QUESTION BANK
ON

Analog & Digital Communication(Th- 03)

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ANALOG & DIGITAL COMMUNICATION

CHAPTER-WISE DISTRIBUTION OF MARKS

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UNIT-1

ELEMENTS OF COMMUNICATION SYSTEMS

POSSIBLE SHORT TYPE QUESTIONS WITH ANSWERS

1. Define communication process.

Ans: Communication means exchanging information.

•The process of transmission and reception of information is called communication process.

2. Define Communication System? Write the elements of Communication System.

Ans: The communication system is a system which describes the information exchange between two points. The major elements of communication are:

1. Transmitter.
2. Channel or medium.
3. Receiver.

3. Define Bandwidth.

Ans: Bandwidth is the difference between the upper and lower frequencies in a continuous band of frequencies. It is typically measured in hertz.

4. Define Bandwidth limitation.

Ans: The information theory states that the greater is the transmission bandwidth of a communication system, the more is the information that can be transmitted.

- However, in AM radio the maximum modulating frequency is restricted up to 5 kHz and hence the maximum bandwidth of AM transmission is 10 kHz.

5. Define Digital to analog conversion (D/A C).

Ans: Digital-to-analog conversion (DAC), Process by which digital signals (which have a binary state) are converted to analog signals (which theoretically have an infinite number of states).

6. Define Analog to digital conversion (A/D C).

Ans: Analog-to-Digital converters (ADC) translate analog signals, like temperature, pressure, voltage, current, distance, or light intensity, into a digital representation of that signal. This digital representation can then be processed, manipulated, computed, transmitted or stored.

- The simplest digital signals have only two states, and are called binary i.e. 0 or 1.

7. Define modulation.

Ans: The process of changing some characteristics (i.e. amplitude, phase, frequency) of carrier wave in accordance with the intensity of the information signal is known as modulation.

8.How many types of communication systems are there and what are they?

Ans: The communication system basically classified in to two types:

1. Line communication system.
2. Wireless or Radio communication system.

9. State the need of modulation.

Ans: In a communication system, the baseband signal of a low-frequency spectrum is translated to a high frequency spectrum. This is achieved through modulation.

- Two signals are involved in the modulation process. The baseband signal and the carrier signal.
- The baseband transmission has many limitations which can be overcome using modulation. In the process of modulation, the baseband signal is transmitted i.e., shifted from low frequency to high frequency.

10. Define Source of information.

Ans: A source of information is one of the basic concepts of communication.

- Sources are objects which encode message data and transmit the information, via a channel, to receivers.

11. Define Communication Channels.

Ans: A communication channel refers either to a physical transmission medium such as a wire, or to a logical connection such as air between the transmitter & receiver.

12. Define Analog and Digital Signal. [W-20]

Ans: An analog signal is any continuous signal for which the time-varying feature (variable) of the signal is a representation of some other time-varying quantity.

A digital signal is a continuous-time physical signal, alternating between a discrete number of waveforms.

LONG QUESTIONS

1. Explain the Block Diagram of Communication System.
2. Explain the classification of communication system.
3. Define modulation & classify it with fig.
4. Define analog & digital Signal. Explain its conversion.
5. Define signal conversion. Explain analog to digital signal (A/DC) conversion.
6. Explain Wireless or Radio communication system with its advantages & disadvantages.
7. Define Modulation. Explain the need of modulation in detail. [W-20]

UNIT- 2.0

AMPLITUDE (LINEAR) MODULATION SYSTEM

Possible Short type Questions with answers

1. Define Balanced modulator.

ANS: **Balanced modulator** consists of two identical AM modulators. These two modulators are arranged in a balanced configuration in order to suppress the carrier signal. Hence, it is called as Balanced modulator.

2. Define Amplitude modulation.

ANS: **Amplitude modulation**

In amplitude modulation, the amplitude (signal strength) of the carrier wave is varied in proportion to that of the message signal

3. Define Modulation Index of AM. [W-20]

ANS: **Modulation Index**

- Modulation index defines the extent upto which amplitude of the carrier will be varied about an unmodulated maximum carrier.

Mathematically, m = A_M / A_C Where Am is the maximum amplitude of Base Band signal & Ac is the maximum amplitude of carrier signal.

4. Define *LSB.*

ANS: ***LSB:*** This stands for Lower Sideband. This form of single sideband modulation is formed when the lower sideband only of the original signal is transmitted. Here specified BPF is used .Typically, this is used by radio amateurs or radio hams on their allocations below 9 MHz.

