

Lecture Plan 1Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:-EC-413-FSubject:-Analog Communication SystemUnit:-1

S. No.	Topic :-Analog Communication System	Time Allotted:-
1.	<p>Introduction Communication is the process of establishing connection b/w two points for information exchange.</p>	<u>5-10 min</u>
2	<p>Division of the Topic -Elements of communication system -Classification of communication -Types of transmission -OSI Reference Model -LAN,MAN, WAN and topologies</p>	<u>25-30 min</u>
3.	<p>Conclusion A detail study on the communication system, transmission mode, reference models used in computer networks, types of networks, topologies used and various devices used in computer networks have been studied.</p>	<u>5 min</u>
4	<p>Question / Answer Q.Name the process of transmitting two or more information signals simultaneously over the same channel? A. Multiplexing Q.What are the fundamental limitations of the Analog Communication System? A. Noise limitation , bandwidth limitation , equipment limitation</p>	<u>5 min</u>

Assignment to be given:- Write a short note on the communication system.Reference Readings:- Sanjay Sharma , Singh & Sapre

Lecture Plan 2Faculty:-Ms. Chandra MukherjeeSemester:-IV

Class: - ECS

Course Code:- EC-413-FSubject:- Analog Communication SystemUnit:-1

S. No.	Topic :-Modes & medias of communication	Time Allotted:-
1.	Introduction Communication is the process of establishing connection b/w two points for information exchange. There are many modes of communication and various media for establishing the communication between the two points	<u>5-10 min</u>
2	Division of the Topic - Modes of communication - Practical examples of different modes of communication - Media of communication - Practical examples of different media of communication	<u>25-30 min</u>
3.	Conclusion Depending on the mode of communication and medium of communication, we have to choose the type of modulation, frequency of transmission and type of communication eqpt for given system.	<u>5 min</u>
4	Question / Answer Q. What are the different mediums used for transmission? A. Wired and Wireless. Q.What are the different transmission channels in wired system? A. Twisted Pair Coaxial Cables, optical fibres etc.	<u>5 min</u>

Assignment to be given:-Assignment to be given:- Find out how the telephone network works.Reference Readings:- Sanjay Sharma , Singh & Sapre

Lecture Plan 3Faculty:- Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject:-Analog Communication SystemUnit:-1

S. No.	Topic :-Types of signals	Time Allotted:-
1.	Introduction Signal is defined as a function of one or more independent variables which contains some information & may be function of time, temperature, position, pressure, distance & is generally given in time domain.	<u>5-10 min</u>
2	Division of the Topic -Continuous time/discrete time signals -real/complex signals -deterministic/random signals -periodic/nonperiodic signals -even/odd signals -energy/power signals Analog/digital signals	<u>25-30 min</u>
3.	Conclusion Therefore for transmission purpose we need an electrical signal because all the signal processing are electrical.	<u>5 min</u>
4	Question / Answer Q .Explain real & complex signals? A. a signal is a real signal if its value is a real no & a signal is complex if its value is a complex no. Q. Define fundamental period? A. the smallest value of period T which satisfies any equation is called fundamental time period T_0 .	<u>5 min</u>

Assignment to be given:-Explain different types of signals.Reference Readings:- Sanjay Sharma , Singh & Sapre

Lecture Plan 4Faculty:- Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject:- Analog Communication SystemUnit:-1

S. No.	Topic :- Overview of Modulation	Time Allotted:-
1.	Introduction Modulation is a technique of transferring message signal from low frequency band to higher frequency band for the long distance communication..	<u>5-10 min</u>
2	Division of the Topic -Electromagnetic Spectrum and its use -Radio wave propagation mode -Modulation – analog and digital modulation -Amplitude, frequency and phase Modulation -Time domain representation -Frequency domain representation.	<u>25-30 min</u>
3.	Conclusion To get the frequency domain information Fourier series & Fourier transform are used.& singularity functions play vital role in the study of Analog Communication System.	<u>5 min</u>
4	Question / Answer Q.What is the frequency band of audio signals? A. 300 – 3400 Hz Q.what is the frequency band of modulating signal? A. 20 – 20,000 Hz	<u>5 min</u>

