Shantilal Shah Engineering college,
Electronics & Communication Department,
Mid Semester Syllabus
Semester : 5
Subject: Electronics & Communication(2151004)

Sr. No	Content
1	Introduction to communication systems: Communication system, Analog and digital Messages, Channel effect, Modulation and detection, Bandwidth of different information signals, Historical review of telecommunication, Applications
2	Passive Circuits: Introduction, Series tuned circuits, Parallel tuned circuits, self-capacitance of a coil, Skin effect.
3	Amplitude modulation(AM)/Demodulation: Concept of modulation, Mathematical representation of sinusoidal Amplitude modulated signals in time and frequency domain- Double sideband Full carrier (DSBFC) , Double sideband suppressed carrier(DSBSC) and single sideband suppressed carrier modulations(SSBSC), Vestigial Sideband (VSB) modulation and Quadrature amplitude modulation(QAM), power and bandwidth calculations for DSBFC, DSBSC, SSBSC, VSB and QAM modulations, Non sinusoidal AM – effective modulation index, Effective voltage and current for sinusoidal and non-sinusoidal AM, AM generation: FET balanced modulator and IC balanced modulator circuits, Diode ring modulator, SSB generation: balanced modulator-filter method, phasing method and the third method, AM detection: peak (envelope detector), synchronous detectors, square law detectors.
	Angle modulation/demodulation: Conceptof instantaneous frequency and angle modulation, sinusoidal FM and its time domain representation, spectral components of angle modulated signals, power in sinusoidal FM and modulation index, Carson's rule, equivalence between Frequency modulation(FM) and Phase modulation(PM), Angle modulator circuits, Fm transmitters, Armstrong method of FM generation, Fm stereo broadcast, FM detection: Basic slope detector, Foster- Seeley discriminator, ratio detector, PLL detector and Quadrature detector, Concept of Amplitude limiter, Pre-emphasis and de-emphasis circuits, Interference in angle modulated systems.
	Noise: Introduction, thermal noise, Shot noise, Partition Noise, Low frequency noise, Burst noise, a noise, High frequency noise, BJT and FET noises, Equivalent input noise generators, Signal to noise ratio (SNR), SNR of Tandem connection, Noise factor and noise figure, Amplifier input noise in terms of noise figure, Noise factor in cascaded amplifiers, Noise factor and equivalent input noise generators, noise factor of a lossy network, Noise temperature, Measurement of noise temperature and noise factor, narrow-band band pass noise.Behavior of Analog systems in presence of Noise

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H.O.D(E.C)

Prof. S. B. Parmar

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Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 1
(Introduction, Passive circuits, Introduction to amateur radio technology)

Sr. No	Contents	Marks	
1	Draw series tuned circuit & derive the equation for resonant frequency , Q factor & -3 dB bandwidth.Give the uses of this circuit in communication.	7	2015W
2	What is Skin effect? How to reduce it ?	4	2016S,2017S
3	What is Ham radio ? Discuss importance of Ham radio during natural calamities.	7	2016S
4	Define communication.	1	2016W
5	Where do we use AM & FM ?	1	2016w
6	Draw& explain basic block diagram of the basic communication system.	4	2016w,2017w
7	What is modulation and why modulation is required in communication ?	4	2016w
8	For a tuned circuit , if a Q factor is high means bandwidth will be comparatively.(less,high)	1	2017s
9	Modulation is done in…….. a)Transmitter b) Receiver c) Between transmitter& receiver d) None of the above.	1	2017S
10	A series tuned circuit offers ……impendance a)Zero b)Minimum c)Maximum d) None of the above	1	2017s
11	Express an equation for impendance of series tuned circuit in terms of quality factor.	4	2017s
12	Mention the transfer function of the system required for distortion less transmission.	3	2017S
13	Define the following terms. a)Signal bandwidth b) Noise c)Distortion	3	2017W
14	In series RLC circuit, R = 10 Ω, L = 100 mH and C = 47 μF. Determine 3-dB Bandwidth of this	4	2017W
15	Write short note on Amateur radio.	7	2017W
16	Draw parallel tuned circuit & derive the equation for resonant frequency & Q factor.	7	2017W

