Zeal Education Society's

ZEAL POLYTECHNIC, PUNE

NARHE | PUNE -41 | INDIA

DEPARTMENT OF ELECTRONICS ANDTELECOMMUNICATION ENGINEERING

SECOND YEAR (SY)

SCHEME: I **SEMESTER: III**

NAME OF SUBJECT: PRINCIPLES OF ELECTRONIC COMMUNICATION

Subject Code: 22334

UNIT WISE MULTIPLE CHOICE QUESTIONS BANK

	ZEAL EDUCATION SOCIETY'S**ZEAL** **POLYTECHNIC,PUNE** NARHE │PUNE -41 │ INDIA **DEPARTMENT OF E&Tc ENGINEERING**	

Question Bank for Multiple Choice Questions

Program: Diploma in E&Tc Engineering	**Program Code:- EJ**
Scheme:-III	**Semester:- 3**
Course:-Principles of Electronics Communication	**Course Code:- 22334**

01 – Basic of Electronic communication	**Marks:-12**
Content of Chapter:- 1.1 The elements of basic electronic communication system. 1.2 Electromagnetic spectrum. 1.3 Transmission modes: simplex, duplex-full/half,synchronous snd asynchronous 1.4 Sources of noise (internal and external) ,signal to noise ratio..	

1. Medium which sends information from source to receiver is called
   a) Transmitter
   b) Loudspeaker
   c) Transducer
   d) Channel

Answer: - Option d

Explanation: - Medium which sends information from source to receiver is called channel.

2. Telephones send information through wires in form of _____
   a) Radio signals
   b) E & Tc signal
   c) electromagnetic waves
   d) microwaves

Answer: - Option a

Explanation: - Telephones send information through wires in form of _ Radio signals

3. Cell phones sent information in form of _____
   a) Microwaves
   b) E & Tc signals
   c) infrared Waves
   d) radio waves

Answer: - Option d

Explanation: - Cell phones sent information in form of radio waves

4. The ability of receivers to select the wanted signals among various incoming signal is called
   a) Selectivity
   b) Fidelity
   c) Sensitivity
   d) Modulation

Answer: - Option b

Explanation: - Fidelity has ability of receivers to select the wanted signals among various incoming signal,Fidelity is the feature of receiver to reproduce all modulating frequencies equally.

5. _____Fidelity?
   a) Equally amplifies all the signal frequencies at receiver
   b) Ability of receiver to select wanted signal from various incoming signal
   c) Minimum magnitude of input signal required to produce a specified output
   d) Ability to amplify weak signals

Answer: - Option A

Explanation: - At Fidelity Equally amplifies all the signal frequencies at receiver.

6. Sin wave is _____
   a) Aperiodic Signal
   b) Periodic Signal
   c) Random Signal
   d) Deterministic Signal

Answer: - Option B

Explanation:- A sine wave is a geometric waveform that oscillates (moves up, down or side-to-side) periodically.

7. _____is the role of channel in communication system?
   a) acts as a medium to send message signals from transmitter to receiver
   b) converts one form of signal to other
   c) allows mixing of signals
   d) helps to extract original signal from incoming signal

Answer: - Option a

Explanation: - Channel is the medium through which information is transmitted. Transmitter is used to process the E & Tc signal through different aspects. The transducer is used to convert a message signal to an E & Tc signal. Loudspeaker is a type of Transducer.

8. Noise is added to a signal _____
   a) In the channel
   b) At receiving antenna
   c) At transmitting antenna
   d) During regeneration of information

Answer:-Option a

Explanation:- when signal pass from transmitter to receivers noise added at channel.

9. Agreement between communication devices are called _____
   a) Transmission medium
   b) Channel
   c) Protocol
   d) Modem

Answer: - Option C
Explanation: - Protocol are Agreement between communication devices .

10. A term that defines the direction of flow of information between devices.
   a) Interconnectivity
   b) transmission mode
   c) Interconnectivity
   d) transmission

Answer: Option b
Explanation: - transmission mode are used to flow of information between devices.

11. _____of the following isn't a type of transmission mode?
   a) Physical
   b) full duplex
   c) simplex
   d) Half duplex

Answer: - Option a
Explanation: - physical is not mode of transmission.

12. A transmission mode that can transmit data in both the directions but transmits in only one direction at a time.
   a) simplex
   b) full duplex
   c) Half duplex
   d) Semi duplex

Answer: - Option c
Explanation: - Semi duplex transfer data in both in direction.

13. Telephone networks operate in this mode.
   a) simplex
   b) full duplex
   c) Half duplex
   d) Semi duplex

Answer: - Option b
Explanation:- In full duplex data transfer in both direction that why it used in telephone system.

14. A walkie-talkie operates in _____
    a) simplex
    b) full duplex
    c) Half duplex
    d) Semi duplex

Answer: - Option c

Explanation: - In half duplex data transfer in one direction that why it used in walkie-talkie

15. _____is the role of the transmitter in the communication system?
    a) to decode a signal to be transmitted
    b) to convert one form of energy into other
    c) to detect and amplify information signal from the carrier
    d) to detect and amplify information signal from the carrier

Answer: - Option A

Explanation: - to decode a signal to be transmitted is role of transmitter.

16. a sinusoidal signal is considered analog?
    a) It moves in both positive and negative direction
    b) It moves in both positive and negative direction
    c) It moves in both positive and negative direction
    d) It has an infinite number of amplitudes in the range of values of the independent variable

Answer: - Option d

Explanation: - Sinusoidal signal It has an infinite number of amplitudes in the range of values of the independent variable

17. If Output can be represented as linear combination of input then _____
    a) The system is linear
    b) The system is non-causal
    c) The system is non-causal
    d) the system is time invariant

Answer: Option a

Explanation: - Input output is in linear combination.

18. _____device is used for tuning the receiver according to incoming signal (especially inTV)?
    a) Low pass filter
    b) Zener diode
    c) Zener diode
    d) Varacter diode

Answer: - Option d

Explanation: - Varactor diode is a diode working in the reverse-bias because of which no current flows

through it. Varactor diodes are mainly used in Voltage Controlled Oscillators (VCOs) and RF Filters for tuning the receiver to the incoming signal or different stations.

19. _____is the maximum transmission efficiency?

a) 67.88%
b) 73%
c) 33.33%
d) 33.33%

Answer: - Option c

Explanation: - The maximum transmission efficiency is 33.33%. It is so because 2/3rd of the total power is contained in the carrier, which conveys no useful information. Thus, only 1/3rd of total power has useful information which is transmitted. This happens in the case of SSB-SC Modulation, where the carrier is suppressed and only either of the sidebands is allowed to pass.

20. AVC stands for _____

a)Abrupt Voltage Control
b)Automatic Volume Control
c)Audio Voltage Control
d)Automatic Voltage Control

Answer: - Option d

Explanation: - AVC stands for Automatic Volume Control. It automatically adjusts the volume of an audio signal with respect to the surrounding noise, to make the signal be heard better and also to compensate noise to some extent.

21. A transmission that generally involves dedicated circuits.

a)Simplex
b)half duplex
c)Full duplex
d)Semi duplex

Answer: - Option a

Explanation: - Simplex transmission that generally involves dedicated circuits.

22. Fire alarms are based on this type of transmission?

a) Direct
b) analog
c) network
d) multiple

Answer: - Option b

Explanation: - Fire alarms is based on analog type of transmission.

23. A technique of transmitting data or images or videos (information) using a continuous signal

a) Direct
b) analog
c) network
d) multiple

Answer: - Option b

Explanation: - analog technique of transmitting data or images or videos (information) using a continuous signal.

24. Demodulation is done in _____

a) Channel
b) Receiving antenna
c) Receiver
d) Transducer

Answer: - Option c

Explanation: - Demodulation refers to extracting the original message signal from a transmitted modulated wave. The extraction of the message signal is generally carried out in the receiver.

25. Figure of merit is _____

a) Ratio of output signal to noise ratio to input signal to noise ratio
b) Ratio of input signal to noise ratio to output signal to noise ratio
c) Ratio of output signal to input signal to a system
d) Ratio of input signal to output signal to a system

Answer: - Option a

Explanation: - Ratio of output signal to noise ratio to input signal to noise ratio called Figure of merit.

26. Notch is a _____

a) High pass filter
b) Band stop filter
c) Low pass filter
d) Band pass filter

Answer: - Option b

Explanation: - Notch filter is a band stop filter that allows most frequencies to pass through it, except frequencies in a specific range. It is just opposite of a band-pass filter. High pass filter allows higher frequencies to pass while Low pass filter allows lower frequencies to pass through it.

27. ____is the role of channel in communication system?

a) Acts as a medium to send message signals from transmitter to receiver
b) converts one form of signal to other
c) converts one form of signal to other
d)helps to extract original signal from incoming signal

Answer: - Option a

Explanation: - Channel Acts as a medium to send message signals from transmitter to receiver.