Assignment to be given:-NilReference Readings:- Sanjay Sharma , Singh & Sapre

Lecture Plan 5Faculty:- Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:-EC-413-FSubject:- Analog Communication SystemUnit:-II

S. No.	Topic :-Advantages of Modulation	Time Allotted:-
1.	<p>Introduction Modulation is achieved by varying one of the properties of the carrier in accordance with the property of the message signal. There are various reasons of modulating a carrier signal with modulating or message signal.</p>	<u>5-10 min</u>
2	<p>Division of the Topic -Reduction in the height of Antenna size. -Narrow banding. -High Power in signal -Multiplexing -Less Noise and Interference</p>	<u>25-30 min</u>
3.	<p>Conclusion There are many reasons of using modulation at the transmitter end which are studied in details.</p>	<u>5 min</u>
4	<p>Question / Answer Q. How the size of antenna reduces on using the modulation? A. Size of antenna is directly proportional to wavelength of transmitted signal. Higher the wavelength, the smaller is the size of antenna. By using the modulation, The frequency of the message signals is increased multiple folds.</p>	<u>5 min</u>

Assignment to be given:-What are the various advantages of using modulation in communication system?

Reference Readings:- Sanjay Sharma , Singh & Sapre

Lecture Plan 6Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject:- Analog Communication SystemUnit:-II

S. No.	Topic :-Amplitude modulation	Time Allotted:-
1.	<p>Introduction Modulation is achieved by varying one of the properties of the carrier in accordance with the property of the message signal. In AM the amplitude of the carrier is varied according to the amplitude of the message signal.</p>	<u>5-10 min</u>
2	<p>Division of the Topic -Amplitude Modulation -Time domain representation -Frequency domain representation -Modulation index and its effect -DSB-SC, DSB-FC, SSB-SC -Percentage Modulation</p>	<u>25-30 min</u>
3.	<p>Conclusion In Amplitude modulation, different signals are shown in time and frequency domain. Effect of modulation index on the modulated signal is studied.</p>	<u>5 min</u>
4	<p>Question / Answer Q. Define modulation index for AM? A. Measure of extent of amplitude variation of modulated signal about maximum amplitude of unmodulated carrier signal. Q. What is the difference between DSB-FC, DSB-SC, SSB-SC. A. Transmission of both sidebands with full carrier, transmission of both the sidebands only and transmission of only sidebands.</p>	<u>5 min</u>

Assignment to be given: - A voltage $v = 200(1 + 0.4\sin \omega t)$ is applied to a resistor of 100 ohms. Find the power dissipated by each of the frequency component present in the voltage v .

Ques2. – Define Amplitude modulation

Reference Readings: - Kennedy, Sanjay Sharma

Lecture Plan 7Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject: - Analog Communication SystemUnit:-II

S. No.	Topic :-Power and Current in Amplitude modulation	Time Allotted:-
1.	Introduction Power and bandwidth are the critical resources in communication system. The power and current of the AM wave is calculated.	<u>5-10 min</u>
2	Division of the Topic -AM Power in modulated signal -AM power in carrier and sidebands - AM Currents -Percentage Modulation calculation	<u>25-30 min</u>
3.	Conclusion In Amplitude modulation, Power in modulated signal with and without carrier signal is calculated.	<u>5 min</u>
4	Question / Answer Q. what is the formula for power calculation in modulated signal. A. $P_t = P_c(1 + m^2/2)$	<u>5 min</u>

Assignment to be given: - The antenna current of AM transmitter is 8A if only the carrier is sent , but it increases to 8.93A if the carrier is modulated by a single sinusoidal wave. Determine the percentage modulation. Also find the antenna current if the percent of modulation changes to 0.8.

