-2012

Class: three
Subject: DSP
Time: 3hour

Note: - Answer four questions only

Q1: *The discrete-time system shown in Figure (1) consists of one unit delay elements and one scalar multipliers. Write a difference equation that relates the output* ***y[n]*** *and the input* ***x [n]****.*



Q2: *A system specified by the following difference equation:*

$$y(n) + 0.5\,y(n-1) = x(n) - 0.5\,x(n-1)$$

(1) Find and plot $20\log_{10} |H(e^{jw})|$ *versus W, if W = 0: π/4:2π.*

(2) Find and plot $\phi(e^{jw})$ *versus W, if W = 0: π/4:2π*

Q3: ***A-*** *Mention the applications of Digital Signal Processing (DSP).*

B- *Find* ***Y (Z)*** *for equation using* ***Z.T***

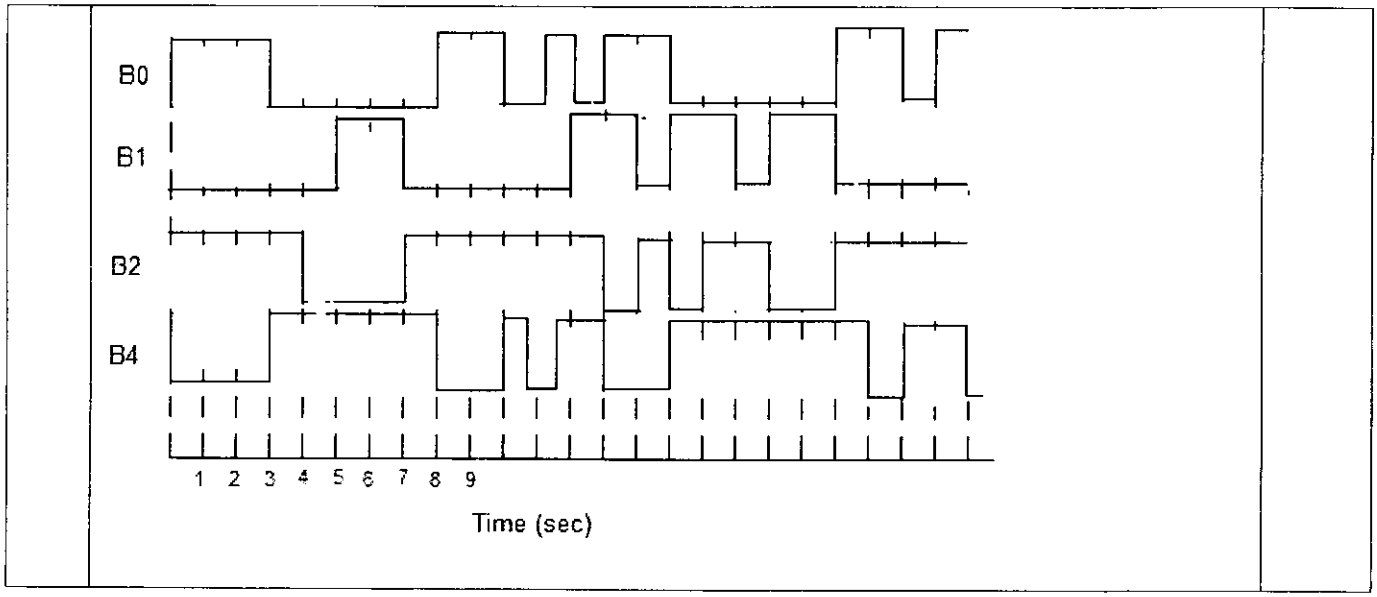
$$Y(n)-(3/2)y(n-1)+(1/2)y(n-2)=(1/4)^n$$

Q4: *If* ***x(n)=[1 2 3 3]****,and* ***h(n)=[1 1 2]****.Find* ***y(n)*** *by using digital convolution such that:-*

1. *Linear convolution.*
2. *Circular convolution.*
3. *Table method.*
4. *Matrix by vector method*

Q5: *Considering the sequence x(0)=1, x(1)=2, x(2)=3 and x(3)=4,given the* f_s*=100 Hz compute* ***DFT****.*

1. *Using the triangular window function.*
2. *Using the hamming window function*



Dr. Mohammed S. Saleh

University of Diyala
College of Engineering
Dep. Of com.& electronic
Final Exam/2nd Attempt

