القســـــم الاتصالات — أسئلة الامتحان النهائي لمادة: اتصالات1 — التاريخ 2018/07/18

لطلبة الفصل: الرابع. — رمز المادة CM201

الفصل الدراسي: ربيع 2018 — اسم الأستاذ: مصطفى الشاطر — الزمن: ساعتان

اسم الطالب :..... ..... — رقم القيد ..... — المجموعة : .....

(الاسئلة من (1) الى (10)) ضع علامة (√) أو علامة خطاء(X) درجة واحدة لكل سؤال. البقية عشرة درجات لكل سؤال.

Q1- Any scheme that can be used to generate DSB-SC can also generate AM.

Q2- Any scheme that can be used to demodulate DSB-SC can also demodulate AM.

Q3- If the signal $g(t)$ is not bandlimited, then any sampling rate will result in aliasing.

Q4- Quantization is the second step to convert a digital signal to analog one.

Q5- PWM is the technique of varying the width of the constant amplitude pulse proportional to the frequency of the modulation signal.

Q6- The bandwidth of a narrowband FM signal is approximately 200Hz, if the message signal has a bandwidth of 200Hz.

Q7- In a wideband FM, doubling the peak value of the message signal approximately doubles the bandwidth of the FM signal.

Q8- The Nyquist frequency for a signal of bandwidth 8 kHz is 16 kHz.

Q9-In QAM system, we usually use the Hilbert Transform to transmit two signals to reduce the required bandwidth.

Q10- PWM still works if synchronization between transmitter and receiver fails,

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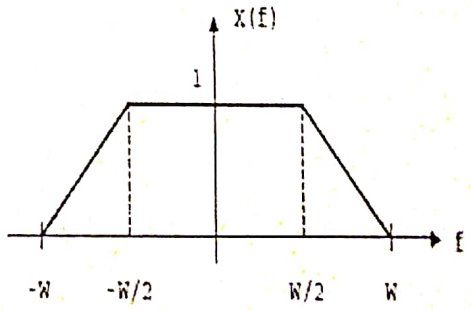
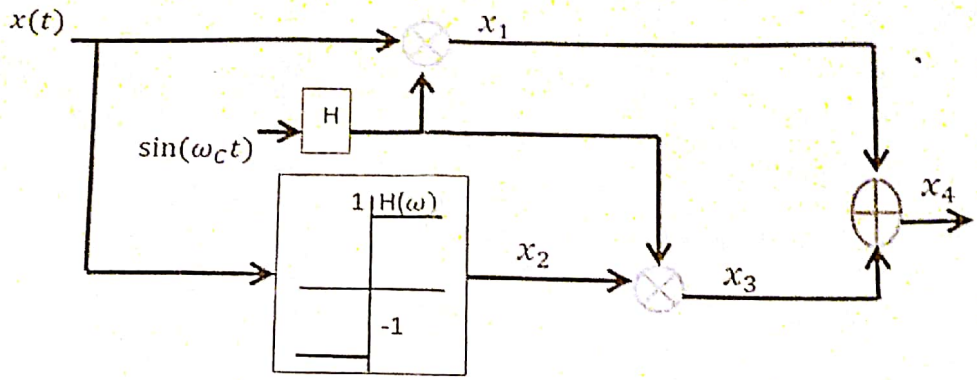
Q11- A signal $x(t)$ has the Fourier transform as shown, the signal is applied to the shown system,. The block marked (H) represents Hilbert transform block, Assume $\omega_C \gg w$

a. Sketch the signal spectra of x1, x2, x3, and x4.
b. What is the modulation scheme.





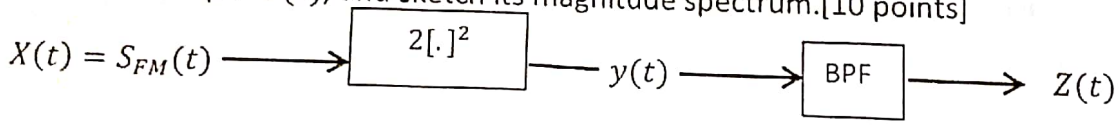
Q12- A normalized sinusoidal signal *a(t)* has a bandwidth of 5,000 Hz and its average power is 0.5W. The carrier *Acos2πfct* has an average power of 50W. Determine the bandwidth and the average power of the modulated signal if the following analog modulation scheme is employed:

(a) single-side band modulation with suppressed carrier modulation (SSBSC), which is generated by phase-shift method with the given carrier ;

(b) double-side band with suppressed carrier modulation (DSB-SC) ;

(c) AM or double-side band with large carrier (DSB-LC) with a modulation index of 0.8.

Q13- - $S_{FM}(t) = 5\cos(2\pi \times 10^6\, t + \sin(50000\pi t))$ is input to a square-law nonlinearity (with the characteristic: $y(t) = 2X^2(t)$, where $X(t)$ is the input, $y(t)$ is the output and filtered by an ideal bandpas fillter. The bandpass filter has a center frequency 0f 2.025 MHz and bandwidth of 50kHz. Determine the output $Z(t)$, and sketch its magnitude spectrum.[10 points]



تمنياتي بجميع بالتوفيق

β	J0	J1	J2	J3	J4	J5	J6	J7	J8
0	1								
0.25	0.98	0.12							
0.5	0.94	0.24	0.03						
1.0	0.77	0.44	0.11	0.02					
2.0	0.22	0.58	0.35	0.13	0.03				
3.0	-0.26	0.34	0.49	0.31	0 13	0.04	0.01		
4.0	-0.40	-0.07	0.36	0.43	0.28	0.13	0.05	0.02	
5.0	-0.18	-0.33	0.05	0.36	0.39	0.26	0.13	0.05	0.02

$$\cos^2\theta = \frac{1}{2}[1 + \cos 2\theta]$$

$$\sin^2\theta = \frac{1}{2}[1 - \cos 2\theta]$$

$$\sin\theta \sin\varphi = \frac{1}{2}[\cos(\theta - \varphi) - \cos(\theta + \varphi)]$$

$$\sin(\theta \pm \varphi) = \sin\theta\cos\varphi \pm \cos\theta\sin\varphi$$

$$\cos\theta \cos\varphi = \frac{1}{2}[\cos(\theta - \varphi) + \cos(\theta + \varphi)]$$