Reference Readings: - Kennedy, Sanjay Sharma

Lecture Plan 8Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject:- Analog Communication SystemUnit:-II

S. No.	Topic :-Frequency Modulation	Time Allotted:-
1.	Introduction Frequency Modulation is achieved by varying frequency of the carrier signal in accordance with the instantaneous amplitude of the message signal.	<u>5-10 min</u>
2	Division of the Topic -Frequency Modulation -Frequency Deviation -Frequency Modulation Index -Narrowband and Wideband FM -Pre-emphasis and de-emphasis	<u>25-30 min</u>
3.	Conclusion In Amplitude modulation, Power in modulated signal with and without carrier signal is calculated.	<u>5 min</u>
4	Question / Answer Q. what is the pre-emphasis and de-emphasis?	<u>5 min</u>

Assignment to be given:- What do you understand by frequency deviation and modulation index?Reference Readings:- Kennedy , Sanjay Sharma

Lecture Plan 9

Faculty:- Ms. Chandra Mukherjee
Course Code:- EC-413-F
Subject:- Analog Communication System

Semester: IV Class:- ECS
Unit:-IV

S. No.	Topic :-Spectrum of Frequency Modulation	Time Allotted:-
1.	Introduction The spectrum of frequency modulation is analysed using Bessel function. The power and bandwidth of the FM wave is calculated.	<u>5-10 min</u>
2	Division of the Topic -Bessel Function -Spectrum of FM wave -Sidebands in FM wave -FM Power in modulated signal -pulse Modulation -Comparasion of AM, FM, PM	<u>25-30 min</u>
3.	Conclusion In Frequency modulation, there are infinite number of side-bands, but the side-bands with significant amplitude are limited, depending upon modulation index.	<u>5 min</u>
4	Question / Answer Q. What is the bandwidth required in FM? A. The required BW of an FM signal is: $BW = 2 \times n \times f_m$, where n is the number of pairs of side-frequencies.	<u>5 min</u>

Assignment to be given: - What is the advantage of angle modulated wave over amplitude modulated wave?

Reference Readings: - Kennedy, Sanjay Sharma

Lecture Plan 10Faculty:-Ms. Chandra MukherjeeSemester:- IVClass:ECSCourse Code:- EC-413-FSubject: - Analog Communication SystemUnit:-IV

S. No.	Topic :-Generation of amplitude modulation	Time Allotted:-
1.	<p>Introduction The device which is used to generate the AM modulated wave is called the Modulator. various modulators are being employed for this generation</p>	<u>5-10 min</u>
2	<p>Division of the Topic -introduction of modulators -Low level amplitude modulation -High level amplitude modulation -Non linear circuits -Square law diode modulation -Collector modulation method</p>	<u>25-30 min</u>
3.	<p>Conclusion Different types of AM modulators are studied. We can conclude that when two voltages of different frequencies are passed through a non linear resistance or a transistor, amplitude modulation takes place.</p>	<u>5 min</u>
4	<p>Question / Answer Q.What is the different between the low level & high level AM modulation methods ? A.In low level modulation, the modulation of carrier is carried out at low power and then further power amplified before transmission.. In high level modulation , the modulation is done at high power and then transmitted through an antenna. Q.Give the mathematical analysis in the collector method used for generation? A.$v_0 = V_{cc}(1 + m \cos W_m t) \cos W_c t$ Q.Which method is suited for low voltage level? A. square law diode.</p>	<u>5 min</u>

Assignment to be given:- What are the different types of AM modulators?Reference Readings:- Kennedy , Sanjay Sharma

Lecture Plan 11Faculty:- Ms. Chandra MukherjeeSemester:-IV

Class:- ECS

Course B.ECode:- EC-413-FSubject:- Analog Communication SystemUnit:-IV

S. No.	Topic :-Demodulation of AM waves	Time Allotted:-
1.	Introduction The process of extracting a base band signal from the modulated signal is called detection. Various detectors are being used.	<u>5-10 min</u>
2	Division of the Topic -Square law detector -envelope detector -choice of time constant RC in a linear diode detector -Distortion in linear diode detector	<u>25-30 min</u>
3.	Conclusion By the proper use of the detectors the base band signals can be recovered easily at the receiver end.	<u>5 min</u>
4	Question / Answer Q. What is the distortion in the linear diode detector? A. It is due to improper selection of time constant RC & due to curvatures of the diode characteristics.	<u>5 min</u>

