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QUESTION BANK

SUBJECT CODE: CS6304

SUBJECT NAME: ANALOG AND DIGITAL COMMUNICATION

Part-A

UNIT-I

ANALOG COMMUNICATION

1. Define modulation?

Modulation is a process by which some characteristics of high frequency carrier signal is varied in accordance with the instantaneous value of the modulating signal

2. Define depth of modulation.

It is defined as the ratio between message amplitude to that of carrier amplitude.

3. What is the need of modulation?

- Ease of transmission
- multiplexing
- reduce noise
- narrow bandwidth
- reduce the equipments limitations

4. What is the degree of modulation?

- Under modulation, $m < 1$
- Critical Modulation, $m = 1$
- Over modulation, $m > 1$

5. What are the two types of modulator?

- linear modulator
- Non-Linear modulator

6. What are the advantages of VSB-AM?

- It has bandwidth greater than SSB but less than DSB system.
- Power transmission greater than DSB but less than SSB system
- No low frequency component loss. Hence it avoids phase distortion

7. How will you generate DSBSC-AM?

There are two ways of generating DSBSC-AM such as,

- Balanced modulator
- Ring Modulator

8. Define frequency modulation.

Frequency Modulation is a process by which frequency of carrier signal is varied in accordance with the instantaneous value of the modulating signal.

9. Define modulation index of frequency modulation.

It is defined as the ratio of maximum frequency deviation to the modulating frequency.

10. State the Carson's rule.

An approximate rule for the transmission bandwidth of an FM signal generated by a single tone modulating signal of frequency.

11. What are the types of FM detector?

-Slope detector

-Phase discriminator

UNIT-II

DIGITAL COMMUNICATION

1. What are the advantages of digital communication/

-transmission quality high

-Effect of noise, distortion and interference is less in a communication system.

-Digital circuits are more reliable and cheaper compared to analog circuits

2. What are the disadvantages of digital communication?

-Large System Bandwidth

-System Synchronization

3. What are the performance measure of communication systems?

-Spectral Efficiency

-Bit Error Rate

-Bandwidth Utilization

4. Define Sampling.

The process of conversion of analog signal into digital signal is called sampling. There are two types of sampling 1. Impulse sampling 2. Natural Sampling

5. What is meant by Aliasing effect?

Aliasing effect takes place when the sampling frequency is less than Nyquist rate. During this condition the spectrum of sampled signal overlaps itself. So high frequency takes the form of low frequency. This interference is called as aliasing effect.

6. What is meant by quantization?

The process of transforming continuous sampled amplitude values $m(nT_s)$ of a message signal $m(t)$ at time $t=nT_s$ into discrete amplitude value $m_q(nT_s)$ from finite set of possible amplitude is referred to as quantization.

7. What are the types of quantization?

- Scalar quantization
- vector quantization

8. Mention the pulse modulation techniques?

- Pulse Amplitude Modulation
- Pulse Width Modulation
- Pulse Position Modulation

9. What are the types of Adaptive Delta modulation?

- Discrete type
- Continuous type

10. What is meant by sub band coding?

Sub band coding is a method of controlling and distributing quantization noise across the signal spectrum.

UNIT-II

DATA AND PULSE COMMUNICATION

1. What is PAM?

PAM is the pulse modulation. In PAM the amplitude of a carrier consisting of a periodic train of rectangular pulse is varied in proportion to sample values of a message signal.

2. What is PCM?

PCM is a process used to convert analog signal to digital data. In PCM, the analog signal is first sampled then quantized then each sample is replaced with n bits binary data.

3. What do you mean by nonlinear encoding in PCM system?

Nonlinear encoding is a technique used to increase the performance of PCM system. In nonlinear encoding the quantization levels are not equally spaced. That is greater number of quantization levels for signals of low amplitude and smaller number of quantization levels for signals of high amplitude.

4. What is called processing gain?

Processing gain is defined as the ratio of the bandwidth of spread message signal to the bandwidth of unspread data signal.

5. What is meant by PCM?

PCM is a method of signal coding in which the message signal is sampled, the amplitude of each sample is rounded off to the nearest one of a finite set of discrete levels and encoded so that both time and amplitude are represented in discrete form.

6. Define quantization error.

It is the difference between the output and input values of quantizer.

7. Define quantization process.

The conversion of analog sample of the signal into digital form is called quantization process.