28. ____is the advantage of super heterodyning?
    a) High selectivity and sensitivity
    b) Low adjacent channel rejection
    c) Low Bandwidth
    d) Low fidelity

Answer: - Option a

Explanation: - super heterodyning offer better stability because a tune able oscillator is more easily realized than a tune able amplifier.

29. Low frequency noise is _____
    a) Flicker noise
    b) Thermal noise
    c) Shot noise
    d) Partition Noise

Answer: - Option a

Explanation: - Flicker noise is Low frequency noise.

30. Relationship between amplitude and frequency is represented by _____
    a) Time-domain plot
    b) Frequency-domain plot
    c) Phase-domain plot
    d) Amplitude-domain plot

Answer: - Option b

Explanation: - Relationship between amplitude and frequency is represented by Frequency-domain plot

31. A function f(x) is even, when?
    a) a) f(x) = -f(x)
    b) f(x) = -f(x)f(-x)
    c) f(x) = f(-x)
    d) f(x) = f(x)f(-x)

Answer: - Option c

Explanation: - A function f(x) is even when f(x) = f(-x).

32. For a three stage cascade amplifier, calculate the overall noise figure when each stage has again of 12 DB and noise figure of 8dB.
    a) 12
    b) 13.55
    c) 5
    d) 8

Answer: - Option b

Explanation: - As the signal passes through various stages of an amplifier, the output has the original signal and some noise that gets amplified at different stages of amplifiers. So the final noise figure of the cascaded amplifier is obtained by

$F_N = F_1 + (F_2 - 1)/ G_1 + (F_3 - 1)/ G_1G_2 + \quad +(F_N - 1)/ G_1G_2G_3 \; G_N$

F_1, F_2, F_3 .. $F_N, G_1, G_2, G_3 \; G_N$ are the noise figures and the gains respectively of the amplifiers at different stages.

$F_1 = 12, F_2 = 12, F_3 = 12$

$G_1 = 8, G_2 = 8, G_3 = 8$

$F_N = 12 + (12 - 1)/ 8 + (12 - 1)/ 8 * 8$

$= 12 + 11/8 + 11/64$

$= 13.55$

33. Transit time noise is
    a) Low frequency noise
    b)High frequency noise
    c) Due to random behavior of carrier charges
    d) Due to increase in reverse current in the device

Answer: - Option b

Explanation: - Transit time noise is the noise caused due to increase in conductance with increase in frequency. This causes the increase in power spectral density of the signal.

34. Noise factor for a system is defined as the ratio of
    a) Input noise power (Pni) to output noise power (Pno)
    b) Output noise power (Pno) to input noise power (Pni)
    c) Output noise power (Pno) to input signal power (Psi)
    d) Output signal power (Pso) to input noise power (Pni)

Answer: - Option b

Explanation: - ratio of the signal to noise ratio at the input to the signal to noise ratio at the output of the amplifier stage.

35. Noise Factor (F) and Noise Figure (NF) are related as
    a) NF = 10 log10 (F)
    b) NF = 10 (F)
    c) F = 10 log10(NF)
    d) F = 10 (NF)

Answer: - Option a

Explanation: - Geometrically a function f(x) is even, if plot of the function is symmetric over y-axis. Algebraically, for any function f(x) to be even, f(x) = f(-x).

While for a function f(x) to be odd, f(x) = -f(-x).

36. The noise temperature at a resistor depends upon
    a) Resistance value
    b) Noise power
    c) Both a and b
    d) None of the above

Answer: - Option b

Explanation: - The noise temperature T_n of any white noise source is defined by $T_n = P_n/KB$, Where P_n is the noise power

37. In TV transmission, picture signal is_____modulated.
    a) DSB-SC
    b) VSB
    c) SSB-SC
    d) Pulse

Answer: - Option b

Explanation: - All analog television systems use vestigial sideband modulation, which is a form of amplitude modulation, for transmission. In VSB, one sideband is fully transmitted and another sideband is partially removed, which further reduces the bandwidth of transmitted signal. This enables narrower channels to be used.

38. In TV transmission, sound signal is_____modulated..
    a) Phase
    b) Pulse
    c) Frequency
    d) Amplitude

Answer: - Option c

Explanation: - Amplitude Modulation is invariably used for picture transmission while frequency modulation is generally used for transmission of sound due to its inherent advantages over amplitude modulation. It is not suitable for transmitting videos due to its large bandwidth.

39. In TV transmission, sound signal is_____modulated..
    a) Phase
    b) Pulse
    c) Frequency
    d) Amplitude

Answer: - Option C

Explanation: - Amplitude Modulation is invariably used for picture transmission while frequency modulation is generally used for transmission of sound due to its inherent advantages over amplitude modulation. It is not suitable for transmitting videos due to its large bandwidth.

40. In a receiver, noise is usually developed at _____

a) Audio stage
b) Receiving antenna
c) RF stage
d) IF stage

Answer: - Option c

Explanation: - Ability of receiver to selected only wanted signal, and reject other frequencies, out of the various incoming signals, helps the receiver to operate more efficiently. However, at times, the RF amplifier allows a frequency lying close to the desired frequency, to pass to the next stage. This other frequency is undesired and later on is responsible for production of image frequency. Thus, noise is usually developed at RF stage

Prepared By S P Dolli	Verified By S.L.Dawkhar Module Coordinator	Re-Verified By S N Navale Academic Coordinator	Approved By S.G.Tupe HOD EJ

02- AM and FM modulation	**Marks:-18**

Content of Chapter: -

2.1 Need for modulation

2.2 Types of modulation techniques, Amplitude modulation: mathematical representation of amplitude modulated wave, modulation index, bandwidth requirement, representation of AM signal in time and frequency domain, types of AM with respect to frequency spectrum (DSB, SSB and VSB), power relations in AM wave.

2.3 frequency modulation: representation of FM Signal in time domain and frequency domain, frequency deviation ratio, modulation index (beta), mathematical representation of FM, bandwidth requirement, types of frequency modulation (NB and WBFM)

2.4 Phase modulation

1. Modulation is done in _____
   (A) Receiver (B) Transducer
   (C) Between transmitter and radio receiver (D) Transmitter

Answer: - Option A

Explanation: - Transmitter modulates the signal to be transmitted, by varying one of the properties of a carrier signal with respect to the instantaneous amplitude of the message signal. This process is known as modulation.

2. In TV transmission, picture signal is_____modulated.
   (A) DSB-SC (B) VSB
   (C) SSB-SC (D) Pulse

Answer: - Option B

Explanation: - All analog television systems use vestigial sideband modulation, which is a form of amplitude modulation, for transmission. In VSB, one sideband is fully transmitted and another sideband is partially removed, which further reduces the bandwidth of transmitted signal. This enables narrower channels to be used.

3. FM stands for _____
   (A) Frequency Modulation (B) Frequent Frequent Multiplier
   (C) Frequency Modulator (D) Frequency Mixer

Answer: - Option A

Explanation: - FM stands for Frequency Modulation. It is the encoding of information on a carrier wave by varying its frequency with respect to the instantaneous amplitude of the message signal. Rest other options are the components used in the process of frequency modulation.

4. Data transmitted for a given amount of time is called _____

(A) Noise (B) Frequency

(C) Power (D) Bandwidth

Answer: - Option D

Explanation: - A Demodulation is a process of recovering the information signal from a modulated carrier wave, in which properties of a periodic waveform is varied. A modulator is a device that performs modulation while the demodulator performs demodulation. The process of mixing a signal with a sinusoid to produce a new signal is done by a mixer.

5. Amplitude Modulation suffers from _____

(A) Side-band Suppression (B) Cross Modulation

(C) Intra Pulse Modulation (D) Carrier Suppression

Answer: - Option B

Explanation: - Cross modulation generally occurs in receivers receiving an AM signal in the presence of other strong AM signal. The modulation from the strong signal cross modulates and appears on the weaker signal being received.

6. Demodulation is done in _____

(A) Channel (B) Receiving antenna

(C) Receiver (D) Transducer

Answer: - Option C

Explanation: - demodulation refers to extracting the original message signal from a transmitted modulated wave. The extraction of the message signal is generally carried out in the receiver.

7. _____is Amplitude Modulation?

(A) Change in amplitude of carrier according to modulating signal amplitude

(B) Change in frequency of carrier according to modulating signal amplitude

(C) Change in amplitude of carrier according to modulating signal frequency

(D) Change in amplitude of modulating signal according to carrier signal amplitude

Answer: - Option A

Explanation: - Change in amplitude of carrier according to modulating signal amplitude

8. In amplitude modulation frequency and phase of carrier _____

(A) varies simultaneously (B) varies simultaneously

(C) initially varies but become same after sometime (D) remains constant

Answer: - Option A

Explanation: - In Amplitude Modulation sinusoidal quantities with same frequency can be added or subtracted.

9. For Amplitude Modulation, Emitter modulator _____

(A) Operates in class C mode (B) Output power is high

(C) Has a low efficiency (D) Operates in class B mode

Answer: - Option C

Explanation: - Emitter modulator amplifier for Amplitude Modulation operates in class A mode and has a

very low efficiency. The output of the modulator is very small, therefore, it is not suitable for modulation at high level.