Assignment to be given:- Explain different types of demodulators.Reference Readings:- Kennedy , Sanjay Sharma

Lecture Plan 12

Faculty:- Ms. Chandra Mukherjee
Course Code:- EC-413-F

Semester:-IV

Class:- ECS

Subject:- Analog Communication System

Unit:-IV

S. No.	Topic :-Double Side Band Suppressed Carrier	Time Allotted:-
1.	Introduction The modulated signal which contain no carrier but two sidebands is called DSB-SC.thus saving of two third power may be achieved.	<u>5-10 min</u>
2	Division of the Topic -Transmission BW -Generation Balanced modulator Ring modulator	<u>25-30 min</u>
3.	Conclusion Two non-linear devices are connected in balanced modes so as to suppress the carrier of each other then only sidebands are left. Similar is the condition used in ring modulator but with 4 diodes.	<u>5 min</u>
4	Question / Answer Q.What is the BW of DSB-SC? A. $2W_m$ Q.What happens to the bandwidth of DSB-SC ? A. It remains same as that of AM.	<u>5 min</u>

Assignment to be given:- Explain Balanced and Ring modulator for DSB-SC.

Reference Readings:- Kennedy , Sanjay Sharma

Lecture Plan13Faculty:-Ms. Chandra MukherjeeSemester:-IV

Class:- ECS

Course Code:- EC-413-FSubject:- Analog Communication SystemUnit:-IV

S. No.	Topic :-Demodulation of DSB-SC	Time Allotted:-
1.	Introduction At the receiver end the original modulating signal is recovered from the modulated signal this retranslation is called demodulation.	<u>5-10 min</u>
2	Division of the Topic -synchronous detection method -using envelope detector after carrier re insertion. -effect of phase & frequency errors in synchronous detection.	<u>25-30 min</u>
3.	Conclusion By the use of coherent detection, phase & frequency errors occurred & this is due to the Discrepancy of carrier generated at the receiver end.	<u>5 min</u>
4	Question / Answer Q.What is quadrature null effect? A.When angle is 90 degrees & detected output is zero. Q.What are the components used in synchronous detection method? A. Multiplier , low pass filter	<u>5 min</u>

Assignment to be given:- How can you remove the errors occurred at the receiver end?Reference Readings:- Kennedy , Sanjay Sharma

Lecture Plan 14

Faculty:- Ms. Chandra Mukherjee
Course Code:- EC-413-F

Semester:-IV

Class:- ECS

Subject:- Analog Communication System

Unit:-III

S. No.	Topic :-Single side band suppressed carrier	Time Allotted:-
1.	Introduction Modulation of this type which provides single sideband with suppressed carrier & by the use of this it reduces the transmission bandwidth by half.	<u>5-10 min</u>
2	Division of the Topic -Hilbert transform -Generation of SSB -Detection of SSB	<u>25-30 min</u>
3.	Conclusion Thus no. of methods are devised for both the processes and according to the application these are utilized in the Analog Communication System.	<u>5 min</u>
4	Question / Answer Q.Give the limitations of frequency discrimination method? A. not suitable for video communication Design of band pass filter is difficult Q.What are the applications of Hilbert transform? A. for generation of SSB signals , for designing minimum phase type filters , for representation of band pass signals.	<u>5 min</u>

Assignment to be given:- what is a frequency discriminator modulator?

