

**Department of Electronics & Communication Engineering**

**MID QUESTION BANK**

<b>Course Title</b>	<b>ANALOG COMMUNICATIONS</b>			
<b>Course Code</b>	<b>A50408</b>			
<b>Regulation</b>	<b>R13</b>			
<b>Course Structure</b>	Lectures	Tutorials	Practicals	Credits
	4	1	-	4
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<b>Team of Instructors</b>				

**Course Objectives:**

This course aims at:

- Developing and understanding of the design of Analog communication system.
- Study of analog modulation techniques.
- Subject will develop analytical abilities related to Circuit members.
- Establishing a firm foundation for the understanding of telecommunication systems, and the relationship among various technical factors when such systems are designed and operated.

## Group-A: Short Answer Questions

S.No.	QUESTION	BLOOMS TAXONOMY	COs	POs
<b>UNIT-I</b>				
1	Draw one cycle of AM wave & Calculate the modulation index in terms of $V_{max}$ & $V_{min}$ .	Knowledge	1	a,l
2	Sketch the envelope for a maximum positive envelope voltage of 12V & minimum positive envelope amplitude of 4V; determine the modulation index & percentage modulation.	Analysis	2	c,d,l
3	Give the generation of DSB-SC using ring modulator.	Comprehension	1	a,l
4	A 400W carrier is modulated on a depth of 75%. Calculate the total power in the modulated wave in : (i) AM (ii) DSB SC	Knowledge	2	c,d,l
5	Explain the concept of modulation & Give their classification	Comprehension	1	a,l
6	Explain in detail the need for modulation and advantages over modulation	Knowledge	1	a,l
7	Explain Envelop Detection of AM	Comprehension	1	a,l
8	In a DSB-SC system, modulating signal is a single tone sinusoid $4\cos 2\pi 10^3 t$ which modulates a carrier signal $6\cos 2\pi 10^6 t$ . Write the equation of the modulated wave, Calculate $P_T$	Application	2	c,d,l
9	Explain how an AM wave is generated using switching modulator	Application	1	a,l
10	An AM transmitter has an un-modulated carrier power of 10KW. It can be modulated to a max depth of 40%, if the modulation index is reduced to 30%. What is the extent of carrier power that can be increased to avoid overloading?	Comprehension	1	a,l
11	Explain about Coherent Detection of DSB-SC	Comprehension	1	a,l
12	Explain how an AM wave can be detected using square law detector	Knowledge	2	c,d,l
13	A broadcast AM transmitter radiates 50KW of carrier power. What is radiated power at 80% modulation	Knowledge	2	c,d,l
14	Explain about COSTAS Loop	Knowledge	2	c,d,l
15	In a DSB SC system, modulating signal is a single tone sinusoid $10\cos 2\pi 10^3 t$ which modulates a carrier signal $10\cos 2\pi 10^6 t$ . Write the equation of the modulated wave, Calculate $P_T$	Knowledge	1	a,l
16	Explain about Synchronous Detection of DSB-SC	Comprehension	2	c,d,l
17	A 400W carrier is modulated on a depth of 50%. Calculate the total power transmitted power and sideband power	Knowledge	1	a,l
18	Explain how an AM wave can be detected using square law detector	Application	2	c,d,l
19	A broadcast AM transmitter radiates 50KW of carrier power. What is radiated power at 80% modulation	Application	1	a,l
20	Draw the circuit diagram for switching modulator?	Application	1	a,l
21	How is TDM different from FDM?	Knowledge	1	a,l
22	Define modulation index and percent modulation?	Comprehension	2	c,d,l
23	Explain the reasons for doing modulation?	Comprehension	1	a,l
24	Mention its advantages of modulation?	Knowledge	2	c,d,l
25	Mention its applications of modulation?	Comprehension	1	a,l
26	Compare low level and high level modulation.	Knowledge	1	a,l
27	Explain the principle of operation of Costa's loop?	Comprehension	1	a,l
28	Draw the circuit diagram for balanced ring modulator?	Application	2	c,d,l
29	Draw the circuit diagram for square-law modulator?	Application	1	a,l