10. ____AM is used for broadcasting?

(A) More immune to noise (B) less transmitting power is required

(B) it has high fidelity (C) Avoids Receivers Complexity

Answer: - Option D

Explanation: - The circuit used in amplitude modulation is not as complicated as other form of modulation. Thus it is less complicated.

11. Single tone amplitude modulation _____

(A) consists of only one frequency component (B) contains a large number of frequency

(B) contains no frequency components (C) contains infinite number of frequency

Answer: - Option A

Explanation: - Single tone modulation consists of only one frequency component in the baseband or message signal. Thus, modulation of carrier wave is done by a single frequency component only.

Explanation: Spectrum of Am wave consists of a carrier with upper sideband and lower sideband.

12. AM spectrum consists of _____

(A) Carrier frequency (B) Upper sideband

(C) Lower sideband (D) Carrier frequency with both upper andlower sideband

Answer: - Option D

Explanation: - Spectrum of Am wave consists of a carrier with upper sideband and lower sideband. If carrier frequency is Wc, then the two sidebands produced by it are (Wc+Wm) and (Wc-Wm), where Wm is the frequency of the message signal.

13. The minimum channel Bandwidth is used by which modulation technique?

(A) VSB (B) DSB-SC

(C) SSB-SC (D) AM

Answer: - Option C

Explanation: - signal has two sidebands which are exactly the mirror images of each other. So we can remove one side band which further reduces its bandwidth. In SSB-SC modulation technique, the carrier is suppressed and only either of the sidebands is transmitted. Thus, SSB-SC has minimum channel Bandwidth.

14. Amplitude Modulated wave is _____

(A) Sum of carrier and modulating wave (B) Product of carrier and modulating wave

(B) Difference of carrier and modulating wave (C) Sum of carrier and its product withmodulating wave

Answer: - Option A

Explanation: - Amplitude modulation is a process by which the wave signal is transmitted by modulating the amplitude of the signal. It is often called AM and is commonly used in transmitting apiece of information through a radio carrier wave. Amplitude modulation is mostly used in the form of electronic communication.

15. For 100% modulation, total power is?

(A) same as the power of unmodulated signal (B) twice as the power of unmodulated signal

(B) four times as the power of unmodulated signal (C) one and half times as the power ofunmodulated signal

Answer: - Option A

Explanation: - For 100% modulation, total power is? Explanation: Total power, $P_t = P_c (1 + m^2/2)$, where m is Modulated Signal, P_c is Power of Unmodulated Signal or Carrier Signal. So, for m=1, $P_t = P_c (1 + 1^2/2) =$ 1.5 P_c.

16. AM waves are represented by which equation?

(A) [1 + m(t)].c(t) (B) [1 + m(t)].c(t)

(C) [1 – m(t)].c(t) (D) [1 + 2m(t)].c(t)

Answer: - Option A

Explanation: - AM waves is represented by which equation? Explanation: Amplitude wave is represented by [1 + um(t)]. c(t), where c(t) is carrier signal, m(t) is message signal, u is Modulation Index.

17. _____do you understand by the term SSB?

(A) Suppressed Side Band (B) Suppressed Single Band

(C) Single Side Band (D) Selected Single Band

Answer: - Option C

Explanation: - SSB stands for Single Side band. In SSB-SC (Single Side Band Suppressed Carrier), the carrier is suppressed and only either of the two sidebands is transmitted.

18. _____is the full form of PPM?

(A) pulse-position modulation (B) pulse-pulse modulation

(C) position-pulse modulation (D) position-position modulation

Answer: - Option A

Explanation: - In modern times, pulse-position modulation has origins in telegraph time-division multiplexing, which dates back to 1853, and evolved alongside pulse-code modulation and pulse-width modulation. .

19. Pulse communication system that is inherently highly immune to noise is_____

(A) PCM (B) PAM

(C) PPM (D) PWM

Answer: - Option A

Explanation: A. Digital modulation system is inherently highly immune to noise. Since among the given option only PCM is digital modulation system. Hence alternative (A) is the correct choice.

20. Quantization noise occurs in _____

(A) Frequency Division Multiplexing (B) Delta Modulation

(C) Time Division Multiplexing (D) Amplitude Modulation

Answer: - Option D

Explanation: - Quantization occurs when an analog signal is converted into it's digital form, thus it occurs in Pulse Code modulation (PCM).

21. In AM pilot carrier, transmission has _____

(A) carrier and part of one side band (B) two side bands and a carrier

(C) two side bands (D) carrier, one side band and part ofother side band

Answer: - Option B

Explanation: - In amplitude modulated wave, the transmitted wave has two side bands and a carrier. Thus it's bandwidth is twice the maximum modulating frequency

22. _____of the following frequency is not transmitted in AM transmission?

(A) Upper side band frequency (B) Lower side band frequency

(C) Carrier frequency (D) Audio frequency

Answer: - Option D

Explanation: - audio frequency is the frequency that is not transmitted in AM transmission.

23. If peak voltage of a carrier wave is 10V, what is the peak voltage of modulating signal if modulation index is 50%?

(A) 10V (B) 5 V

(C) 20 V (D) 15V

Answer: - Option B

Explanation: - From the relation, Modulation Index (μ) = V_m/V_c = 50% = 0.5, where V_m = Peak voltage of modulating signal, V_c = Peak voltage of a carrier wave = 10V, Therefore, V_m = 10 X 0.5 = 5V.

24. Maximum Amplitude of an amplitude modulated 10V and minimum amplitude is 5V. Find its modulation index?

(A) 0.66 (B) 0.33

(C) 0.5 (D) 1

Answer: - Option B

Explanation: - Maximum Amplitude of an amplitude modulated 10V and minimum amplitude is 5V. Therefore, μ = (10-5)/(10+5) = 0.33.

25. 24 channels, each band limited to 3.4 KHz, are to be time division multiplexed. Find the bandwidth required for 128 quantization level? (Given that sampling frequency is 8 KHz)

(A) 2436 KHz (B) 1536 KHz

(C) 1002 KHz (D) 1337 KHz

Answer: - Option B

Explanation: - Given, n = 24, f_m = 3.4 kHz

M = 128,

$2^N = 128 \Rightarrow n = 7$

But $f_S = 2f_m$, here we will consider f_S (sampling) frequencyinstead at $2f_m$ $\Rightarrow$ 2 x 3.4 kHz 6.8 KHz.

B.W. = [24(7 + 1)] 8 kHz = 1536 KHz.

26. Sampling frequency of a signal is 6 KHz and is quantized using 7 bit quantizer. Find its bit rate?

(A) 48kbPs (B) 16kbPs

(C) 64kbPs (D) 8kbPs

Answer: - Option A

Explanation: - Given, f =6khz ,N = 7

Bit rate. = [6*7]= 48kbPs

27. Calculate power in each sideband, if power of carrier wave is 96W and there is 40% modulationin amplitude modulated signal?

(A) 11.84W (B) 3.84W

(C) 6.84W (D) 15.84W

Answer: - Option B

Explanation: - Modulation index = 0.4 and Pc = 96W. Power in sidebands may be calculated as

$\frac{m^2 P_C}{4}$ i.e. $\frac{0.4^2 \times 96}{4} = 3.84W.$

28. For 50% modulation, power in each sideband is_____of that of carrier.

(A) 10% (B) 5%

(C) 6.25% (D) 4.32%

Answer: - Option C

Explanation: - Modulation index = 0.5. Power in sidebands may be calculated as $\frac{m^2 P_C}{4}$. So, power in each sideband is $\frac{0.5^2 P_C}{4}$ i.e. 6. 25%.

29. If each element of signal occupies 70ms, what will its speed?

(A) 17.39 bauds (B) 11.23 bauds

(C) 14.28 bauds (D) 13.33 bauds

Answer: - Option C

Explanation: - The carrier signal is characterized by the number of signal intervals, or pulses, that are transmitted per second. Each pulse is called a baud. Bps stands for bits per second. Bps is a measure of how many bits can be transmitted during one pulse (one baud).

$$\text{Speed} = \frac{1}{70 \times 10^{-3}} = 14.28 \text{ bauds.}$$

30. Power of carrier wave is 300W and modulation index is 0.75. Find its total power?

(A) 465W (B) 384W

(C) 323W (D) 502W

Answer: - Option B

Explanation: - Pc=300W,μ=75%=0.75Pc=300W,μ=75%=0.75

Pt=Pc(1+μ22)Pt=Pc(1+μ22) o r Pt=300(1+(0.75)22)=384W.

31. If a wave is modulated by two waves. One of them has modulation index equal to 0.75 and otherhas 0.2, the total modulation index will be _____

(A) 0.67 (B) 0.77

(C) 0.58 (D) 0.35

Answer: - Option B

Explanation: - Given that m1 = 0.75 and m2 = 0.2. Total modulation index will be equal to $\sqrt{m_1^2 + m_2^2}$. Bysubstituting values we have $(\sqrt{0.75^2 + 0.2^2})$ which is equal to 0.77.