Reference Readings:- Kennedy , Sanjay Sharma

Doc. No.: DCE/0/15

Revision :00

Lecture Plan 15

Faculty:- Ms. Chandra Mukherjee

Semester:-IV

Class:- ECS

Course Code:- EC-413-F

Subject:- Analog Communication System

Unit:-III

S. No.	Topic :-Vestigial sideband modulation systems	Time Allotted:-
1.	Introduction It is actually a compromise b/w DSB-SC & SSB-SC & takes optimum advantages of both the systems.	<u>5-10 min</u>
2	Division of the Topic -Introduction of the process -Frequency characteristics of the system	<u>25-30 min</u>
3.	Conclusion Thus in this technique instead of rejecting one sideband completely a gradual cut off of one side band is allowed this gradual cut is compensated by a portion of the other side band.	<u>5 min</u>
4	Question / Answer Q.What is the BW of VSB? A.BW of message signal + width of the VSB Q.What is CSSB? A. An SSB signal may be generated in which the carrier is suppressed even than it can be detected with an envelope detector & is compatible for rECSpption using AM radio rECServer.	<u>5 min</u>

Assignment to be given:-Nil

Reference Readings:- Kennedy , Sanjay Sharma

Doc. No.: DCE/0/15

Revision :00

Lecture Plan 16

Faculty:- Ms. Chandra Mukherjee

Semester:-IV

Class:- ECS

Course Code:- EC-413-F

Subject:- Analog Communication System

Unit: V

S. No.	Topic :-Angle Modulation, Frequency modulation , Phase modulation	Time Allotted:-
1.	Introduction It is that type of modulation in which the instantaneous frequency is varied linearly with a message or base band signal about an unmodulated carrier frequency.	<u>5-10 min</u>
2	Division of the Topic -Angle Modulation -Phase modulation -Frequency Modulation -Narrowband FM -Wideband FM -Transmission bandwidth of FM signal -Effect of variation of modulation index on the spectrum of FM signal	<u>25-30 min</u>
3.	Conclusion Thus FM receiver makes a good deal more immune to noise than AM reception & is possible to reduce noise further by increasing the frequency deviation.	<u>5 min</u>
4	Question / Answer Q. What is Carson's rule? A. $BW=2(\Delta f + W_m)$ Q. What is the effect of BW on PM & FM? A. Bandwidth of the PM wave varies fastly with the variation in the modulating frequency on the other hand FM bandwidth varies slowly with modulating frequency.	<u>5 min</u>

Assignment to be given:-Nil

Reference Readings:- Sanjay Sharma , Kennedy

Doc. No.: DCE/0/15

Revision :00

Lecture Plan 17

Faculty:-Ms. Chandra Mukherjee

Semester:-IV

Class:- ECS

Course Code:- EC-413-F

Subject:- Analog Communication System

Unit:-V

S. No.	Topic :-Narrow Band and Wide Band FM generation	Time Allotted:-
1.	Introduction FM modulator circuits used for generating FM signals may be put in to different categories.	<u>5-10 min</u>
2	Division of the Topic -Narrowband FM -Wideband FM -Parameter variation method(Direct method) -Armstrong method(Indirect method)	<u>25-30 min</u>
3.	Conclusion For low modulation index, the FM is called the Narrow band and for High modulation index the FM is Wide band as the No of side bands increase with increase in modulation index. In direct method carrier generation cannot be of high stability which is a necessary requirement & this is overcome by indirect method.	<u>5 min</u>
4	Question / Answer Q .What is Narrow band FM? A. If the modulation index is low and between 1 to 6 it is narrow band FM. the main advantage of using Q .What is Wide band FM? A. If the modulation index is more than 6 it is Wide band FM.	<u>5 min</u>