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كلية التقنية الالكترونية
College of Electronic Technology - Tripoli

القســـم الاتصالات | أسئلة الامتحان النهائي لمادة: اتصالات1 لطلبة الفصل: الرابع. رمز المادة CM201 | التاريخ 2018/01/30

الفصل الدراسي: خريف 2018/2017 | اسم الأستاذ: مصطفى الشاطر | الزمن: ساعتان

اسم الطالب :..... ..... | رقم القيد ..... | المجموعة : .....

س1- بين أي من الاشارات التالية مناسبة كموجة حاملة للأرسال اللاسلكي مع بيان السبب: (2)

I. $m(t) = 8\cos(2\pi \times 10^3 t)$
II. $s(t) = 2\cos(2\pi \times 10^8 t)$

س2- عرف وتحدث باختصار عن كل من: (3)

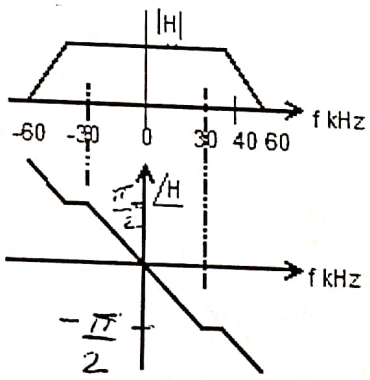
I. 'Modulation.
II. Multiplexing.

س3- ارسم المخطط الصندوقي لأنظمة التضمين التالية: (3)

I. Standard AM.
II. SSB-SC

Q4) A certain AM transmitter of single- tone modulation has a transmission power efficiency of 25% and carrier power of 200w. The modulating signal has a frequency of 1kHz and the carrier of 50kHz.[10-points]

a) Determine the modulation index.
b) Compute the power in the sidebands.
c) Sketch the spectrum of this AM signal.
d) Sketch this AM signal in time domain, indicating Its maximum and minimum values.
e) If we want to send this AM signal through the Shown channel. What should the maximum Frequency carrier frequency be used instead of 50 kHz to avoid distortion.

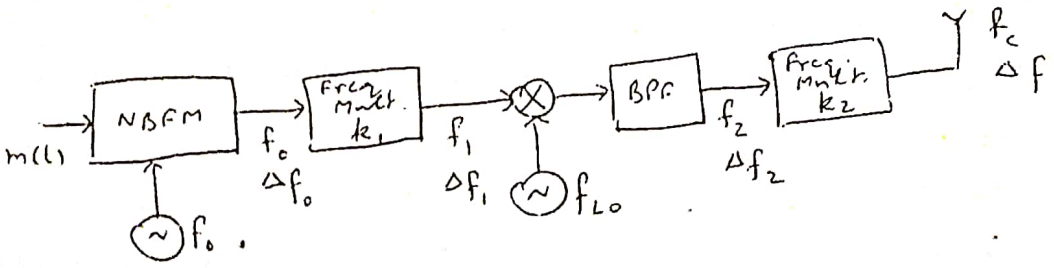


Q5) Consider the following DSB signal:[8- points]

$$s_{DSB}(t) = \cos(495 \times 10^3\, t) + \cos(505 \times 10^3\, t)$$

a. Sketch the spectrum of this DSB signal.
b. Draw a block diagram of DSB demodulator to recover the baseband message, indicating the carrier frequency value and the ideal filter characteristics.
c. Sketch the spectrum of the recovered baseband signal after demodulation process.
d. What is minimum channel bandwidth required to pass this DBS signal through it.

Q6) A wideband FM signal is generated from a narrowband FM generator by Armstrong's indirect method as shown below.[8- points]



The desired (target) carrier frequency f_c is 100 MHz and frequency deviation $\Delta f = 75$ kHz the message signal to be broadcast is given by:

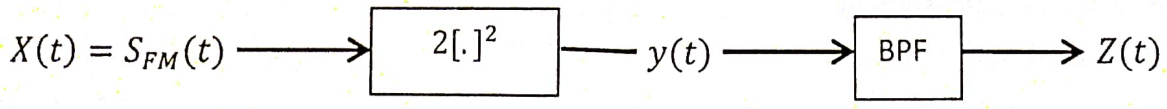
$$m(t) = 1000\sin^2(15000\pi t)$$

The following information is given: $f_0 = 100kHz$, $k_1 = 150$, $k_2 = 50$

Determine the following quantities:

a. NBFM frequency deviation Δf_0
b. Carrier frequencies f_1 *and* f_2 *and the corresponding frequency deviations* Δf_1 *and* Δf_2
c. The oscillator frequency f_{LO}
d. The center frequency and bandwidth of the band pass filter.

Q-7)- $S_{FM}(t) = 5\cos(2\pi \times 10^6\, t + \sin(50000\pi t))$ is input to a square-law nonlinearity (with the characteristic: $y(t) = 2X^2(t)$, where $X(t)$ is the input, $y(t)$ is the output and filtered by an ideal bandpas fillter. The bandpass filter has a center frequency 0f 2.025 MHz and bandwidth of 25kHz. Determine the output $Z(t)$, and sketch its magnitude spectrum.[6 points]



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