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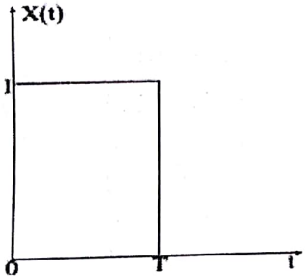
Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 2 (Analysis & transmission of signals)

Sr No	Content	Marks	GTU Exam.
1	State the Parseval's theorem. Verify Parseval's theorem for the signal $g(t) = e^{-at}u(t)$ $(a>0)$.	7	2015w
2	Determine the fourier transform of a gate pulse of unit height ,unit width & centered at t=0.	7	2015W
3	Find the fourier transform of following functions. 1) $e^{-at}u(t)$ 2) $X(t)= rect(t/T) =1$ for $-T/2< t < T/2$ $= 0$ otherwise.	7	2016S
4	State the time delay theorem of fourier transform.	1	2016W
5	Find the fourier transform of the following functions. 1 $X(t)= d(t)$ 2 $x(t)= sgn\ t= 1$ for $t>0$ $= -1$ for $t<0$	4	2016W
6	List the properties of Fourier transform & prove any two of them.	7	2016W
7	Define & state properties of sinc(x) function in relation to Fourier transform.	1	2016S
8	State & prove time shifting property of Fourier transform. Using same property show that $g(t-T)+g(t+T)= 2G(w) \cos (wT)$	7	2017S
9	Determine the Fourier transform of rectangular pulse shown below. 	7	2017S
10	State & prove properties of Fourier transform.	7	2017W
11	Explain ESD & PSD with mathematical expression.	7	2017W
12	State & prove Scaling property ,time shifting property & frequency shifting property of Fourier transform.	7	2017S

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Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 3(Amplitude Modulation)

Sr No	Content	Marks	GTU Exam.
1	Draw & explain circuit of the envelope detector for AM.Also explain importance of RC time constant.	7	2015W,2016S 2017S
2	Discuss Quadrature Amplitude Modulation(QAM) with the help of block diagram	7	2015W
3	Explain Amplitude modulation with required waveforms. Also give mathematical representation of amplitude modulated wave.	7	2015W
4	The total power content of an AM signal is 1000W.Determine the power being transmitted at the carrier frequency when the percentage modulation is 100%.	7	2015W,2016W
5	What is the figure of merit in DSB-SC and SSB-SC?	2	2016S
6	What is diagonal clipping?	2	2016S
7	Explain trapezoidal method of monitoring A.M waveform directly on an oscilloscope. Sketch trapezoidal pattern for 0 <m< 1.	7	2016S
8	Explain Balanced modulator. Why a ring modulator is known as a double balanced modulator	7	2016S
9	Explain Phasing method for generation a SSBSC signal in detail.	7	2016S
10	Define modulation index(m).	1	2016W
11	Write the expression of AM wave	1	2016W
12	What is the bandwidth of AM wave?	1	2016W
13	What is the difference between SSB wave & DSB wave?	1	2016w
14	List different types of Amplitude Modulated Signal and Give Transmission Bandwidth of respective types of AM.	3	2016W
15	The antenna current of an AM broadcast transmitter, modulated to a depth of 40 percent by an audio sine wave, is 11 A. It increases to 12 A as a result of simultaneous modulation by another audio sine wave. What is the modulation index due to this second wave?	7	2016W
16	What is single-sideband suppressed-carrier modulation? What are its advantages with respect to ordinary AM.	3	2016w
17	With related to Amplitude modulation discuss following parameters: (I) Bandwidth requirement (II) Power distribution in sidebands and carrier.	4	2016W
18	If an AM modulation is 100% then signal amplitude is..... Carrier amplitude.	1	2017s