Assignment to be given:-Nil

Reference Readings:- Sanjay Sharma , Kennedy

Lecture Plan18Faculty:- Ms. Chandra Mukherjee
ECSSemester:-IV

Class:-

Course Code:- EC-413-FSubject:- Analog Communication SystemUnit:-VI

S. No.	Topic :-Noise triangle in FM, Pre Emphasis & De-emphasis	Time Allotted:-
1.	<p>Introduction Noise amplitude modulates and phase modulates the carrier while signal is frequency modulating the carrier. This varies the Noise-signal ratio and creates a noise triangle for different frequencies of noise and varies the S-N ratio for different mod index</p>	<u>5-10 min</u>
2	<p>Division of the Topic -Modulation of Carrier by Signal -Modulation of Carrier by Noise -Effect of Noise and Signal due to Change in Modulation index -Noise Triangle -Pre Emphasis -De Emphasis</p>	<u>25-30 min</u>
3.	<p>Conclusion The FM wave has much better noise immunity compared to AM and hence preferred. The S/N ratio for FM is not constant for all frequencies, but varies in a triangular fashion. To improve the signal to noise ratio, some frequencies are pre emphasised before transmission and are deemphasised at receiver end to reduce the noise.</p>	<u>5 min</u>
4	<p>Question / Answer Q.What is the advantage of FM over AM? A.FM reception is more immune to noise , it reduces noise by reducing frequency deviation. Q.How do you improve the reception for bass frequencies in FM ? A By employing pre emphasis and de emphasis circuits.</p>	<u>5 min</u>

Assignment to be given:-NilReference Readings:- Sanjay Sharma , Kennedy

Lecture Plan 19

Faculty:- Ms. Chandra Mukherjee
ECS
Course Code:- EC-413-F

Semester:-IV

Class:-

Subject:- Analog Communication System

Unit:-VI

S. No.	Topic :-FM Generation	Time Allotted:-
1.	Introduction The process of getting FM signal is known as FM generation.	<u>5-10 min</u>
2	Division of the Topic -Varactor metod -Armstrong method	<u>25-30 min</u>
3.	Conclusion The FM is generated by varying the frequency by the tuned circuit parameters.	<u>5 min</u>
4	Question / Answer Q.What are frequency discriminators? A.A device that converts FM signal into corresponding AM signal with the help of frequency dependent circuits. Q.What is FM A. It is Frequenc Modulation in which the frequency of the carrier is varied in accordance with the modulating signal.	<u>5 min</u>

Assignment to be given:-Nil

Reference Readings:- Sanjay Sharma , Kennedy

Lecture Plan 20

Faculty:- Ms. Chandra Mukherjee

Semester:- IV

Class:- ECS

Course Code:- EC-413-F

Subject:- Analog Communication System

Unit:-VII

S. No.	Topic :-FM demodulators	Time Allotted:-
1.	Introduction The process of getting a base band signal from a frequency modulated signal is called detection.	<u>5-10 min</u>
2	Division of the Topic -Slope detector -Balanced slope detector -Foster Seely detector -Ratio detector -Phase Locked Loop	<u>25-30 min</u>
3.	Conclusion Thus according to the application & utility any of the detector system can be utilized in the FM receiver section.	<u>5 min</u>
4	Question / Answer Q.What are frequency discriminators? A.A device that converts FM signal into corresponding AM signal with the help of frequency dependent circuits. Q.What are the drawbacks of slope detector system? A. harmonic distortions are produced , can't eliminate amplitude variations.	<u>5 min</u>

Assignment to be given:-Nil

Reference Readings:- Sanjay Sharma , Kennedy

Lecture Plan 21Faculty:- Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code:- EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Sampling	Time Allotted:-
1.	Introduction Sampling is the process of converting the analog signals into the discrete signals.	<u>5-10 min</u>
2	Division of the Topic -Sampling theorem -Proof of the theorem -Nyquist rate, Aliasing effect	<u>25-30 min</u>
3.	Conclusion A continuous time signal may be completely represented in its samples and recovered back if the sampling frequency is $F_s \geq 2F_m$.	<u>5 min</u>
4	Question / Answer Q.What is Nyquist rate & interval? A. It is known as minimum sampling rate & is given by $F_s = 2F_m$ & Nyquist interval is given by $T_s = 1/2F_m$ Q.What is aliasing & how it is reduced? A. $F_s < 2F_m$; reduced by using Prelias filter	<u>5 min</u>