30	Draw the circuit diagram for square-law detector?	Comprehension	1	a,l
<b>Unit II</b>				
1	Compare different AM systems?	Knowledge	3	b,l
2	How much power is saved in VSB system compared to AM system?	Comprehension	3	b,l
3	What is the percentage of power saving in SSB modulation?	Knowledge	3	b,l
4	List the advantages of SSB transmission.	Knowledge	3	b,l
5	What is the difference between VSB and DSB?	Knowledge	3	b,l
6	What is VSB Transmission? How is it used in TV broadcast?	Analysis	3	b,l
7	How is SSB signal generated by Frequency discrimination method?	Analysis	3	b,l
8	Discuss different methods of SSBSC generation with a relevant block diagram.	Analysis	3	b,l
9	What is Hilbert transform?	Comprehension	3	b,l
10	List applications of different AM systems	Analysis	3	b,l
11	Draw the spectrum of SSB modulated signal?	Knowledge	3	b,l
12	Draw the spectrum of VSB modulated signal?	Comprehension	3	b,l
13	Write the expression for SSB and VSB Waves.	Application	3	b,l
14	What are the methods for SSB generation?	Application	3	b,l
15	List Application of SSB?	Application	3	b,l
16	What are the advantages of VSB system	Knowledge	3	b,l
17	Define SSB-SC system	Application	2	c,d,l
18	What are the disadvantages of single side band transmission?	Comprehension	3	b,l
19	What are the methods for generating SSB-SC signal?	Application	2	c,d,l
20	Write the applications of Hilbert transform?	Application	3	b,l
21	What is the percentage of power saving in SSB modulation?	Knowledge	3	b,l
22	List the advantages of SSB transmission.	Comprehension	3	b,l
23	What is the difference between VSB and DSB?	Knowledge	3	b,l
24	What is VSB Transmission? How is it used in TV broadcast?	Knowledge	3	b,l
25	How is SSB signal generated by Frequency discrimination method?	Knowledge	3	b,l
26	Discuss different methods of SSBSC generation with a relevant block diagram.	Analysis	3	b,l
27	What is Hilbert transform?	Analysis	3	b,l
28	What are the advantages of VSB system	Analysis	3	b,l
29	Define SSB-SC system	Comprehension	3	b,l
30	What are the disadvantages of single side band transmission?	Analysis	3	b,l
<b>Unit III</b>				
1	What do you mean by angle modulation?	Understanding	2	c,d,l
2	What is the difference between phase modulation and frequency modulation?	Remembering	2	c,d,l
3	Define frequency deviation and phase deviation	Creating	2	c,d,l
4	What do you mean by deviation sensitivity in PM and FM?	Remembering	2	c,d,l
5	What is narrowband FM?	Evaluate	2	c,d,l
6	Sketch the waveform of FM wave.	understanding	2	c,d,l
7	Sketch the waveform of PM wave.	understanding	2	c,d,l
8	What do you mean by instantaneous frequency?	Evaluate	2	c,d,l
9	What is the total power in FM wave?	Evaluate	2	c,d,l
10	What is the bandwidth of FM wave by Carson's rule?	Analyse	2	c,d,l
11	Compare Narrow band and wide band FM	Remember	3	b,l
12	Define phase deviation and modulation index?	Knowledge	3	b,l