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	a)Equal to b)Less than c) Greater than d) none of the above.		
19	A 10 kW carrier wave is amplitude modulated at 80% depth of modulation by a sinusoidal modulating signal .Calculate the sideband power,total power & transmission efficiency of the AM wave.	4	2017S
20	What are the different methods for generation of SSB signal? Explain any two methods in detail & compare them.	7	2017S
21	A sinusoidal carrier has a peak value of 100v & a frequency of 100KHz.Standard amplitude modulation is employed, the modulating signal is being a sine wave of amplitude 75V and frequency 5 KHz. Determine a)the modulation index b)the amplitude & frequencies of side frequencies and c)the power in each spectral component. The load resistance is 300Ω.	7	2017W
22	List the methods of generation of SSB .Explain any one method in detail. Discuss the advantages & disadvantages of SSB over DSB modulation technique.	7	2017w
23	An AM signal is represented by $e(t) = (10 \div 4 \cos 1000\pi t) \cos (2\pi 10^6 t)$ Find: Modulation index, percentage modulation index, frequencies of sidebands and amplitude of each sideband.	7	2017S
24	List different types of Amplitude modulated signal & explain them in detail.	7	2017S
25	What do you mean by Single side band ? Explain phase shift method with necessary equations.	7	2017w

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Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 4 (Angle modulation/Demodulation)

Sr No	Content	Marks	GTU Exam.
1	Explain pre-emphasis & de-emphasis in relation to FM.	7	2015W 2016W
2	Explain the Armstrong method of FM generation with neat diagram.	7	2015w 2017S,W
3	An FM wave is given by $e(t) = 20\sin(6*10^8\ t + 7\sin 1250t)$. Determine (i) carrier frequency (ii) modulating frequency (iii) modulation index and (iv) maximum deviation.	7	2015w
4	What is Carson's rule.	2	2016S 2017W
5	Discuss the Advantages & Disadvantages of FM Over AM	7	2016S
6	List all FM demodulators. Explain Foster - Seeley discriminator in detail.	7	2016S 2017S
7	Explain a Varactor diode Modulator for FM Generation.	7	2016S
8	Explain the importance of pre-emphasis and de-emphasis circuits. Why it is not useful in phase modulation but useful in frequency modulation?	7	2016S
9	Define modulation index for FM.	1	2016W
10	Differentiate between FM & PM system.	3	2016W
11	Find the carrier and modulating frequencies, the modulation index, and the maximum deviation of FM wave represented by the voltage equation: $V = 12 \sin (6 \times 10^8\ t + 5 \sin 1250\ t)$.	7	2016w
12	Give Comparison between FM and AM system.	3	2016W
13	List all the basic FM demodulators, Draw and explain Foster seeley discriminator in brief.	7	2016W
14	Pre-emphasis and de-emphasis networks are essential in (a) frequency modulation system (b) amplitude modulation system (c) pulse amplitude modulation system (d) none of the above	1	2017S
15	Compare AM, FM and PM.	3	2017S
16	A 20 MHz carrier is modulated by a 400Hz modulating signal. The carrier voltage is 5V and the maximum deviation is 10 kHz. Write down the mathematical expressions for the FM and PM waves. If the modulating frequency is increased to 2 kHz keeping everything else	4	2017S

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	constant write down the expressions for the FM and PM waves.		
17	Discuss drawbacks of direct method for FM generation.	3	2017S
18	An FM wave is given by $e(t) = 10\sin(5 \times 10^8 t + 4\sin 1250t)$. Determine (i) The carrier frequency (ii) Modulating frequency (iii) The modulation index (iv) The maximum deviation.	4	2017S
19	List the detection methods for frequency modulated signal. Explain any two of them.	7	2017W
20	Explain phase modulation. Also derive the equivalence between FM and PM.	7	2017W
21	Define following terms with reference of FM 1) Frequency deviation 2) Deviation ratio 3) Modulation index	3	2017W
22	Write short note on : Phase Lock Loop(PLL)	7	2017W

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Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 5 (Radio Receivers)