Assignment to be given:-NilReference Readings:- Singh & Sapre , Sanjay Sharma

Lecture Plan 22

Faculty:-Ms. Chandra Mukherjee
Course Code: - EC-413-F

Semester:-IV

Class:- ECS

Subject:- Analog Communication System

Unit:-VII

<u>S. No.</u>	<u>Topic :- Pulse Amplitude Modulation</u>	<u>Time Allotted:-</u>
<u>1.</u>	<u>Introduction</u> <u>In this the amplitude of the pulses of the carrier pulse train is varied in accordance with the modulating signal.</u>	<u>5- 10 min</u>
<u>2</u>	<u>Division of the Topic</u> <u>-Working principle</u> <u>-Modulation</u> <u>-Demodulation</u>	<u>30 min</u>
<u>3.</u>	<u>Conclusion</u> <u>Although it is used in many applications but still the BW required is very large & noise cannot be removed easily.</u>	<u>5 min</u>
<u>4</u>	<u>Question / Answer</u> <u>Q.What is aperture effect?</u> <u>A. Higher frequencies are attenuated due to roll off characteristics.</u>	<u>5 min</u>

Assignment to be given:- nil

Reference Readings:- Sanjay Sharma , Singh

Lecture Plan 23

Faculty:-Ms. Chandra Mukherjee
Course Code: - EC-413-F

Semester:-IV

Class:- ECS

Subject:- Analog Communication System

Unit:-VII

S. No.	Topic :-Pulse Width Modulation	Time Allotted:-
1.	Introduction In pulse width modulation width of the pulses is varied but amplitude of the pulse is kept constant.	<u>5-10 min</u>
2	Division of the Topic -Generation -Modulation -demodulation	<u>25-30 min</u>
3.	Conclusion This particular scheme is simple to implement & also noise , interference is minimum.	<u>5 min</u>
4	Question / Answer Q.For PWM transmission of voice signal with $F_m = 3\text{kHz}$.Find the BW if $F_s=8\text{kHz}$ & $\tau = .1T_s$? A. $BW \geq 1/2 \tau$ $\tau = .1/8 * (10)^3$	<u>5 min</u>

Assignment to be given:- nil

Reference Readings:- Sanjay Sharma , Singh

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Faculty:-Ms. Chandra Mukherjee
Course Code: - EC-413-F

Semester:-IV

Class:- ECS

Subject:- Analog Communication System

Unit:-VII

S. No.	Topic :-Pulse Width Modulation	Time Allotted:-
1.	Introduction In pulse width modulation width of the pulses is varied but amplitude of the pulse is kept constant.	<u>5-10 min</u>
2	Division of the Topic -Generation -Modulation -demodulation	<u>25-30 min</u>
3.	Conclusion This particular scheme is simple to implement & also noise , interference is minimum.	<u>5 min</u>
4	Question / Answer Q.For PWM transmission of voice signal with $F_m = 3\text{kHz}$.Find the BW if $F_s=8\text{kHz}$ & $\tau = .1T_s$? A. $BW \geq 1/2 \tau$ $\tau = .1/8 * (10)^3$	<u>5 min</u>

Assignment to be given:- nil

Reference Readings:- Sanjay Sharma , Singh

Lecture Plan 25Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Differential Pulse Code Modulation, Delta & Adaptive Delta modulation	Time Allotted:-
1.	Introduction What are the various schemes over PCM?Also these are the techniques in which an analog signal can be encoded into bits.	<u>5-10 min</u>
2	Division of the Topic -DM system -Various limitations in the DM system -ADM -DPCM	<u>25-30 min</u>
3.	Conclusion Hence in this given system slope overloaded & granular noise are the major limitation.& is overcome by the adaptive delta modulation. In DPCM no. of bits per code is reduced.	<u>5 min</u>
4	Question / Answer Q.What is granular noise? A. In which waveform recovered as dc but original signal is not dc. Q.What is DPCM? A. In which difference b/w two successive samples is quantized,encoded,transmitted as in PCM.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh

Lecture Plan 26Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Differential Pulse Code Modulation, Delta & Adaptive Delta modulation	Time Allotted:-
1.	Introduction What are the various schemes over PCM?Also these are the techniques in which an analog signal can be encoded into bits.	<u>5-10 min</u>
2	Division of the Topic -DM system -Various limitations in the DM system -ADM -DPCM	<u>25-30 min</u>
3.	Conclusion Hence in this given system slope overloaded & granular noise are the major limitation.& is overcome by the adaptive delta modulation. In DPCM no. of bits per code is reduced.	<u>5 min</u>
4	Question / Answer Q.What is granular noise? A. In which waveform recovered as dc but original signal is not dc. Q.What is DPCM? A. In which difference b/w two successive samples is quantized,encoded,transmitted as in PCM.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh

Lecture Plan 27Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Differential Pulse Code Modulation, Delta & Adaptive Delta modulation	Time Allotted:-
1.	Introduction What are the various schemes over PCM?Also these are the techniques in which an analog signal can be encoded into bits.	<u>5-10 min</u>
2	Division of the Topic -DM system -Various limitations in the DM system -ADM -DPCM	<u>25-30 min</u>
3.	Conclusion Hence in this given system slope overloaded & granular noise are the major limitation.& is overcome by the adaptive delta modulation. In DPCM no. of bits per code is reduced.	<u>5 min</u>
4	Question / Answer Q.What is granular noise? A. In which waveform recovered as dc but original signal is not dc. Q.What is DPCM? A. In which difference b/w two successive samples is quantized,encoded,transmitted as in PCM.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh

Lecture Plan 28Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-BPSK , QPSK , M-ary technique	Time Allotted:-
1.	Introduction In this binary symbol 1 & 0 modulate the phase of the carrier & also in next phase of carrier is changed to 45 & so on.	<u>5-10 min</u>
2	Division of the Topic BPSK -Generation of BPSK -RECSption of BPSK QPSK -Symbol -generation -RECSption	<u>25-30 min</u>
3.	Conclusion Thus according to the application various digital techniques can be employed.	<u>5 min</u>
4	Question / Answer Q.What is the phase shift utilized by the QPSK? A.45 degrees. Q.What is the disadvantage of using BPSK? A. In the rECSived signal it is difficult to analyze that whether the signal is for +ve or -ve.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh

Lecture Plan 29Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Noise	Time Allotted:-
1.	Introduction What is Noise? What are the various types of noise? Also give the remedies for this factor?	<u>5-10 min</u>
2	Division of the Topic -Internal noise -External noise -Types of Internal Noise	<u>25-30 min</u>
3.	Conclusion Noise limitation is the one of the most important limitation of a Analog Communication System as noise limits the performance of a Analog Communication System.	<u>5 min</u>
4	Question / Answer Q.What is meant by noise? A. Noise is the unwanted incoherent signals introduced by the medium and by the communication equipment in use which interferes with the main intelligence and information of a message reducing the reliability of faithful reproduction of original signal by the receiver and reduces the capability of the receiver.. Q.Give the various internal noises? A. shot noise , partition noise , flicker noise , transit time noise , Thermal noise.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh

Lecture Plan 30Faculty:-Ms. Chandra MukherjeeSemester:-IVClass:- ECSCourse Code: - EC-413-FSubject:- Analog Communication SystemUnit:-VII

S. No.	Topic :-Noise	Time Allotted:-
1.	Introduction External noises are noises produced in the medium external to the communication eqpt	<u>5-10 min</u>
2	Division of the Topic -External noise -Types of External Noise -Signal to Noise Ratio -Noise Figure	<u>25-30 min</u>
3.	Conclusion Signal to Noise ratio and Noise figure are measures of interference in the signal by noise	<u>5 min</u>
4	Question / Answer Q.What are various types of external noise? A. Atmosphericnoise, man made noises Q.What is meant by atmospheric noise? A.This is produced by lightning discharges in thunderstorm which occur in the atmosphere.	<u>5 min</u>

Assignment to be given:- nilReference Readings:- Sanjay Sharma , Singh