13	Compare the advantages and disadvantages of angle modulation with amplitude modulation?	Knowledge	3	b,l
14	Give the procedure to generate a narrow band FM and PM signal with neat diagram.	Remember	3	b,l
15	Give the procedure to generate FM from phase modulator with neat block diagram.	Understand	3	b,l
16	Give the procedure to generate PM from frequency modulator with neat block diagram.	Understand	3	b,l
17	What is the total power in FM wave?	Apply	3	b,l
18	What is the bandwidth of FM wave by Carson's rule?	Understand	3	b,l
19	Define frequency deviation and phase deviation	Apply	3	b,l
20	What do you mean by deviation sensitivity in PM and FM?	Remember	3	b,l
21	What do you mean by deviation sensitivity in PM and FM?	Understanding	2	c,d,l
22	What is narrowband FM?	Remembering	2	c,d,l
23	Sketch the waveform of FM wave.	Creating	2	c,d,l
24	Sketch the waveform of PM wave.	Remembering	2	c,d,l
25	What do you mean by instantaneous frequency?	Evaluate	2	c,d,l
26	What is the total power in FM wave?	understanding	2	c,d,l
27	What is the bandwidth of FM wave by Carson's rule?	understanding	2	c,d,l
28	Compare Narrow band and wide band FM	Evaluate	2	c,d,l
29	Define phase deviation and modulation index?	Evaluate	2	c,d,l
30	Compare the advantages and disadvantages of angle modulation with amplitude modulation?	Analyse	2	c,d,l
<b>Unit IV</b>				
1	Define noise in analog communication?	Knowledge	4	a, b,l
2	The threshold level for AM is equivalent to the input SNR(S/N) <sub>i</sub> =10. Assume this is also valid for FM. Determine the output SNR at the threshold level for FM.	Remember	4	a,b,l
3	Write the input signal to noise ratio equation for amplitude modulation.	Analysing	4	a,b,l
4	Write the output signal to noise ratio equation for amplitude modulation.	Knowledge	4	a,b,l
5	Write the figure of merit equation for amplitude modulation.	Remember	4	a, b,l
6	Write the input signal to noise ratio equation for DSB-SC.	Knowledge	4	a, b,l
7	Write the output signal to noise ratio equation for DSB-SC.	Understand	4	a,b,l
8	Write the figure of merit equation for DSB-SC.	Remember	4	a, b,l
9	Write the input signal to noise ratio equation for SSB-SC.	Analysing	4	a,b,l
10	Write the output signal to noise ratio equation for SSB-SC.	Knowledge	4	a,b,l
11	Write the figure of merit equation for SSB-SC.	Knowledge	4	a, b,l
12	Write the input signal to noise ratio equation for FM.	Remember	4	a,b,l
13	Write the output signal to noise ratio equation for FM.	Analysing	4	a,

				b,l
14	Write the figure of merit equation for FM.	Knowledge	4	a,b,l
15	Define capture effect in angle modulated system.	Remember	4	a,b,l
16	Define threshold effect in angle modulated system.	Knowledge	4	a,b,l
17	Explain how the threshold effect can be reduced in angle modulated system using FM.	Understand	4	a,b,l
18	Define noise and also classify them.	Remember	4	a,b,l
19	Explain about effective noise temperature and average noise bandwidth.	Knowledge	4	a,b,l
20	Explain noise in cascading amplifiers.	Knowledge	4	a,b,l
21	Write the input signal to noise ratio equation for amplitude modulation.	Knowledge	4	a, b,l
22	Write the output signal to noise ratio equation for amplitude modulation.	Remember	4	a,b,l
23	Write the figure of merit equation for amplitude modulation.	Analysing	4	a,b,l
24	Write the input signal to noise ratio equation for DSB-SC.	Knowledge	4	a,b,l
25	Write the output signal to noise ratio equation for DSB-SC.	Remember	4	a, b,l
26	Write the figure of merit equation for DSB-SC.	Knowledge	4	a, b,l
27	Write the input signal to noise ratio equation for SSB-SC.	Understand	4	a,b,l
28	Write the output signal to noise ratio equation for SSB-SC.	Remember	4	a, b,l
29	Explain about effective noise temperature and average noise bandwidth.	Analysing	4	a,b,l
30	Explain noise in cascading amplifiers.	Knowledge	4	a,b,l
<b>Unit V</b>				
1	Define receiver and how they are classified.	Remember	5	a,b,l
2	Mention the drawbacks of Tuned Radio Frequency Receiver	Knowledge	5	a,b,l
3	Mention the advantages of superhetrodyne receiver	Understand	5	a,b,l
4	Draw the circuit of amplitude limiter and with the aid of the transfer characteristics.	Analysing	5	a,b,l
5	Compare FM Receiver with AM Receiver.	Remember	5	a,b,l
6	What is the role of ganged capacitors in Tuned radio frequency (TRF) receiver.	Knowledge	5	a,b,l
7	What is threshold effect? And explain.	Understand	5	a,b,l
8	Prove that the figure of merit of DSB-SC receiver is unity.	Applying	5	a,b,l
9	Distinguishing between delayed AGC and simple AGC.	evaluating	5	a,b,l
10	What is tracking error?	Knowledge	5	a,b,l
11	Describe the general process of frequency changing in a super hetero dyne receiver.	Remember	5	a,b,l
12	Define pulse amplitude modulation, Draw the waveform, explain the Generation and Demodulation of PAM.	Knowledge	5	a,b,l
13	Draw the waveforms and block diagrams of PAM.	Understand	5	a,b,l