32. Find the power saving for DSB-SC wave with 100% modulation?

(A) 66% (B) 50%

(C) 86% (D) 33%

Answer: - Option A

Explanation: - In DSB-SC carrier is suppressed. In normal AM, carrier is not suppressed. Therefore, Power saving = $((P_C/2)/(3P_C/2)) \times 100\% = 66\%$.

33. If power transmitted is 45kW, field at a distance of 23km will be _____

(A) 0.05 (B) 0.75

(C) 0.002 (D) 0.03

Answer: - Option A

Explanation: - Field is a region around a charged particle or object within which a force would be exerted on other charged particles or objects.

$$E = \frac{1}{r}\sqrt{30\,P_t} = \frac{\sqrt{30 \times 45000}}{23000} = 0.05\frac{V}{m}$$

34. Find the number of pulses, if the number of level is 128 in PCM?

(A) 5 (B) 4

(C) 2 (D) 7

Answer: - Option D

Explanation: - A pulse in signal processing is a rapid, transient change in the amplitude of a signal from a baseline value to a higher or lower value, followed by a rapid return to the baseline value.

Therefore,

$2^n = 128$, so n = 7.

35. Neper is_____decibel.?

(A) 20/(ln10) (B) Same as

(C) 20ln10 (D) Exactly twice of

Answer: - Option A

Explanation: - Neper is 20/(ln10)

36. AM broadcast station transmits modulating frequency up to 6 KHz. If transmitting frequencyis 894KHz, then maximum and lower sidebands are _____

(A) 900KHz and 888KHz (B) 916KHz and 904KHz

(C) 826KHz and 804KHz (D) 822KHz and 816KHz

Answer: - Option A

Explanation: - Maximum Frequency f_{USB} = 894 + 6 = 900 kHz

Minimum Frequency f_{LSB} = 894 – 6 = 888 kHz

37. Find lower frequency component in AM wave, given that highest frequency component is 900KHz and bandwidth is 12 KHz?

(A) 900KHz (B) 916KHz

(C) 826KHz (D) 888KHZ

Answer: - Option D

Explanation: - given that highest frequency component is 900KHz and bandwidth is 12KHz? Explanation: Highest frequency component is 900KHz and bandwidth is 12KHz. So lower frequency component is 900 – 12 = 888KHz.

38. For attenuation of high frequencies we can use _____

(A) inductor (B) shunt capacitance

(C) combination of inductor and resistor (D) series capacitance

Answer: - Option B

Explanation: - Since X_C for high frequencies is low, the high frequencies are shunted to ground and are not transmitted.

39. If each element of signal occupies 40ms, determine its speed?

(A) 05 bauds (B) 25 bauds

(C) 20 bauds (D) 30 bauds

Answer: - Option B

Explanation: -

$$\text{Speed} = \frac{1}{40 \times 10^{-3}} = 25 \text{ bauds.}$$

40. A modem is classified as low if speed of data rate is

(A) up to 600bps (B) up to 400bps

(C) up to 200bps (D) up to 800bps

Answer: - Option A

Explanation: - When data rate in bits per second is upto 600, modem is low speed.

41. The radiation at right angles is zero means _____

(A) $l = \lambda$ (B) $l = 2\lambda$

(C) $l = \lambda/4$ (D) $l = \lambda/2$

Answer: - Option A

Explanation: - If the length of antenna is equal to the whole wavelength then the radiation at right anglesis zero.

Prepared By S P Dolli	Verified By S.L.Dawkhar Module Coordinator	Re-Verified By S N Navale Academic Coordinator	Approved By S.G.Tupe HOD EJ

03- Transmitters and Receivers	**Marks:-14**

Content of Chapter:-

3.1 Generation of AM.
3.2 Block diagram of AM Superheterodyne receiver, its working with waveforms.
3.3 Demodulation of AM signal: Diode detector and practical diode detector
3.4 Automatic gain control and its types
3.5 concept of pre-emphasis and deemphasis
3.6 generation of FM using direct (varactor diode and reactance modulator) and indirect method (Armstrong method)
3.7 block diagram of FM receiver and its working with waveform
3.8 FM detector circuits: radio detector and PLL as FM demodulator.

1 Modulation is done in
a) Receiver
b) Transducer
c) Between transmitter and radio receiver
d) Transmitter
Answer: d
Explanation: Transmitter modulates the signal to be transmitted, by varying one of the properties of a carrier signal with respect to the instantaneous amplitude of the message signal. This process is known as modulation. Receiver demodulates the modulated signal to extract the message signal.
Transducer converts the E & Tc signal to sound wave. Between the transmitter and the radio receiver, is the channel which acts as the medium of transmission.

2 In TV transmission, picture signal is modulated.

a) DSB-SC
b) VSB
c) SSB-SC
d) Pulse
Answer: b
Explanation: All analog television systems use vestigial sideband modulation, which is a form of amplitude modulation, for transmission. In VSB, one sideband is fully transmitted and another sideband is partially removed, which further reduces the bandwidth of transmitted signal. This enables narrower channels to be used.

3 What is the role of the transmitter in the communication system?

a) to decode a signal to be transmitted
b) to convert one form of energy into other
c) to detect and amplify information signal from the carrier
d) to produce radio waves to transmit data
Answer: d
Explanation: Transmitter is used to produce radio waves which are then sent to the antennae to transmitted. It encodes or modulates the message signal before transmission. Transducer converts a signal from one form of energy to other. Receiver detects and amplifies information signal from the carrier.

4 What is the maximum transmission efficiency?

a) 67.88%
b) 33.33%
c) 73%
d) 54.03%
Answer: b
Explanation: The maximum transmission efficiency is 33.33%. It is so because 2/3rd of the total power is contained in the carrier, which conveys no useful information. Thus, only 1/3rd of total power has useful information which is transmitted. This happens in the case of SSB-SC Modulation, where the carrier is suppressed and only either of the sidebands is allowed to pass.

5 AVC stands for
a) Abrupt Voltage Control
b) Audio Voltage Control
c) Automatic Volume Control
d) Automatic Voltage Control
Answer: c
Explanation: AVC stands for Automatic Volume Control. It automatically adjusts the volume of an audio signal with respect to the surrounding noise, to make the signal be heard better and also to compensate noise to some extent.

6 What is the role of Amplitude limiter in the FM receiver?
a) Filtration
b) Adjust the gain of receiver
c) Amplify a weaker signal
d) Demodulate a signal
Answer: d
Explanation: Amplitude Limiter in FM receivers are used to eliminate the amplitude changes caused due to noise interference. It does so by clipping the amplitude of output signals to the desired level, irrespective of any variations in the input signal.

7 Demodulation is done in
a) Channel
b) Receiver
c) Receiving antenna
d) Transducer
Answer: b
Explanation: Demodulation refers to extracting the original message signal from a transmitted modulated wave. The extraction of the message signal is generally carried out in the receiver. Channel is the medium through which the modulated message signal is transferred and Antenna receives the transmitted signal. Transducer converts the E & Tc signal to sound waves and vice- versa.

8 In a receiver, noise is usually developed at
a) Audio stage
b) Receiving antenna
c) RF stage
d) IF stage
Answer: c
Explanation: Ability of receiver to selected only wanted signal, and reject other frequencies, out of the various incoming signals, helps the receiver to operate more efficiently. However, at times, the RF amplifier allows a frequency lying close to the desired frequency, to pass to the next stage. This other frequency is undesired and later on is responsible for production of image frequency. Thus, noise is usually developed at RF stage.

9 Which oscillator is used as a local oscillator in radio receiver?
a) Wien-bridge
b) Hartley
c) Crystal
d) Phase Shift
Answer: b
Explanation: Oscillator which is used as a local oscillator in radio receiver is generally a tuned circuit. This tuned circuit consists of inductors and capacitors to determine the resonant frequency, therefore it is an LC tuned circuit. Out of the four options, only Hartley Oscillator has an LC resonant tank circuit.

10 Process of recovering information signal from received carrier is known as
a) Sensitivity
b) Selectivity
c) Demodulation
d) Fidelity
Answer: c
Explanation: Demodulation means extracting information or message signal from the transmitted modulated wave, while minimum magnitude of input signal required to produced a specified output is

known as Sensitivity. The ability of receiver to select wanted signal from various incoming signals is called Selectivity. Fidelity means reproducing all modulating frequencies equally, without any distortion.

11 What is the use of a varactor diode in radio receiver?
a) Demodulation
b) Mixing
c) Multiplexing
d) Tuning
Answer: d
Explanation: Varactor diode is a diode working in the reverse-bias because of which no current flows through it. It has variable capacitance which varies with applied voltage. Varactor diodes are mainly used in Voltage Controlled Oscillators (VCOs) and RF Filters for tuning the receiver to the incoming signal or different stations.