Class:3rd stage
Subject: Microprocessor
Year: 2012-2013
Time:3 hour

Note:-Answer Three questions with Q5

Q1	A)what are the meaning of the statements 1- PUSH B 2- CC sub1 3- RZ 4- OUT PORT2 5- CPI ABh	**25%**
Q2	(Choose only one) A) Draw the internal block diagram of the microprocessor, and explain the function of each block B) Explain the memory types and them properties.	**25%**
Q3	A) compute the value of X for the physical address a- FE890 = X : 34F0 b- 78FAE = 78DC : X B) write program to satisfy the logic expression , where u, v, w, x, and y are 8-bit variables store in memory start from ML 3500h respectively. $z = x + (u + v \cdot w).y$	**25%**

Q4	Consider the program of the instruction bellow, draw the flow chart then what are the output.
	MOV B,07H
	MVI C,06H
	CXY:
	CALL XYZ1
	MOV B,A
	DCR C
	JNZ CXY
	STA 5000H
	HLT
	XYZ1:
	MOV A,00
	MOV D,C
	N1:
	ADD B
	DCR D
	JNZ N1
	RET
		25%

Q5	Write program that generate the signals bellow continues, at the port2, where the microprocessor frequency 4 MHz. , assume all instruction need 4 T-state except branch instruction need (10 T-state) and instruction deal with 16-bits need (7 T-state).	**25%**

Q6:/ A) Determine the output SNR and ΔV_{min} in a DM system for a 3 volt maximum peak, 1 KHz sinusoidal signal sampled at 32 KHz without slop overload, and followed by a 4 KHz pre construction filter.

(B) Draw the block diagram of Zero Crossing Frequency discriminator then explain how to demodulate a FSK signal by using this demodulator.

A TABLE OF BESSEL FUNCTIONS $J_n(\beta)$

β	J_0	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9	J_{10}
0.0	1.00										
0.2	0.99	0.10									
0.4	0.96	0.20	0.02								
0.6	0.91	0.29	0.04								
0.8	0.85	0.37	0.08	0.01							
1.0	0.77	0. 44	0.11	0.02							
1.2	0.67	0.50	0.16	0.03	- 0.01						
1.4	0.57	0.54	0.21	0.05	- 0.01						
1.6	0.46	0.57	0.26	0.07	0.01						
1.8	0.34	0.58	0.31	0.10	0.02						
2.0	0.22	0.58	0.35	0.13	0.03	- 0.01					
2.2	0.11	0 56	0 40	0.16	0.05	0.01					
2.4	0.00	0.52	0.43	0.20	0.06	0.02					
2.6	- 0.10	0.47	0.46	0.24	0.08	0.02	- 0.01				
2.8	- 0.19	0.41	0.48	0.27	0.11	0.03	- 0.01				
3.0	-0.26	0.34	0.49	0.31	0.13	0.04	0.01				
3.2	- 0.32	0.26	0.48	0.34	0.16	0.06	0.02				
3.4	- 0.36	0.18	0.47	0.37	0.19	0.07	0.02	- 0.01			
3.6	- 0.39	0.10	0.44	0.40	0.22	0.09	0.03	- 0.01			
3.8	- 0.40	0.01	0.41	0.42	0.25	0.11	0.04	0.01			
4.0	- 0.40	- 0.07	0.36	0.43	0.28	0.13	0.05	0.02			
4.2	- 0.38	- 0.14	0.31	0.43	0.31	0.16	0.06	0.02	- 0.01		
4.4	- 0.34	- 0.20	0.25	0.43	0.34	0.18	0.08	0.03	- 0.01		
4.6	- 0.30	- 0.26	0.18	0.42	0.36	0.21	0.09	0.03	0.01		
4.8	- 0.24	- 0.30	0.12	0.40	0.38	0.23	0.11	0.04	0.01		
5.0	- 0.18	- 0.33	0.05	0.36	0.39	0.26	0.13	0.05	0.02	- 0.01	
5.2	- 0.11	- 0.34	- 0.02	0.33	0.40	0.29	0.15	0.07	0.02	- 0.01	
5.4	- 0.04	- 0.35	- 0.09	0.28	0.40	0.31	0.18	0.08	0.03	- 0.01	
5.6	0.03	- 0.33	- 0.15	0.23	0.39	0.33	0.20	0.09	0.04	0.01	
5.8	0.09	- 0.31	- 0.20	0.17	0.38	0.35	0.22	0.11	0.05	0.02	- 0.01
6.0	0.15	- 0.28	- 0.24	0.11	0.36	0.36	0.25	0.13	0.06	0.02	- 0.01
6.2	0.20	- 0.23	- 0.28	0.05	0.33	0.37	0.27	0.15	0.07	0.03	- 0.01
6.4	0.24	- 0.18	- 0.30	- 0.01	0.29	0.37	0.29	0.17	0.08	0.03	0.01
6.6	0.27	- 0.12	- 0.31	- 0.06	0.25	0.37	0.31	0.19	0.10	0.04	0.01
6.8	0.29	- 0.07	- 0.31	- 0.12	0.21	0.36	0.33	0.21	0.11	0.05	0.02
7.0	0.30	0.00	- 0.30	- 0.17	0.16	0.35	0.34	0.23	0.13	0.06	0.02