14	Draw the circuit for PWM modulation.	Analysing	5	a,b,l
15	What are various pulse modulation techniques?	Remember	5	a,b,l
16	Draw the circuit for PPM modulation.	Knowledge	5	a,b,l
17	Draw the circuit for PPM demodulation.	Understand	5	a,b,l
18	Draw the circuit for PWM demodulation.	Applying	5	a,b,l
19	Describe the general process of frequency changing in a super hetero dyne receiver.	evaluating	5	a,b,l
20	Compare PAM and PWM?	Knowledge	5	a,b,l
21	What are the advantages of PAM?	Remember	5	a,b,l
22	What are the disadvantages of PAM?	Knowledge	5	a,b,l
23	Compare PWM and PPM?	Understand	5	a,b,l
24	What are the advantages of PWM?	Analysing	5	a,b,l
25	What are the disadvantages of PWM?	Remember	5	a,b,l
26	What are the advantages of PPM?	Knowledge	5	a,b,l
27	What are the disadvantages of PPM?	Understand	5	a,b,l
28	Describe the block diagram of frequency mixer.	Applying	5	a,b,l
29	Describe the block diagram of local oscillator.	evaluating	5	a,b,l
30	Describe the general process of frequency changing in a super hetero dyne receiver.	Knowledge	5	a,b,l

## Group-B: Long Answer Questions

S.No.	QUESTION	BLOOMS TAXONOMY	COs	POs
<b>Unit I</b>				
1	Explain the generation of AM signals using Square Law Modulator	Evaluate	1	a,l
2	Explain the detection of AM signals using Envelope Detector	Evaluate	1	a,l
3	Explain about balanced modulator to generate DSB-SC signal.	Create	1	a,l
4	Draw the circuit diagram of Ring Modulator and explain with its operation?	Evaluate	1	a,l
5	Discuss the coherent detection of DSB-SC modulated wave with a block diagram of detector and explain.	Evaluate	1	a,l
6	Draw the block diagram for the generation and demodulation of a VSB signal and explain the principle of operation	Apply	1	a,l
7	Explain the method of generating AM waves using Non-Linear circuits	Evaluate	1	a,l
8	Explain the terms “synchronous detection”, “envelope detection”, “coherent detection”, and “non-coherent detection”	Application	1	a,l
9	a) Explain necessary expressions, waveforms and spectrums, Explain AM for an arbitrary baseband signal $m(t)$ . b) The output power of an AM transmitter is 1KW when sinusoidal modulated to a depth of 100%. Calculate the power in each side band when the modulation depth is reduced to 50%	Application	1	a,l
10	a) Discuss the main objectives of a communication system design? What are the primary resources of any communication system? b) The rms antenna current of an AM transmitter is 10 A when un-modulated and 12 A when sinusoidal modulated. Calculate the modulation index	Comprehension	1	a,l
11	Draw the amplitude -frequency characteristic of $v_o(t)$ . The signal $v(t) = (1 + 0.1 \cos \omega_1 t + 0.1 \cos 2\omega_1 t) \cos \omega_c t$ is detected by a square law detector $V_o = 2v^2$ .	Apply	1	a,l
12	Determine the total power radiated when modulated to 30%? A transmitter supplies 8kw to the antenna when unmodulated	Knowledge	1	a,l
13	Find the value to which unmodulated carrier power may be increased without resulting in overloading if the maximum permitted modulation index is restricted to 40%? A Radio transmitter using AM has unmodulated carrier output power of 10kw and can be modulated to a maximum depth of 90% by a sinusoidal modulating voltage without causing overloading.	Apply	1	a,l
14	Determine the depth of modulation for a Certain AM transmitter is coupled to an antenna. The input power to the antenna is measured although monitoring of the input current , when there is no modulation ,the current is 10.8A. With modulation ,the current rises to 12.5A	Knowledge	1	a,l
15	Calculate the power of the modulated signal for a 1MHz carrier is amplitude modulated by a 400Hz modulating signal to a depth of 50%. The unmodulated carrier power is 1kw	Evaluate	1	a,l