12 What is the function of radio receiver?
a) to detect and amplify information signal from the carrier
b) to modulate a message signal
c) to produce radio waves
d) to convert one form of energy into other
Answer: a

13 Superheterodyne principle provides selectivity at
a) RF stage
b) IF stage
c) Demodulating Stage
d) Audio Stage
Answer: b
Explanation: A superheterodyne receiver uses frequency mixing to convert the received high frequency signal to a fixed lower intermediate frequency (IF), which can be processed more conveniently than original received frequency. Thus, the principle of selectivity is applied at the IF stage as it consists of very efficient filters to only select a wanted signal and pass it to the Demodulating Stage.

14 A heterodyne frequency changer is
a) Mixer
b) Demodulator
c) Modulator
d) Local Oscillator
Answer: a
Explanation: A mixer is a nonlinear E & Tc circuit that multiplies two signal frequencies applied to it, and produces a new frequency. Mixers are widely used to shift signals from one frequency range to other, which is known as heterodyning process. Generally, Local Oscillator generates a frequency to be applied at one of the input terminals of the mixer. Demodulator decodes the message signal from modulated signal, while modulator encodes message signal for transmission.

15. Which of the following statement is true about frequency modulation?
a) noise gets decrease if we decrease deviation
b) noise gets decrease if we increase deviation
c) noise gets decrease by maintaining deviation constant
d) noise relates parabolically to deviation
Answer: b
Explanation: In frequency modulated system, noise is inversely proportional to the frequency deviation. Thus, if we increase deviation then the noise in system gets decreases.

16 In a frequency modulated signal, the power as the modulation index increases.
a) remains constant
b) increase
c) decrease
d) becomes 0
Answer: a
Explanation: In a frequency modulated system, if we increase the modulation index the power remains constant as the power depends only on the amplitude of the message signal.

17 Pre-emphasis circuit is used
b) after detection
Explanation: A carrier wave is modulated in terms of amplitude, frequency or phase, with respect to an input signal for conveying information. Carrier wave has generally higher frequency than the input signal.

22 Bandwidth of RF amplifier for a color TV receiver is
a) equal to channel width
b) more than channel width
c) less than channel width
d) twice of channel width
Answer: b
Explanation: RF amplifiers are tuned amplifiers in which the frequency of operation is controlled by a tuned circuit. Bandwidth of RF amplifier is generally kept a little more than channel so that there is no problem in reception.

23 Which of the following devices is used to generate AM waves?
a) Square-law modulator
b) Reactance modulator
c) Transmitter
d) Transducer
Answer: a
Explanation: AM signals are generated by Square-law modulators. The input for generating AM

signal should be of type (A + m(t)) instead of m(t). Square-law modulator sums carrier and information signal, then passes them through a non-linear device.

24 What is the disadvantage of FM over AM?
a) high modulating power is needed
b) requires high output power
c) large bandwidth required
d) high noise is produced
Answer: c
Explanation: Advantage of FM over AM is that the amplitude of an FM wave remains constant. In FM, the power of transmitted wave depends on amplitude of unmodulated carrier wave and hence it is constant. FM is less prone to noise compared to AM. However, wide-band FM has a wider bandwidth than AM as it's BW is given by Carson's rule which = 2*(β+1)fm, where β = Frequency Modulation Index and fm is frequency of modulating signal. And BW of AM = 2*fm.

25 For low level amplitude modulation, amplifier must be
a) Class C amplifier
b) Class B amplifier
c) Class D amplifier
d) class A amplifier
Answer: a
Explanation: In low level AM, modulation is done at low power of carrier and modulating signal therefore output power is low. Therefore, power amplifiers are used to boost the carrier and modulating signal. Thus, Class C amplifier is used.

26 A wave is modulated by two sin waves having modulation indices of 0.3 and 0.5. Find the total modulation index?
a) 0.1
b) 0.7
c) 0.58
d) 0.35
Answer: c
Explanation: Given that m1 = 0.3 and m2 = 0.5. Total modulation index will be equal to

By substituting values we have
which is equal to 0.58.
0.58

27 Carrier wave carries information.
a) True
b) False
Answer: b
Explanation: It is a high frequency electro-magnetic wave. A carrier wave does not have any information. One of the properties like amplitude, frequency or phase of the carrier are modulated with

respect to an input signal for the purpose of conveying information.

28 What can we do to eliminate distortion in the picture?
a) use a longer transmission line
b) change the antenna orientation
c) use a short transmission line
d) connect a booster
Answer: b
Explanation: According to modulation, length of antenna should be one fourth of wavelength. If distortion occurs whether in television or at any other place, simplest way to eliminate this is to change the orientation of antenna.

29 For 100% amplitude modulation, the power in upper sideband when carrier power is to be 100W?

a) 100W
b) 75W
c) 25W
d) 50W
Answer: c
Explanation: Modulation index, m = 100% = 1. Power in sidebands is (Pcxm2⁄4). By substituting the values, we have (100 x 1⁄4) which is equal to 25W.
Modulation index, m = 100% = 1.
Power in sidebands = (Pcx m2/4), Pc = Power of Carrier
By substituting the values, we have (100 x 1/4) = 25W.

30 AM waves is represented by which equation?
a) [1 + m(t)].c(t)
b) [1 – m(t)].c(t)
c) [1 + m(t)].2c(t)
d) [1 + 2m(t)].c(t)
Answer: a
Explanation: Amplitude wave is represented by [1 + um(t)].c(t), where c(t) is carrier signal, m(t) is message signal, u is Modulation Index.
Generally, c(t) = Accos(wct), Ac = Amplitude of Carrier Signal.

31 Modulation is also called detection.
a) True
b) False
Answer: b
Explanation: Modulation is encoding the message signal for efficient transmission. Whereas, Demodulation is the process to extract or decode the original message signal from the transmitted modulated signal. Demodulation is also called detection.

32 Power of carrier wave is 500W and modulation index is 0.25. Find its total power?
a) 500W
b) 415W
c) 375W
d) 516W
Answer: d
Explanation: Total Power (Pt) = (1+m2/2)*Pc
So, here, m = 0.25, Pc = 500W
Pt = (1+(0.252/2))*500 = 516W.

33 Calculate power in each sideband, if power of carrier wave is 176W and there is 60% modulation in amplitude modulated signal?
a) 13.36W
b) 52W
c) 67W
d) 15.84W
Answer: d
Explanation: Modulation index = 0.6 and Pc = 176W. Power in sidebands may be calculated as

$\frac{m^2 P_C}{4}$ i.e. $\frac{0.6^2 \times 176}{4} = 15.84W.$

34 For 100% modulation, power in each sideband is of that of carrier.
a) 50%
b) 70%
c) 60%
d) 25%
Answer: d
Explanation: Modulation index = 1. Power in sidebands may be calculated as

$\frac{m^2 P_C}{4}$. So, power in each sideband is $\frac{1^2 P_C}{4}$ i.e. 25%.

35 Overmodulation results in
a) Distortion
b) Weakens signal
c) Strengthens the signal
d) provides immunity to noise
Answer: a
Explanation: When instantaneous level of modulating signal exceeds the value necessary to provide 100% modulation, the signal is said to over-modulated. In other words, when

modulation index is greater than 1, it results in Overmodulation. Thus, Overmodulation results in distortion of the modulating signal.

36 The maximum power efficiency of an AM modulator is?
a) 25%
b) 33%
c) 66%
d) 100%
Answer: b
Explanation: Efficiency (ή) = m2 / (m2 + 2), m=Modulation Index
For maximum efficiency m = 1 so, ή = 1/(1+2) = 1/3
and ή% = (1/3)x100 = 33%.

37 For getting 100% modulation, carrier amplitude should
a) exceed signal amplitude
b) be equal to signal amplitude
c) be lesser than signal amplitude
d) be equal to 0
Answer: b
Explanation: Modulation index is the amount of modulation present in a carrier wave. It is also described as the ration of the amplitude of message signal to that of carrier signal.
Modulation Index (m) = Vm/Vc, where Vm is maximum baseband or message signal amplitude and Vc is maximum carrier signal amplitude. So for m = 1, Vm should be equal to Vc.

38 For 100% modulation, total power is?
a) same as the power of unmodulated signal
b) twice as the power of unmodulated signal
c) four times as the power of unmodulated signal
d) one and half times as the power of unmodulated signal
Answer: d
Explanation: Total power, Pt = Pc (1 + m2⁄2), where m is Modulated Signal, Pc is Power of Unmodulated Signal or Carrier Signal.
So, for m=1,

Pt = Pc (1 + 12/2) = 1.5 Pc.

39 What we called a resistor if a transmitter is connected to a resistor instead of an antenna?
a) a test load
b) a temporary load
c) a dummy load
d) a heavy load
Answer: c
Explanation: If a transmitter is connected to resistor not antenna than it is called dummy load. Such

a load is used for testing purposes to set the parameters of the transmitter, as it would have behaved in presence of an actual antenna.

40 The carrier is suppressed in
a) a mixer
b) a frequency multiplier
c) a transducer
d) a balance modulator
Answer: d
Explanation: A mixer is the one which mixes the audio frequency with the carrier frequency. A transducer converts a signal from one form to another. Balance modulator suppresses the carrier and leaves only the sidebands.