Sr No	Content	Marks	GTU Exam.
1	A receiver has a noise figure of 12 dB, and it is fed by a low-noise amplifier that has a gain of 50 dB and a noise temperature of 90 K. Calculate the noise temperature of the receiver and the overall noise temperature of the receiving system.	7	2015W
2	Explain AGC and discuss difference between simple AGC and Delayed AGC	7	2015W
3	With respect to receivers explain Image rejection and double spotting in detail.	7	2015W
4	An AM broadcast receiver has an IF of 465 KHz and is tuned to 1000 KHz and the RF stage has one tuned circuit with a Q of 50. (a) Find the image frequency; (b) Find the image rejection in decibels.	7	2015W
5	Define the following terms related with radio receiver: (i) selectivity (ii) fidelity (iii) sensitivity and gain (iv) tracking (v) double spotting (vi) image frequency (vii) spurious response.	7	2015W
6	Define Image rejection.	2	2016S
7	Explain Superhetrodyne principal and superhetrodyne receiver.	7	2016S
8	Explain automatic gain control in superhetrodyne receiver	7	2016S
9	State the principal of a Super heterodyne receiver.	1	2016W
10	Write two major differences between FM and AM receivers.	1	2016W
11	Draw the circuit diagram of delayed AGC.What are the advantages of delayed AGC?	4	2016w 2017W
12	Draw only diagram of Super heterodyne receivers.	3	2016W
13	List the main function of a radio receiver.	3	2016w
14	Define the following terms related with radio receivers: (1) Selectivity (2) Fidelity (3) sensitivity (4) Adjacent channel selectivity.	4	2016W
15	Express frequency tuning range ratio and capacitor tuning range ratio in relation to receivers.	1	2017S
16	A receiver tunes signals from 550 to 1600 kHz with an IF of 455 kHz. Find the frequency tuning range ratio and capacitor tuning range ratio for the oscillator section .	4	2017S
17	Draw the general block diagram of a super heterodyne receiver and briefly explain the function of each block.	7	2017S
18	What is need of tracking in receiver? Explain three types of tracking with figure	7	2017S
19	An AM broadcast receiver has an IF of 465 KHz and tuned to 1000KHz and the RF stage has one tuned circuit with Q of 50. (a)Find the image frequency (b) Find the image rejection in decibels.	3	2017w
20	Explain following with reference of receiver 1) Spurious response 2) Adjacent channel selectivity	4	2017W

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Shantilal Shah Engineering College, Bhavnagar
Department of Electronics & Communication
Semester-V
Electronic & communication --2151004
Assignment – 6 (Noise)

Sr No	Content	Marks	GTU Exam.
1	Derive the Friis's formula for noise factor when amplifiers are in cascade connection.	7	2015,16W 2017s,
2	Explain different types of noise related to communication	7	2015W
3	What is White Noise and what is its power spectral density	2	2016S
4	A mixer stage has a noise figure of 20 dB, and this is preceded by an amplifier that has a noise figure of 9 dB and available power gain of 15dB. Calculate the overall noise figure referred to the input.	7	2016s
5	Find overall noise figure of three stage cascaded amplifier, each stage having a power gain of 10 dB and noise figure of 4 dB.	7	2016s
6	Define noise factor & derive Friis's formula.	7	2016s
7	Write the expression for thermal noise generated in a resistor.	1	2016w
8	A receiver connected to an antenna whose resistance is 50 O has an equivalent noise resistance of 30 O. Calculate the receiver's noise figure in decibels and its equivalent noise temperature.	4	2016w
9	Define partition noise.	1	2017s
10	Define signal to noise ratio.	1	2017s
11	Discuss different noise sources exhibits in bipolar transistor.	3	2017s
12	Two resistors 20 kΩ and 50 kΩ are at room temperature (290K) for a bandwidth of 100kHz.Calculate thermal noise for each resistor, if two resistors are in series and if two resistors are in parallel.	4	2017s
13	Explain different types of external noise related to communication.	4	2017w
14	Discuss noise factor. Derive expression for noise factor of amplifier connected in cascade.	7	2017w
15	The equivalent noise factor for an amplifier is 300 Ω, and the equivalent shot noise current is 5 μA. The amplifier is fed from a 150- Ω, 10 μV rms sinusoidal signal source. Calculate th individual noise voltages at the input and the input signal-to-noise ratio in decibels. The noise bandwidth is 10 MHz.	7	2017w
16	Discuss shot noise, partition noise and flicker noise in detail.	7	2017s

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