16	a) Explain about the quadrature null effect of coherent detector. b) In DSB-SC, suppression of carrier so as to save transmitter power results in receiver complexity -Justify this statement	Comprehension	1	a,l
17	a) Define communication. Explain with block diagram the basic communication system. Write about modern communication system. b) A carrier wave of frequency 10 MHz and peak value of 10 V is amplitude modulated by a 5 KHz sine wave of amplitude 6 V. Determine the modulation index and draw the one sided spectrum of modulated wave	Knowledge	1	a,l
18	A 220W carrier is modulated to a depth of 65%. Calculate the total power in AM and DSBSC modulated wave.	Remembering	1	a,l
19	A carrier of 1MHz with 400W of its power is amplitude modulated with a sinusoidal signal of 2500Hz. The depth of modulation is 75%. Calculate the sideband frequencies, BW, Power in sidebands and total power in modulated wave.	Comprehension	1	a,l
20	What is the total sideband power radiated? A 360W carrier is simultaneously Amplitude modulated by two audio waves with modulation percentages of 55 and 65 respectively.	Application	1	a,l
<b>Unit II</b>				
1	Discuss about coherent detector to detect SSB-SC signal	Knowledge	3	b,l
2	Explain about the generation of SSB using Balanced Modulator	Comprehension	3	b,l
3	Describe the time domain band)pass representation of SSB with necessary sketches.	Knowledge	3	b,l
4	a) Why VSB system is widely used for TV broadcasting ) Explain? b)An AM transmitter of 1KW power is fully modulated. Calculate the power transmitted if it is transmitted as SSB.	Knowledge	3	b,l
5	Calculate the filter requirement to convert DSB signal to SSB Signal, given that the two sidebands are separated by 200HZ. The suppressed carrier is 29MHZ	Knowledge	3	b,l
6	Describe the single tone modulation of SSB. Assume both modulating and carrier signals are sinusoids. Write SSB equation and plot all the waveforms and spectrums.	Analysis	3	b,l
7	Explain with block diagram, the phase discrimination method of generating SSB modulated waves.	Analysis	3	b,l
8	a) Explain the Third method of generating SSB modulated waves. b) Explain the coherent detection of SSB signals.	Analysis	3	b,l
9	Explain the envelope detection of VSB wave plus carrier.	Comprehension	3	b,l
10	ExplainwiththehelpofsketchesandmathematicalexpressionshowV SBModulationcanbeobtained and mention its applications.	Analysis	3	b,l
11	An AM broadcast station has a modulation index, which is 0.75on the average. What would be the average power saving if it could go over to SSB-SC transmission, while having to maintain the same signal strength in the reception area?	Knowledge	3	b,l
12	Draw the circuit and explain the generation of SSB-SC wave using phase shift method?	Comprehension	3	b,l
13	Explain the Third method of generating SSB modulated waves.	Application	3	b,l
14	Explain the coherent detection of SSB signals.	Application	3	b,l
15	Determine carrier power, modulating frequency, total power output and peak power output for the output voltage of a SSB	Application	3	b,l