41 What is the full form of AFC?
a) Amplitude to frequency conversion
b) Automatic frequency conversion
c) Automatic frequency control
d) Audio frequency control
Answer: c
Explanation: AFC stands for Automatic frequency control. It is a method to automatically keep a resonant circuit tuned to a frequency of an incoming radio signal. It is used in receivers to tune to the desired frequency.

42 Mixing is used in communication to
a) raise the carrier frequency
b) lower the carrier frequency
c) to altered the deviation
d) to change the carrier frequency to any required value
Answer: d
Explanation: Mixing is used to change the frequency of carrier by mixing it with a radio frequency signal or audio signal. The frequency can be changed to any required value in communication.

43 Which device is most commonly used for detection in radio receiver?
a) Triode
b) Capacitor
c) Diode
d) Transistor
Answer: c
Explanation: In radio receivers, diode is most preferably used for detection purposes.

44 modulator is an indirect way of generating FM.

a) Varactor FET

b) Reactance FET

c) Armstrong

d) Reactance bipolar transistor

Answer: c

Explanation: FM can be generated in two ways. One is direct and other is indirect way. In indirect way, there is an Armstrong method which is used to generate FM system, while other methods stated in the options are direct ways.

45 The household radio receiver uses detector.

a) Synchronous

b) Coherent

c) Radio

d) Envelope

Answer: d

Explanation: Household receivers generally uses envelope detector.

46 High IF in superheterodyne receiver

a) improves fidelity

b) improves selectivity

c) improves sensitivity

d) increases tracking problems

Answer: d

Explanation: In superheterodyne receiver, most of the received signals gets amplified from intermediate frequency (IF). High intermediate frequency helps in tracking problems.

47 Baseband compression produces

a) a small range of frequencies from low to high

b) a small range of different phases

c) a small range of angles

d) a small range of amplitude

Answer: d

Explanation: A signal compression method in a wireless network provides efficient transfer of compressed signal samples over serial data links in the system. Baseband compression produces a small range of amplitude.

48

Envelope Detector is a/an

a) Coherent detector

b) Asynchronous Detector

c) Synchronous Detector

d) Product Demodulator

Answer: b

Explanation: An envelope detector is used to demodulate a previously modulated signal by removing all high frequency components of the signal. The capacitor and resistor form a low-pass filter to filter out the carrier frequency. Envelope detectors are asynchronous in nature. The advantage of asynchronous over synchronous is that it is simple, cheap and setup is faster.

49 What is the disadvantage of FM over AM?

a) high modulating power is needed

b) requires high output power

c) large bandwidth required

d) high noise is produced

Answer: c

Explanation: Advantage of FM over AM is that the amplitude of an FM wave remains constant. In FM, the power of transmitted wave depends on amplitude of unmodulated carrier wave and hence it is constant. FM is less prone to noise compared to AM. However, wide-band FM has a wider bandwidth than AM as it's BW is given by Carson's rule which = 2*(β+1)fm, where β = Frequency

Modulation Index and fm is frequency of modulating signal. And BW of AM = 2*fm.

Prepared By S P Dolli	Verified By S.L.Dawkhar Module Coordinator	Re-Verified By S N Navale Academic Coordinator	Approved By S.G.Tupe HOD EJ

04- Wave propagation	**Marks:-14**

Content of Chapter:-

4.1 concept of propagation of radio waves.
4.2 ground wave propagation.
4.3 sky wave : Ionospheric layers, concept of actual height and virtual height ,critical frequency, skip distance, skip zone, concepts of fading, maximum usable frequency ,multiple hop sky wave propagation.
4.4 space wave propagation : Line of sight, multipath space wave propagation, optical and radio horizon
,shadow zones.
4.5 duct propagation (microwave space-wave propagation).
4.6 Troposphere scatter propagation.

1 Ground wave is always_____polarized.
a) Vertically
b) Horizontally
c) Either vertical or horizontal
d) Neither horizontal nor vertical
Answer: a
Explanation: If the wave is horizontally polarized, then the electric field is short circuited by the earth. So the ground wave is always vertically polarized and vertical antennas are used.

2 Ground wave propagation is used for signals up to frequency _____
a) 2MHz
b) 2GHz
c) 30MHz
d) 30GHz
Answer: a
Explanation: Ground wave propagation is used for signals up to frequency of 2MHz. Ground waves are vertically polarized and transmitting and receiving antennas are placed closely and the wave follows the curvature of the earth.

3 The broadcast signals received at low frequencies during day-time are due to _____

a) Ground wave
b) Space wave
c) Sky wave
d) Tropospheric waves
Answer: a
Explanation: Ground wave propagation is used for signals up to frequency of 2MHz. It is useful for the broadcast and low frequency signals. Space waves are also known as tropospheric waves useful for FM reception. Sky wave propagation is used for long distance communication.

4 Ground wave propagation is also known as _____

a) Surface wave
b) Tropospheric wave
c) Ionospheric wave
d) Stratospheric waves
Answer: a

Explanation: Ground waves are also known as Surface waves as the wave propagates close to the surface of earth. Space waves are known as tropospheric waves and Sky waves as Ionospheric waves.

5 The ground wave propagation uses horizontal polarized antennas

a) True
b) False
Answer: b
Explanation: If the wave is horizontally polarized, then the electric field is short circuited by the earth. So the ground wave is always vertically polarized and vertical antennas are used.

6 Which of the following is particularly used for VLF?

a) Surface wave
b) Tropospheric wave
c) Ionospheric wave
d) Stratospheric waves
Answer: a
Explanation: Ground waves are also known as Surface waves are used for low frequencies and broadcasting. Tropospheric waves are used for Mf and HF signals. Ionospheric waves are used for long distance communications

7 Which of the following propagates by gliding over the surface of earth?

a) Surface wave
b) Tropospheric wave
c) Ionospheric wave
d) Stratospheric waves
Answer: a
Explanation: Ground waves are also known as Surface waves. Ground waves are vertically polarized

and transmitting and receiving antennas are placed closely and the wave follows the curvature of the earth.

8 How the ground wave losses vary with high frequencies?
a) Increases
b) Decreases
c) Does not depend on frequency
d) Increase or decrease
Answer: a
Explanation: Ground wave propagation is used at below 2MHz frequency. Ground wave propagation is used for short distance. By using sufficient power and low frequencies it can be used effectively. Ground wave losses increase rapidly with frequencies.

9 The electric field of the component increases in ground wave when it tilts more at the surface.

a) True
b) False
Answer: b
Explanation: As the wave front tilts more and more towards the surface then the electric field gets short circuited. As it gets reduced with tilt, at some point it is completely attenuated.

10 At what height the Ionosphere lies above the earth surface?
a) 70-400km
b) 2-15km
c) 20-70km
d) Above 400km
Answer: a
Explanation: Troposphere is the lowest layer in the atmosphere ranging up to 15km. stratosphere lies at 50 to 90km and from 70- 400km ionosphere. Above 400km is the outer atmosphere.

11 Which of the following is the nearest Ionospheric layer to the earth surface?
a) D layer
b) E layer
c) F1 layer
d) F2 layer
Answer: a
Explanation: D layer is present at 70km from the earth surface and is the nearest layer to earth surface. E layer lies at 110km, f1 layer at 220km and F2 at 250 to 400km. Based on the density of ions different layers are present in this layer.

12 Which of the following layer disappears during night time in ionosphere?
a) D layer
b) E- layer
c) F1 layer
d) F2 layer
Answer: a
Explanation: During night time D layer disappears and F1, F2 layers combine together to form an F layer. D layer is present at 70km from the earth surface and is the nearest layer to earth surface. E layer lies at 110km, f1 layer at 220km and F2 at 250 to 400km.

13 In which of the following layers the electron density is high?
a) E layer
b) F1 layer
c) F2 layer
d) D layer
Answer: c
Explanation: The electron /ion density increases with the increase in height in ionosphere. F2 layer has 3×105 to 2×106 electron density . F2 layer = 2×105 to 4.5×105

14 What is the frequency used for tropospheric scatter propagation?
a) Above 30GHz
b) Above 30MHz
c) Above 300MHz
d) Above 300GHz
Answer: c
Explanation: Tropospheric scatter propagation is used for UHF and microwaves. So it is used at frequencies above 300MHz. Sky wave propagation is used at frequencies above 30MHz (VHF).

15 Which of the following scattering occurs through the fine layers in the troposphere?
a) Forward Scatter propagation
b) Ionosphere
c) Space wave
d) LOS
Answer: a
Explanation: Forward scatter propagation or Tropospheric propagation occurs at frequencies above 300MHz through the fine layers or blobs in the troposphere. UFH and microwaves propagate much beyond the LOS through forward scattering in tropospheric irregularities.

16 Height of the troposphere ranging from earth surface is up to
a) 15m
b) 15km
c) 50m
d) 50km
Answer: b
Explanation: The Troposphere portion of earth extends up to 15km from the earth surface. Ionosphere

from 50 to 400km and Outer atmosphere extends above 400km.