5. Define *USB.*

ANS: ***USB:*** This stands for Upper Sideband. This form of single sideband modulation is formed when the upper sideband only of the original signal is transmitted. Typically, this form of SSB modulation is used by professional users on all frequencies and by radio amateurs or radio hams on their allocations above 9 MHz.

6. Write down the application of VSB.

Ans. Vestigial Side band is used in TV transmission. Here Both Audio & Video signal are transmitted which requires more bandwidth. So VSB is more economical compare to DSB-SC or DSB-FC.

Possible Long type questions:

1. Explain Amplitude modulation & derive the expression for amplitudemodulation signal with proper block diagram. [W-20]

2. Explain Methods of generation DSB-SC signal (Ring Modulator) withBlock diagram.

3. Explain DSBSC signal with Block diagram.

4. Explain Vestigial Side Band.

5. Derive the expression for power in AM wave.

6. With its block diagram Explain the balance modulator using DSB-SCgeneration. [W-20].

UNIT 3.0

ANGLE MODULATION SYSTEMS

.Possible short type questions with Answer

1. **Define Frequency Modulation. (2005-S, 2014-S)**

   ANS: **Frequency Modulation** is the process of varying the frequency of the carrier signal linearly with the message signal.

2. **Define Angle Modulation**

   ANS **Angle Modulation** is the process in which the frequency or the phase of the carrier varies according to the message signal.

- This is further divided into
  - i) Frequency modulation and
  - ii) Phase modulation.

3. **Define Frequency deviation. (2012-S,2010 -S, 2005-S)**

Ans-Frequency deviation is defined as the ratio of maximum allowable frequency deviation to the maximum modulating frequency for FM broadcasting.

4. **Define Modulation Index for frequency modulation (2018-S,2019-S)**

Ans-It is defined as the measure of extend of frequency variation about an unmodulated maximum carrier .

β*=frequency deviation/modulation frequency= $\Delta f/f_m$ =*(kVm/Wm)

5. **Define Armstrong Method for the Generation of FM.**

ANS: In the direct methods of generation of FM, LC oscillators are to be used. The crystal oscillator cannot be used. The LC oscillators are not stable enough for the communication or broadcast purpose. Thus, the direct methods cannot be used for the broadcast applications.

Possible Long Type Questions

1. Derive the expression for frequency modulated signal .(2005-S,2021-S & 2018 -S)
2. Explain Phase discrimination method (Foster Seeley FM Demodulator) with Block diagram. {2007-S,2008-S,2010-S,2012-S,2014-S, 2019-S}
3. Explain Basic principle of Frequency Modulation with Block diagram.
4. What are the advantages of FM over AM [2007-S,2010-S]
5. Explain Difference between Frequency Modulation and AM. [2005-S,2006_s,2008-S,2014-S,2018-S,2019-S 2020-S]
6. Explain in detail the generation of FM using Armstrong method with a neat block diagram. [2005-S,2012-S,2013-S , 2019-S,2020-W]

Unit-4
AM & FM TRANSMITTER & RECEIVER

Possible Short Type Questions with Answers

1. Define Tuned radio frequency, TRF.

Ans: This type of radio receiver was one of the first that was used. The very first radio receivers of this type simply consisted of a tuned circuit and a detector. Crystal sets were early forms of TRF radios.

2. Define Super heterodyne receiver.

Ans: The super heterodyne form of radio receiver was developed to provide additional levels of selectivity.

3. Define Selectivity.

Ans: Selectivity is one of the key attributes of any radio. It needs to accept signals on the wanted frequency and reject others on different frequencies.

•Selectivity is usually measured as a ratio in decibels (dB).

4. Define Sensitivity.

Ans: - The ability of a receiver to identify and amplify signals at the receiver's input is called Receiver Sensitivity.

- It is expressed in dBm.

5. Define Fidelity.

Ans: - Fidelity of a receiver is its ability to reproduce the exact replica of the transmitted signals at the receiver output.

6. Define AM Transmitter.

Ans: - AM transmitter takes the audio signal as an input and delivers amplitude modulated wave to the antenna as an output to be transmitted.

7. Define FM Transmitter.

Ans: - The FM transmitter is a low power transmitter and it uses FM waves for transmitting the sound, this transmitter transmits the audio signals through the carrier wave by the difference of frequency.

8. Define FM Receiver.

Ans: - A radio or FM receiver is an electronic device that receives radio waves and converts the information carried by them to a usable form.

9. Define AGC (Automatic Gain Control).

Ans: - Adjust the IF amplifier gain according to signal level (to the average amplitude signal almost constant).

•AGC is a system by means of which the overall gain of radio receiver is varied automatically with the variations in the strength of received signals, to maintain the output constant.