	transmitter is given by $300(1 + 0.3 \sin 5210t) \sin 2.14 \times 10^7 t$ . This voltage is fed to a load of $500\Omega$ resistance			
16	Explain with block diagram, the phase discrimination method of generating SSB modulated waves.	Knowledge	3	b,l
17	a) Explain the Third method of generating SSB modulated waves. b) Explain the coherent detection of SSB signals.	Application	2	c,d,l
18	Explain the envelope detection of VSB wave plus carrier.	Comprehension	3	b,l
19	Explain with the help of sketches and mathematical expressions how VSB Modulation can be obtained and mention its applications.	Application	2	c,d,l
20	a) Why VSB system is widely used for TV broadcasting ) Explain? b) An AM transmitter of 1KW power is fully modulated. Calculate the power transmitted if it is transmitted as SSB.	Application	3	b,l
<b>Unit III</b>				
1	Compare FM and AM systems.	Understanding	2	c,d,l
2	Differentiate between narrow band FM and wideband FM.	Evaluate	2	c,d,l
3	Compute the bandwidth requirement for the transmission of FM signal having a frequency deviation 75 KHz and an audio bandwidth of 10KHz.	Creating	2	c,d,l
4	The equation of an angle modulated voltage $v(t)=10\sin(108t+3\sin104t)$ , what form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation and power dissipated in a 100ohm resistor.	Remembering	2	c,d,l
5	A single tone modulating signal $\cos(10\pi103t)$ frequency modulates a carrier of 10MHz and produces a frequency deviation of 75kHz. Find i. the modulation index and ii. phase deviation produced in the FM wave. iii. if another modulating signal produces a modulation index of 100 while maintaining the same deviation, find the frequency and amplitude of the modulating signal,, assuming $K_f = 10\text{kHz/V}$	understanding	2	c,d,l
6	An FM wave with modulation index $\beta = 1$ is transmitted through an ideal band pass filter with mid band frequency $f_c$ and bandwidth is $5f_m$ , where $f_c$ is the carrier frequency and $f_m$ is the frequency of the sinusoidal modulating wave. Determine the amplitude spectrum of the filter output.	Evaluate	2	c,d,l
7	FM Give the procedure to determine the effective bandwidth of an signal.	Evaluate	2	c,d,l
8	Compute the bandwidth requirement for the transmission of FM signal having a frequency Deviation 75KHz and an audio bandwidth of 10KHz.	understanding	2	c,d,l
9	An FM radio link has a frequency deviation of 30 kHz. The modulating frequency is 3 kHz. Calculate the bandwidth needed for the link. What will be the bandwidth if the deviation is Reduced to 15kHz?	Evaluate	2	c,d,l
10	Determine the Bandwidth occupied by a sinusoidal frequency modulated carrier for which the modulation index is 2.4 and modulating signal frequency is 3KHz.	understanding	2	c,d,l
11	Describe the generation of FM carrier by transistor reactance modulator with necessary diagrams.	Apply	2	c,d,l
12	Describe the operation of varactor diode VCO FM modulators.	Understand	2	c,d,l

13	Explain about the threshold effect in angle modulated system	Knowledge	2	c,d,l
14	For a de-emphasis network used with an FM receiver, the time constant of the RC circuit is 75s. Compute (i) The break frequency. (ii) The frequency at which the gain of the de-emphasis circuit is reduced to half its maximum gain.	Knowledge	2	c,d,l
15	Describe the generation of FM carrier by FET reactance modulator with necessary diagrams.	Evaluation	2	c,d,l
16	Describe the balanced slope detection of FM demodulator.	Apply	2	c,d,l
17	Explain the noise performance of FM systems.	Apply	2	c,d,l
18	The threshold level for AM is equivalent to the input SNR(S/N) <sub>i</sub> =10. Assume this is also valid for FM. Determine the output SNR at the threshold level for FM.	Apply	2	c,d,l
19	Write about the Armstrong FM transmission.	Apply	2	c,d,l
20	Explain the detection of FM wave using zero crossing detectors.	Apply	2	c,d,l
<b>Unit IV</b>				
1	Explain the noise performance of FM systems.	Analysing	4	a,b,l
2	The threshold level for AM is equivalent to the input SNR(S/N) <sub>i</sub> =10. Assume this is also valid for FM. Determine the output SNR at the threshold level for FM.	Understand	4	a,b,l
3	Calculate the signal to noise ratio for amplitude modulation.	Knowledge	4	a,b,l
4	Derive the expression for figure of merit of AM system for small noise case.	Knowledge	4	a,b,l
5	Explain the noise performance of FM systems.	Evaluation	4	a, b,l
6	Calculate the average transmitted power and channel bandwidth requirements of DSB, SSB and AM schemes for transmitting an audio signal with a bandwidth of 10KHz. With a destination SNR 50DB. Assume that the channel introduces a 50dB power loss & that the noise power spectral density at the receiver input is 10 <sup>-12</sup> Watt/Hz. Assume m <sup>2</sup> <sub>sx</sub> =0.5 for AM.	Understand	4	a,b,l
7	Explain about the threshold effect in angle modulated system.	Understand	4	a,b,l
8	For a de-emphasis network used with an FM receiver, the time constant of the RC circuit is 75s. Compute (i) The break frequency. (ii) The frequency at which the gain of the de-emphasis circuit is reduced to half its maximum gain.	Understand	4	a, b,l
9	The threshold level for AM is equivalent to the input SNR(S/N) <sub>i</sub> =10. Assume this is also valid for FM. Determine the modulation index β that produces (S/N) <sub>o</sub> =30dB at the threshold.	Understand	4	a,b, l
10	Derive the expression for figure of merit of AM system for small noise case.	Understand	4	a,b,l
11	Calculate the average transmitted power and channel bandwidth requirements of DSB, SSB and AM schemes for transmitting an audio signal with a bandwidth of 10KHz. With a destination SNR 50DB. Assume that the channel introduces a 50dB power loss & that the noise power spectral density at the receiver input is 10 <sup>-12</sup> Watt/Hz. Assume m <sup>2</sup> <sub>sx</sub> =0.5 for AM.	Apply	4	a,b, l
12	Derive the expression for figure of merit of DSB-SC system for small noise case.	Apply	4	a, b,l
13	Derive the expression for figure of merit of SSB system for small noise case.	Apply	4	a,b,l
14	Derive the expression for figure of merit of DSB-FC system for small noise case.	Apply	4	