17 The lowest layer in the structure of atmosphere extends to a distance of km from earth surface

a) 15m
b) 15km
c) 50m
d) 50km
Answer: b
Explanation: The lowest layer of the atmosphere is troposphere. So it ranges up to 15km from the surface of the earth. The gas components remain almost constant in this region.

18 The actual height of troposphere is least at
a) poles
b) equator
c) both equator and poles
d) other composition other than poles and equator
Answer: a
Explanation: The actual height of troposphere is least at poles and maximum at equator. At other compositions it is almost remains same. The entire belt of troposphere is called Region of change.

19 Which of the following is a property of troposphere?
a) Temperature decreases with increase in height
b) Temperature increases with increase in height
c) Gas components don't remain in constant percentage with increase in height
d) Water vapor components remain same with height
Answer: a
Explanation: The property of troposphere is that temperature decreases with increase in height. Gas components remains in constant percentage with increase in height but water vapor components decrease with increase in height.

20 Which of the following is the nearest region from the earth surface in the atmosphere?
a) Troposphere
b) Stratosphere
c) Ionosphere
d) Outer atmosphere
Answer: a
Explanation: Troposphere is the lowest layer and nearest to earth surface in the atmosphere ranging up to 15km. Stratosphere lies at 50 to 90km and up to 400km ionosphere. Above 400km is the outer atmosphere.

21 The region between the top of troposphere and start of stratosphere is called
a) tropopause
b) stratopause
c) ionosphere
d) region of calm
Answer: a
Explanation: The region between the top of troposphere and start of stratosphere is called Tropopause. Stratopause is also known as region of calm and ranges from 20 to 70km.

22 Troposphere scatter propagation is used for point to point communication
a) True
b) False
Answer: a
Explanation: Since the troposphere propagation takes at 2- 15km from earth surface there is a possibility for great attenuation. It is used for point to point communication.

23 Duct propagation is due to which layer?
a) Temperature Inversion layer
b) Higher atmospheric layer
c) Ionospheric layer
d) Surface water
Answer: a
Explanation: Duct propagation is due to temperature inversion layer. Normal atmospheric temperature reduces at 6.5°C/km where as to provide duct wave propagation temperature must increase within 15-50m from earth surface. This layer occurs due to super refraction and at lower atmospheric layers.

24 Temperature inversion layer occurs due to
a) Super refraction
b) Reflection
c) Diffraction
d) Increase in altitude
Answer: a
Explanation: Around 50m of height from earth surface temperature increases with height, at this level the EM waves tend to refract continuously than to reflect into ionosphere. This is termed as super refraction. Reflection and diffraction don't affect the temperature inversion much.

25 In which of the following propagation temperature inversion layer is present?
a) Duct wave propagation
b) Sky wave propagation
c) Tropospheric scattering wave propagation
d) Space wave propagation
Answer: a
Explanation: Duct propagation is due to temperature inversion layer. This layer occurs due to super refraction and at lower atmospheric layers. Around 50m of height from earth surface temperature increases with height, at this level the EM waves tend to refract continuously than to reflect into

ionosphere. This is termed as super refraction.

26 How long the waves due to duct propagation travel following the earth curvature?
a) 1000km
b) 50m
c) 15m
d) 5000km
Answer: a
Explanation: Duct wave propagation is possible for microwave frequency and is due to temperature inversion layer. The waves follow the curvature of earth up to 1000km long. This occurs at a height of 15- 50m above the earth surface.

27 Up to which frequency the ground wave propagation is used?
a) 2MHz
b) 2GHz
c) 30MHz
d) 30GHz
Answer: a
Explanation: Ground wave propagation also known as surface wave propagation is used up to 2MHz. sky wave propagation is used at 2MHz to 30MHz.

28 In a ground wave propagation, which component of electric field is short circuited when it's in contact by earth?
a) Horizontal
b) Vertical
c) Both horizontal and vertical
d) Neither horizontal nor vertical
Answer: a
Explanation: Any horizontal component of electric field which is in contact with earth is short circuited by earth. Usually ground wave propagation is done by vertical antennas so it is vertically polarized.

29 During ground wave propagation earth behaves like a
a) Leaky capacitor
b) Leaky Inductor
c) Series combination of capacitor and inductor
d) Parallel combination of capacitor and inductor
Answer: a
Explanation: Any horizontal component of electric field which is in contact with earth is short circuited by earth. So earth behaves like a leaky capacity. It forms a resistor in shunt with a capacitor.

30 Sky wave propagation reflects the frequencies
a) 2MHz
b) 2 MHz to 30MHz
c) 2 GHz to 30 GHz
d) 30 GHz to 50GHz
Answer: b
Explanation: Ground wave propagation also known as surface wave propagation is used up to 2MHz. sky wave propagation is used at 2MHz to 30MHz.

31 At what distance the sky wave propagation is present from the earth surface?
a) 50 to 400km
b) Below 50 km
c) 600 to 750km
d) 50 to 400 m
Answer: a
Explanation: Sky wave propagation also known as ionosphere propagation reflects the waves with frequency 2 to 30MHz. It is present at 50 to 400km from earth surface.

32 Space wave propagation reflects the waves with frequencies
a) Below 2 GHz
b) 2 to 30MHz
c) Above 30GHz
d) Above 30MHz
Answer: d
Explanation: Ground wave propagation also known as surface wave propagation is used up to 2MHz. sky wave propagation is used at 2MHz to 30MHz. Space wave propagation reflects frequencies above 30MHz.

33 Space wave propagates at which frequency band?
a) VHF
b) HF
c) MF
d) EHF
Answer: a
Explanation: Space wave propagation reflects frequencies at 30 to 300MHz range. So it propagates at VHF band.
MF- 300 KHz – 3MHz
EHF- 30GHz-300GHz

34 In which of the following mode of propagation the waves are guided along the surface of the earth?

a) Ground wave
b) Sky wave
c) LOS
d) Space wave
Answer: a
Explanation: In ground wave or surface wave propagation the waves are guided along the surface of the earth. In sky wave they are reflected at different layers in the ionosphere. Space wave uses either direct or indirect method of propagation from transmitter to receiver directly.

35 In which of the following modes of propagation the ionosphere acts as the reflecting surface for the waves?
a) Ground wave
b) Sky wave
c) Space wave
d) LOS
Answer: b
Explanation: In Sky wave or Ionospheric wave propagation waves are reflected from the ionosphere layers depending upon different frequencies.

Prepared By S P Dolli	Verified By S.L.Dawkhar Module Coordinator	Re-Verified By S N Navale Academic Coordinator	Approved By S.G.Tupe HOD EJ

05- Antennas	**Marks:-12**

Content of Chapter:-

5.1 Antenna fundamentals: Resonant antenna and non- resonant antennas.

5.2 Antenna parameters: Radiation pattern, polarization, bandwidth, beamwidth, Antenna resistance, directivity and power gain, Antenna gain.

5.3 Dipole antenna: Half wave dipole antenna(Resonant antenna) and its radiation pattern, folded antenna and its radiation pattern, radiation pattern for dipole antenna of different length.

5.4 loop antenna , telescopic antenna, Yagi antenna, Micro-wave antenna-Dish antenna, Horn antenna and microstrip patch antenna –rectangular, square and circular (structure, radiation pattern and application of antennas).

1 The induction and radiation fields are equal at a distance of _____

a) λ/4
b) λ/6
c) λ/8
d) λ/2

Answer: b

Explanation: For an Hertzian dipole, equating the magnitudes of maximum induction and radiation fields we get,

|Eθ¯¯¯¯¯¯|maxRadiation=|Eθ¯¯¯¯¯¯|maxInduction

Imdl4πϵ(ωv2r)=Imdl4πϵ(1r2v)

r=vω=λf2πf=λ6.

2 The ratio of radiation intensity in a given direction from antenna to the radiation intensity over all directions is called as _____

a) Directivity
b) Radiation power density
c) Gain of antenna
d) Array Factor

Answer: a

Explanation: Directivity of antenna is defined as the ratio of radiation intensity in a given direction from antenna to the radiation intensity over all directions. D=UmaxU0.

Radiation Intensity is power radiated from an antenna for unit solid angle.

U0=wr.r2wattssteradians.

Gain of antenna is ratio of radiation intensity in given direction to the radiation intensity of isotropic radiation. Array factor is a function of geometry of array and the excitation phase.

3 What is the overall efficiency of a lossless antenna with reflection coefficient 0.15?

a) 0.997

b) 0.779

c) 0.669

d) 0.977

Answer: d

Explanation: For a lossless antenna, the radiation efficiency ecd=1.

Overall efficiency of antenna is given by eo =ecd (1-|γ2|)=1×(1-(0.152))=0.977.

4 The equivalent area when multiplied by the instant power density which leads to free radiation of power at antenna

is called a

a) Loss area

b) Scattering area

c) Captured area

d) Effective area

Answer: b

Explanation: Scattering area is the equivalent area when multiplied by the instant power density which leads to free radiation of power. Loss area leads to power dissipation and captured area leads to total power collection by the antenna. The relation among them is given by,

Captured area= effective area + loss area + scattering area.

