



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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Hyderabad - 500 043, Telangana

## ELECTRONICS AND COMMUNICATION ENGINEERING

### ASSIGNMENT

<b>Course Name</b>	:	ANALOG COMMUNICATIONS
<b>Course Code</b>	:	A50408
<b>Class</b>	:	III - B. Tech I Sem
<b>Branch</b>	:	Common for ECE
<b>Year</b>	:	2017 – 2018
<b>Course Coordinator</b>	:	Dr. P G Krishna Mohan
<b>Course Faculty</b>	:	Dr.P Muniswamy, Dr.V Shiva Nagraju, T Nagarjuna,

### OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner’s learning process.

S. No	Question	Blooms Taxonomy Level	Course Outcome
<b>ASSIGNMENT-I UNIT-I AMPLITUDE MODULATION</b>			
1.	(a) <b>Explain</b> the operation of Square law modulator of AM with neat diagrams. (b) <b>calculate</b> the power of each sideband for a broadcast transmitter radiates 20kw when the modulation percentage is 75. How much is the carrier power?	Understand	c
2	a. <b>Define</b> modulation index. Derive the expression for single tone modulation of AM b. A sinusoidal carrier has amplitude of 10v and frequency of 30KHz. It is amplitude modulated by a sinusoidal voltage of amplitude 3v and frequency 1KHz. Modulated voltage is developed across 50Ω resistance	Apply	c
3	a) <b>Define</b> Amplitude Modulation. Derive equation for AM Wave. (b) An audio frequency signal $10\sin 2\pi 500t$ is used to amplitude modulate a carrier of $50\sin 2\pi 10^5 t$ . Assume modulation index $m=0.2$ . (2.5M) (i) Determine sideband frequencies. (ii) Determine Bandwidth of AM. (iii) Draw the spectrum of AM.	Apply	c
4	<b>Define</b> Modulation. Explain the principle of Envelope detector of AM with diagram	Understand	b

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	(b) The carrier amplitude after AM varies between 4 volts and 1 volt. Calculate depth of modulation and draw the waveform of AM wave		
5	(a) <b>Draw</b> the circuit diagram of Balanced Modulator and explain how DSB-SC waveform is generated. (b) A carrier $c(t)=20\cos 2\pi 10^6 t$ is modulated by a message signal $m(t)=5\cos 2\pi 10^3 t$ to generate a DSB-SC signal. Sketch the spectrum and determine Bandwidth, Power and Modulation efficiency .	Analyze	e
6	(a) <b>Draw</b> the circuit diagram of Balanced Modulator and explain how DSB-SC waveform is generated. (b) A carrier $c(t)=20\cos 2\pi 10^6 t$ is modulated by a message signal $m(t)=5\cos 2\pi 10^3 t$ to generate a DSB-SC signal. Sketch the spectrum and determine Bandwidth, Power and Modulation efficiency .	Apply	e
7	(a) <b>Explain</b> the Coherent detection of DSB-SC waves with neat diagrams. (b) A carrier of frequency 5MHz is modulated by a message signal having three frequencies 5KHz, 8KHz and 10KHz respectively. Determine the LSB, USB frequencies and draw the spectrum of DSB-SC	understand	e
8	a) <b>Explain</b> the working of COSTAS loop with diagram. b) <b>Prove</b> that $P_r = P_c [1 + \mu^2 / 2]$ for an AM wave.	Apply	e
9	<b>Calculate</b> the percentage of power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (i) 100% (ii) 50% .	Apply	c
10	<b>What</b> is the total sideband power radiated for a 360 w carrier is simultaneously Amplitude modulated by two audio waves with modulation percentages of 55 and 65 respectively	Apply	c
<b>ASSIGNMENT – II</b> <b>SSB MODULATION</b>			
1	(a) <b>Derive</b> the Time Domain equation for an VSB modulated wave. (b) <b>Explain</b> the Demodulation of VSB modulated wave with diagram	Understand	f
2	a. <b>Derive</b> the Time Domain equation for an SSB modulated wave. b. <b>Explain</b> Demodulation of SSB wave with diagram	Understand	e
3	a. <b>Explain</b> the principle of Phase Discrimination Method for generating SSB modulated wave with neat diagram. b. <b>Compare</b> SSB generation methods	Understand	e
4	(a) <b>Derive</b> the Time Domain equation for an SSB modulated wave. (b) <b>Explain</b> Demodulation of SSB wave with diagram	Understand	e
5	<b>Explain</b> third method of SSB generators with a neat block diagram	Understand	e
6	<b>Define</b> and describe VSB Transmission. What is its application? What are its merits?	Understand Analyze	f
7	<b>Explain</b> the frequency discrimination method for generating an SSB modulated wave.	Understand	e
8	An AM transmitter of 1KW power is fully modulated. Calculate the power transmitted if it is transmitted as SSB.	Understand	e
9	<b>Explain</b> Hilbert Transform?	understand	e
10	<b>Calculate</b> the filter requirement to convert DSB signal to SSB Signal, given that the two side bands are separated by 200HZ. The suppressed carrier is 29 MHZ.	Apply & analyze	e