Good luck

Examiner : Mr. Dheyaa Tareq

University of Diyala
College of Engineering
Electronics Department

Final - year Examination
Second attempt / 2011-2012

Class: 3rd
Subject :Communication
Time: 3Hours
Date: Sep. 2012

Note: Answer only five questions.

Note : 12 Marks for each question

Q1: A given voltage signal $f(t)=4\cos^2 20\pi t+4\cos 30\pi t$ across 4Ω .

1- Determine PSD of f(t). 2- Sketch $S_f(w)$.

3- Calculate the average power, both in the time domain and in frequency domain.

Q2: A given FM transmitter is modulated with sinusoidal input $f(t)=10\cos 200\pi t$ and the modulation index is (4.4). The no modulation power is 10 watt across 50 Ω resistive load . Determine :-

1- The modulation constant (K_f).

2- The ratio of the average power in the sum of the third and fourth order sidebands to the power in all remaining sidebands excluding carrier.

3- The bandwidth of the modulated signal (use significant sidebands).

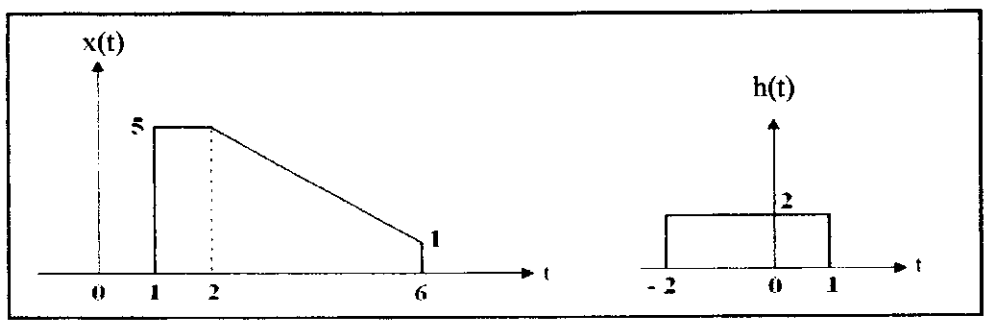
1- **Q3:/ A)** An AM signal of 50 watt power is transmitted in a frequency range 100-103 KHz in a transmission channel. If the Additive White Gaussian noise PSD (two-sided) in the transmission channel is 10^{-6} watt/ Hz. Find SNR at the receiver .

(B) Twenty five signals, fifteen of them each one has 3 KHz bandwidth, and the others ten each one has bandwidth of 4.5 KHz, all the signals are FDM/ DSB-SC multiplexed then RF modulated by using (AM/DSB-LC) modulator.

1- Calculate minimum multiplexing and final transmission bandwidths.

2- Calculate multiplexing and final transmission bandwidths if 0.6 KHz guard band is allowed between each two signals and below the first signal.

Q4: Evaluate the convolution $(x(t)\otimes h(t))$ for the functions shown in figure below.



Q5: A message signal $m(t)=4\cos(200\pi t)+2\cos(800\pi t)$ modulated a carrier signal $c(t)=6\cos(2*10^4\pi t)$ by using AM/DSB-SC modulation :

1- Write an expression for the modulated signal .

2- Draw the amplitude spectrum of the modulated signal .

3- Verify Parseval power theorem in finding the sidebands power.

4- Calculate total power, transmission efficiency and the transmission bandwidth.

Good luck

Examiner : Mr. Dheyaa Tareq