				a,b,l
15	For a de-emphasis network used with an FM receiver, the time constant of the RC circuit is 75 $\mu$ s. Compute (i) The break frequency. (ii) The frequency at which the gain of the de-emphasis circuit is reduced to half its maximum gain.	Apply	4	a,b,l
16	Explain about the capture effect in angle modulated system.	Apply	4	a,b,l
17	Explain how the threshold effect can be reduced in angle modulated system using FM.	Apply	4	a,b,l
18	Define noise and also write a brief note on noise.	Apply	4	a, b,l
19	Explain about effective noise temperature and average noise bandwidth.	Apply	4	a,b,l
20	Explain noise in cascading amplifiers.	Apply	4	a,b,l
<b>Unit V</b>				
1	What is a receiver and also explain the characteristics of a receiver.	Applying	5	a,b,l
2	Explain briefly about Tuned Radio Frequency Receiver. And also mention its drawback.	Applying	5	a,b,l
3	Explain briefly about Super heterodyne Receiver. And also mention its advantages over TRF receiver.	Applying	5	a,b,l
4	Draw the circuit of amplitude limiter and with the aid of the transfer characteristic explain the operation of this circuit.	Applying	5	a,b,l
5	Compare FM Receiver with AM Receiver.	Applying	5	a,b,l
6	Explain the working of Tuned radio frequency (TRF) receiver with its block diagram.	Applying	5	a,b,l
7	What is threshold effect? And explain.	Applying	5	a,b,l
8	Prove that the figure of merit of DSB-SC receiver is unity.	Applying	5	a,b,l
9	Distinguishing between delayed AGC and simple AGC.	Applying	5	a,b,l
10	What is tracking error? Explain two point and three point tracking methods.	Applying	5	a,b,l
11	Describe the general process of frequency changing in a super heterodyne receiver.	Remember	5	a,b,l
12	Define pulse amplitude modulation, Draw the waveform, explain the Generation and Demodulation of PAM.	Knowledge	5	a,b,l
13	How to obtain PPM from PWM. Explain the various components in the block diagram.	Understand	5	a,b,l
14	Draw the circuit for PWM modulation and explain its operation in detail?	Analysing	5	a,b,l
15	What are various pulse modulation techniques?	Remember	5	a,b,l
16	Draw the circuit for PPM modulation and explain its operation in detail?	Knowledge	5	a,b,l

17	Draw the circuit for PPM demodulation and explain its operation in detail?	Understand	5	a,b,l
18	Draw the circuit for PWM demodulation and explain its operation in detail?	Applying	5	a,b,l
19	Describe the general process of frequency changing in a super hetero dyne receiver.	evaluating	5	a,b,l
20	Compare PAM, PWM and PPM with reference to their waveforms, advantages and disadvantages?	Knowledge	5	a,b,l