S. No	Question	Blooms Taxonomy Level	Course Outcome
<b>UNIT-III</b> <b>ANGLE MODULATION</b>			
1	(a) <b>Derive</b> the single tone frequency modulation of FM. (b) ) A 93.2 MHz carrier is frequency modulated by a 5KHz sine wave. The resultant FM signal has a frequency deviation of 40KHz. (i) Find the carrier Swing of the FM signal (ii) What are the highest and lowest frequencies attained by the frequency modulated signal. (iii) Calculate the modulation index for the wave.	Apply	d
2	(a) <b>Explain</b> the spectrum analysis of FM wave. (b) <b>Define</b> angle modulation. Explain the Frequency Modulation and Phase Modulation.	Understand	d
3	(a) <b>Draw</b> the block diagram of NBFM system and explain its operation. (b) <b>Compare</b> Amplitude modulation techniques.	Understand	d
4	(a) <b>Compare</b> AM and FM Systems.(2.5M) (b) The equation for an FM wave is $s(t)=10\sin[5.7*10^8t+5\sin12*10^3t]$ . <b>Calculate</b> :(a) Carrier Frequency. (b) Modulating Frequency. (c) Modulation Index. (d) Frequency Deviation. (e) Power Dissipated in 100Ω load	Apply	d
5	<b>Describe</b> the relationship between FM and PM. Derive the FM equation for Narrow Band and Wide Band FM signals and explain their spectral features.	Understand	d
6	<b>What</b> is zero crossing detectors? <b>Explain</b> how it works and can be used as an FM demodulator	Understand	d
7	a) <b>Explain</b> the Foster – Seely discriminator. b) <b>Explain</b> the demodulation of FM signals.	Apply	d
8	When the modulation frequency in FM system is 400 Hz and modulating Voltage is 2.4v the modulating index is 60. Calculate the maximum Deviation. What is the modulation index when the modulating frequency is reduced to 250Hz and the modulating voltage is simultaneously raised to 3.2V?	Apply	d
9	a. <b>Describe</b> Foster seeley Discriminator with a neat circuit diagram and b. <b>Explain</b> its principle with necessary Equations. What are its merits and Demerits?	Analyze	d
10.	a) <b>Distinguish</b> between phase and frequency modulation. Show that FM can be derived using PM and vice versa with the help of differentiator or Integrator networks. b) <b>Compute</b> the bandwidth requirement for the transmission of FM signal having a frequency deviation 75 KHz and an audio bandwidth of 10 KHz.	Analyze	d
<b>ASSIGNMENT III UNIT-IV</b> <b>NOISE IN ANALOG COMMUNICATION SYSTEMS</b>			
1	<b>Calculate</b> figure of merit for amplitude modulation for envelope detector considering both small and large noise cases?	Apply	1
2	<b>Calculate</b> Figure of merit for DSBSC	Apply	1
3	a) <b>Prove</b> that the product of the transfer functions of the pre emphasis and de-emphasis circuits is constant? (b) <b>Explain</b> the threshold effect in angle modulation	Apply	1
4	<b>Derive</b> the expression for figure of merit of Frequency modulation.	Analyze	1
5	<b>Calculate</b> Figure of merit for SSBSC	Apply	1
6	<b>Draw</b> the schematic diagram of the modulator demodulator for FM and prove the signal to noise power ratio at the demodulator output (SNR) <sub>0</sub> , $f_m=3Ac^2 k f^2 p / 2NoW^3$ .	understand	1

S. No	Question	Blooms Taxonomy Level	Course Outcome
7	a. <b>Explain</b> shot noise and white noise b. <b>write</b> short notes on noise bandwidth	Understand	l
8	a) <b>Derive</b> noise figure in terms of signal to noise ratio b) <b>Derive</b> effective noise temperature for cascade network of two stages	Understand	l
9	a) <b>Explain</b> flicker noise and thermal noise b) <b>write</b> short notes on effective noise temperature	Understand	l
10	a. <b>Derive</b> noise figure for cascade network of two stages b. <b>Derive</b> noise figure in terms of effective noise temperature	Understand	l
<b>UNIT-RECEIVERS</b>			
1	(a) <b>Define</b> pulse amplitude modulation Draw the waveform and explain the how a PAM wave can be generated. (b) <b>Explain</b> about single polarity and double polarity in PAM.	Understand	a
2	(a) <b>Explain</b> clearly the demodulation of PWM with the help of necessary block diagram and wave forms. (b) <b>How</b> a PPM signal can be generated from a PWM signal.	Understand	c
3	(a) <b>Explain</b> PAM demodulation ? (b) <b>Explain</b> PWM Modulation?	Understand	h
4	(a) <b>What</b> is Flat Top Sampling? Explain about the Aperture Distortion Effect. (b) <b>What</b> are the fundamental differences between pulse modulation techniques, on the one hand, and continuous wave modulation on the other?	Understand	l
5	(a) <b>What</b> is an Amplitude Limiter? Explain its operation with a neat circuit Diagram. (b) <b>Explain</b> block diagram of super heterodyne receiver and explain each block	Understand	g
6	(a) <b>What</b> is Automatic gain control? What are its functions (b) The broad cast super heterodyne receiver has an IF=450KHz and it is tuned for 1400KHz. Calculate the image frequency and 'Q' of the coil if ckt has image frequency rejection( $\alpha$ ) equal to 70.	Apply	e
7	(a) <b>Explain</b> about the Image frequency and Image frequency rejection of a radio receiver. (b) <b>Explain</b> about Double Spotting.	Understand	c
8	List out the advantages and disadvantages of TRF receiver.	Remember	k
9	a) <b>Why</b> is cross talk present in PTM system ? Explain the generation and demodulation of PDM signals with suitable diagrams b) <b>How</b> a PPM signal can be generated from a PWM signal	Remember	l
10	<b>Explain</b> the purpose and working of Tracking circuits.	Analyze	m

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