10. Define Tuning.

Ans: - A tuner is a subsystem that receives radio frequency (RF) transmissions and converts. The verb tuning in radio contexts means adjusting the receiver to detect the desired radio signal carrier frequency that a particular radio station uses. Changing the value of inductor(coil) by sliding or rotating the knob, the frequency can be changed & matched suitably to desired frequency. Similarly, if ganged capacitor is used then also frequency can be changed as desired. Because both capacitor & inductor can change the frequency.

Possible Long Type Questions

1) Define AM Transmitter & Explain with block diagram.

2)Explain Super heterodyne receiver with block diagram. [W-20]

3) Define FM Transmitter & explain with block diagram.

4) Define FM Receiver & explain with block diagram.

5) Explain Classification of Radio receiver.

CHAPTER 5.0

ANALOG TO DIGITAL CONVERSION & PULSE MODULATION SYSTEM

Possible Short Type Questions with Answers

1. **Define Quantizer?**
   ANS: Quantizing is a process of reducing the excessive bits and confining the data. The sampled output when given to Quantizer, reduces the redundant bits and compresses the value.
2. **Define Delta Modulator?**
   ANS: The **Delta Modulator** comprises of a 1-bit quantizer and a delay circuit along with two summer circuits. Following is the block diagram of a delta modulator.

3. **Define Pulse Amplitude Modulation (PAM)?**

   ANS: **Pulse Amplitude Modulation (PAM)** is an analog modulating scheme in which the amplitude of the pulse carrier varies proportional to the instantaneous amplitude of the message signal.

4. **Define Sampling?**

   ANS: **Sampling** is the process of converting analog signal into a discrete signal or making an analog or continuous signal to occur at a particular interval of time, this phenomena is known as sampling.
5. **Define Sampling Theorem?**

   ANS: **Sampling Theorem: -**

   - The Sampling Theorem states that **a signal can be exactly reproduced if it is sampled at a frequency F**, where F is greater than twice the maximum frequency in the signal.

Possible Long Type Questions

1. **Explain Demodulation of DPCM with Block diagram.**
2. **Explain Delta Modulator with Block diagram.**
3. **Explain TDM system with Block diagram. (W-20)**
4. **Explain Basic Elements of PCM with Block diagram. (W-18)**
5. **Explain Pulse Width Modulation (PWM) with Block diagram.**
6. **Explain Comparison between PAM, PWM, and PPM.**
7. **Describe the operation of PAM with neat wave form. (W-20)**

Unit-6

DIGITAL MODULATION TECHNIQUES

Short Type Questions with Answers

1. Define frequency division Multiplexing. (W 2020)

Ans-It is a technique by which total BW available in communication system is divided into series of non-overlapping frequency bands.

2. Define Spread Spectrum.

Ans: In telecommunication and radio communication, spread-spectrum techniques are methods by which a signal (e.g., an electrical, electromagnetic signal) generated with a particular bandwidth is deliberately spread in the frequency domain, resulting in a signal with a wider bandwidth.

3. Define GMSK.

- **Ans:** Gaussian Minimum Shift Keying (GMSK) is a form of modulation based on frequency shift keying that has no phase discontinuities and provides efficient use of spectrum as well as enabling high efficiency radio power amplifiers.

4.Define Spread Spectrum Modulation.

Ans: Spread Spectrum Modulation:

- A collective class of signalling techniques are employed before transmitting a signal to provide a secure communication, known as the Spread Spectrum Modulation.

5. Define Time Division Multiplexing.

- **Ans:** Time Division Multiplexing is a technique in which multiple signals are combined and transmitted one after another on the same communication channel.

6. What is Modem & give its application. (W-2020)

Ans- Modem stands for modulator that converts analog signal at the sender's end & it converts digital signal back to analog signals at the receiving end. It is used in data transmission, remote management, broadband back up, point of sale etc.. It is used to send a voice massage to a telephone/mobile when an alarm is set off, Cell phone tower maintenance on circuits etc.

Possible Long Type Questions

1 **Describe the modulation & demodulation process of ASK in detail. (W-2020)**

2. Explain the Working of T1-Carrier system with Block Diagram.

3. Explain the Working operation of Spread Spectrum Modulation Techniques (DS-SS & FH-SS).

4. Define Digital modulation techniques & classify it with figures.

REFERENCE :

Table:

Sl.No.	Name of the Book/Source	Name of the Author	Name of the Publication
01	Communication systems(Analog &Digital)	By Sanjay Sharma	KATSON
02	Communication system	By V. Chandrasekhar	OX FORD
03	Advanced Communication	By Thomasi	PHI