8. Define PPM.

The position of a constant width pulse within a time slot is varied according to the amplitude of the sample of the analog signal.

9. Define PWM.

The width of a constant amplitude pulse is varied proportional to the amplitude of the analog signal at the time the signal is sampled.

10. State the advantage of angle modulation over amplitude modulation?

-Noise immunity

-Noise performance

-Signal to noise improvement

UNIT-IV

SOURCE AND ERROR CONTROL CODING

1. What is meant by encoder and decoder?

The encoder adds redundant bits to the sender's bit stream to create a codeword. The decoder uses the redundant bits to detect and/or correct as many bit errors as the particular error-control code will allow.

2. What is meant by error control code?

A set of code-words used with an encoder and decoder to detect error, correct error, or both detect and correct error.

3. Define code word.

The encoder blocks of 'n' bits is called as code word.

Code word = Message bits + Redundant bits

4. What is meant by code efficiency?

It is the ratio message bits in a block to the transmitted bits for the block by the encoder.

5. What are the types of error control coding?

- Forward Error Correction
- Automatic Repeat Request

6. What are the advantages and disadvantages of coding?

Advantage:

- Used to minimize the channel noise effect

Disadvantage:

- Decoder circuits is complex
- Addition of redundancy increases the transmission bandwidth

7. What are the types of parity check codes?

- Even parity
- odd parity

8. What are the advantage and disadvantages of linear block codes?

Advantage:

- Easy to encode and decode

Disadvantage:

- Can detect only two error
- can correct only one error

9. What is meant by convolutional code?

Convolutional codes are widely used as channel codes in practical communication systems for error correction. The encoded bits depends on the current k input bits and a few past input bits.

10. What are the representation of convolutional encoder?

- Code tree diagram representation
- State diagram representation
- Trellis diagram representation

11. What is meant by line coding?

The conversion or coding of these symbols into temporal waveforms to be transmitted in baseband is called line coding.

12. What are the types of line coding?

- Non-Return to Zero(NRZ)

-Return to Zero (RZ)

-Phase Encoded

-Multilevel Binary

UNIT-IV

MULTI-USER RADIO COMMUNICATION

1. Define satellite.

Satellite is a celestial body that orbits around a planet. In aerospace terms, a satellite is a space vehicle launched by humans and orbits earth or another celestial body.

2. State Kepler's first law.

Kepler's first law states that a satellite will orbit a primary body following an elliptical path.

3. State Kepler's second law.

Kepler's second law states that for equal time intervals of time a satellite will sweep out equal areas in the orbital plane, focused at the barycenter.

4. State Kepler's third law.

The third law states that the square of the periodic time of orbit is proportional to the cube of the mean distance between the primary and the satellite.

5. Define orbital satellite.

Orbital satellites are also called as nonsynchronous satellite. Nonsynchronous satellites rotate around earth in an elliptical or circular pattern. In a circular orbit, the speed of rotation is constant however in elliptical orbits the speed depends on the height the satellite is above the earth.

6. Define prograde orbit.

If the satellite is orbiting in the same direction as earth's rotation and at an angular velocity greater than that of earth, the orbit is called a prograde.

7. Define retrograde orbit.

If the satellite is orbiting in the opposite direction as the earth's rotation or in the same direction with an angular velocity less than that of earth, the orbit is called a retrograde orbit.

8. Define Azimuth angle.

Azimuth is the horizontal angular distance from a reference direction, either the southern or northern most point of the horizon.

9. What are the advantages of optical fiber communication?

- Greater information capacity
- Immunity to crosstalk

10. Define numerical aperture.

Numerical aperture is mathematically defined as the sine of the maximum angle a light ray entering the fiber can have in respect to the axis of the fiber and still propagate down the cable by internal reflection.

11. Define modal dispersion.

Modal dispersion or pulse spreading is caused by the difference in the propagation times of light rays that take different paths down a fiber. Modal dispersion can occur only in multimode fibers. It can be reduced by using single mode step index fibers and graded index fibers.

12. Define a fiber optic system.

An optical communications system is an electronic communication system that uses light as the carrier of information. Optical fiber communication systems use glass or plastic fibers to contain light waves and guide them in a manner similar to the way electromagnetic waves are guided through a waveguide.

13. Define critical angle.

Critical angle is defined as the minimum angle of incidence at which a light ray may strike the interface of two media and result in an angle of refraction of 90° or greater.