5 Equivalent circuit representation of an antenna is

a) Series R, L, C

b) Parallel R, L, C

c) Series R, L parallel to C

d) Parallel R, C series to L

Answer: a

Explanation: Antenna is represented by a series R, L, C equivalent circuit. Antenna is used for impedance matching and acts like a transducer.

6 Radiation resistance of a Hertzian dipole of length λ/8 is

a) 12.33Ω

b) 8.54Ω

c) 10.56Ω

d) 13.22Ω

Answer: a

Explanation: Radiation resistance of a Hertzian dipole of length l is

R=80π2(lλ)2=80π2(λ/8λ)2=12.33Ω

7 Relation between directivity and effective area of transmitting and receiving antenna is

a) Dt At=Dr Ar

b) Dt Ar=Dr At

c) At Dt=∈Dr Ar

d) Dt At=∈Dr Ar

Answer: b

Explanation: The power collected by the receiving antenna is

Pr=PtDtAr4πR2=>DtAr=PrPt4πR2 = Dr At

∴ Dt Ar=Dr At

8 The axis of back lobe makes an angle of 180° with respect to the beam of an antenna.

a) True

b) False

Answer: a

Explanation: The axis of back lobe is opposite to the main lobe. So it makes 180° with beam of antenna. It is also a side lobe which is at 180 to main lobe.

9 .Radiation resistance of a half-wave dipole is

a) 36.56Ω

b) 18.28Ω

c) 73.12Ω

d) 40.24Ω

Answer: c

Explanation: Since radiation resistance of quarter-wave monopole (l=λ/4) is 36.56Ω, then for a half- wave dipole (l=λ/2) it is given by 36.56×2 = 73.12Ω. Hertzian dipole is an ideal dipole of infinitesimal dipole.

10 The radiation efficiency for antenna having radiation resistance 36.15Ω and loss resistance 0.85Ω is given by _

a) 0.977

b) 0.799

c) 0.997

d) 0.779

Answer: a

Explanation: The radiation efficiency ecd=RrRl+Rr=36.1536.15+0.85=0.977.

Radiation efficiency is also known as conductor-dielectric efficiency. It is the ratio of power delivered to the radiation resistance to the power delivered to it when conductor-dielectric losses are present.

11 Relation between Quality factor, Bandwidth, and resonant frequency is

a) Q=BWf0

b) Q=f0BW

c) Q = BW×f0

d) Q=BW+f0BW−f0

Answer: b

Explanation: Quality factor is defined as the ratio of resonant or center frequency to the bandwidth.Q=f0BW

12 What is the Bw of the antenna operating at resonant freq 200MHz with Quality factor 20?

a) 10Hz

b) 5MHz

c) 10MHz

d) 0.1MHz

Answer: c

Explanation: Bandwidth Q=f0Q=200MHz20=10MHz

13 What is the length of the half-wave dipole with bandwidth 20MHz and Quality factor 30?

a) 5m

b) 0.25m

c) 0.50m

d) 2.5m

Answer: b

Explanation: Operating frequency f0=BW×Q=20MHz×30=600MHz

Now, λ=cf=3×108m/s600MHz=0.5m

∴ Length of half-wave dipole is l=λ2=0.52=0.25m

14 What is the quality factor of the antenna operating at 650MHz and having a bandwidth of 10MHZ?

a) 65

b) 0.65

c) 15

d) 55

Answer: a

Explanation: Quality factor Q=f0BW=650MHz10MHz=65

15 In an antenna, the lower frequency limit is determined by pattern, gain or impedance.

a) True

b) False

Answer: a

Explanation: In an antenna, the lower frequency limit is determined by pattern, gain or impedance as the requirements changes. Higher frequency limit is determined by other parameters like the SWR, FBR etc.

16 In the impedance v/s frequency graph of antenna, the antenna impedance at frequencies less than resonant frequency is

a) inductive

b) capacitive

c) resistive

d) both inductive and capacitive

Answer: b

Explanation: Antenna is a series R,L,C equivalent circuit.For frequencies less than resonant frequency, the impedance is capacitive.

17 High the Fractional Bandwidth is the quality factor.

a) low

b) high

c) constant

d) infinity

Answer: a

Explanation: Fractional Bandwidth is the ratio of the frequency range of antenna to the center frequency. If Fractional bandwidth is high, then Bandwidth of the antenna is also more. So the quality factor decreases as it is inversely proportional to the bandwidth

18 For lower Quality factor antennas, the bandwidth is very high.

a) True

b) False

Answer: a

Explanation: The bandwidth of antenna is inversely proportional to the Quality factor of the antenna.

Q=f0BW

19 A linear antenna having length less than λ/8 is called as

a) Short monopole

b) Short dipole

c) Half-wave dipole

d) Quarter-wave monopole

Answer: a

Explanation: Short monopoles have length less than λ/8 and the current distribution is triangular. Short dipole has length less than λ/2. Half-wave dipoles have length equal to λ/2. Quarter-wave monopoles have length equal to λ/4.

20 Find the power radiated by an antenna whose radiation resistance is 100Ω and operating with 3A of current at 2GHz frequency?

a) 900W

b) 1800W

c) 450W

d) 700W

Answer: a

Explanation: Power radiated Pr=I2 Rr=100×32=900Watts.

21 If beam width of the antenna increases, then directivity

a) Decreases

b) Increases

c) Remains unchanged

d) Depends on type of antenna

Answer: a

Explanation: As beam width of antenna increases its area coverage broadens, thereby directivity decreases. Beam area and directivity are inversely proportional. D=4πBeamArea.

22 The receiving antenna is designed to have side-lobe-ratio and SNR.

a) Low, high

b) High, high

c) Low, low

d) High, low

Answer: a

Explanation: Side lobe ratio is ratio of power density in side lobes to main lobe. A receiving antenna is said to be efficient if side lobes are minimized and receives most of the transmitted signal. So it should have low SLR and high SNR

23 Effective aperture is the ability of antenna to extract energy from the electromagnetic wave.

a) True

b) False

Answer: a

Explanation: Effective aperture is defined as the ratio of power received from load to the average power density produced at that point. So it is the ability of antenna to extract energy from EM wave.

24 What is the effective aperture of Hertzian dipole antenna operating at frequency 100 MHz?

a) 1.07m2

b) 0.17m2

c) 1.7m2

d) 1.2m2

Answer: a

Explanation: Effective aperture for a Hertzian dipole is given by Ae=1.5λ24π

Gain of Hertzian dipole is 1.5

λ=cf=3×108100×106=3m

Ae=1.5λ24π=1.5324π=1.07m2

25 If physical aperture of antenna is 0.02m2 and aperture efficiency is 0.5, then what is the value of effective aperture?

a) 0.0004m2

b) 0.001m2

c) 0.01m2

d) 25m2

Answer: c

Explanation: Effective aperture Aem=Aeη=0.02×0.5=0.01 m2

26 What is the effective aperture of a Half-wave dipole operating at 100MHz?

a) 1.07m2

b) 1.17m2

c) 1.27m2

d) 1.77m2

Answer: b

Explanation: The directivity of half-wave dipole is 1.64

The effective aperture of half-wave dipole is Ae=1.64λ24π

λ=cf=3×108100×106=3m

Ae=1.64λ24π=1.64324π=1.17m2

27 The ratio of maximum power density in the desired direction to the average power radiated from the antenna is called as

a) directivity

b) directive gain

c) power gain

d) partial directivity

Answer: a

Explanation: The ratio of maximum power density in the desired direction to the average power radiated from the antenna is called Directivity. The ratio of power radiated in a particular direction

to the actual power input to antenna is called Power gain. Directive gain is the ratio of power radiated in desired direction to the average power radiated from the antenna. Maximum Directive gain is called as Directivity. Partial directivity is the part of radiation intensity in a particular polarization to radiation intensity in all directions.

28 What is the Beam area for Directivity to be 1 in Steradian?

a) 4π

b) 1/2π

c) 2π

d) 1/4π

Answer: a

Explanation: The Directivity in terms of the Beam area ΩA is given by D=4πΩA

⇨ 4πD=4π steradians.

29 If directivity of antenna increases, then the coverage area

a) decreases

b) increases

c) increases and then decreases

d) remains unchanged

Answer: a

Explanation: As the directivity increases, the beam area decreases. So, the coverage area of beam decreases and takes more time to scan a target for target detection.

30 If half power beam width in one plane and other plane orthogonal to it are equal to π then the directivity is

a) π

b) 4π

c) 4/π

d) 2π

Answer: c

Explanation: Beam area ΩA≈ θ1r θ2r where θ1r, θ2r are half-power beam widths in radians.

Directivity D=4πΩA=4πθ1rθ2r=4ππ.π=4/π

31 Directive gain with maximum radiation intensity is called as Directivity.

a) True

b) False

Answer: a

Explanation: Directivity is defined as ratio of maximum power density in desired direction to the average power radiated in all directions. This is simply, maximum Directive gain. Maximum Directive gain is obtained if maximum radiation intensity is present in desired direction.

32 How the directivity and effective aperture related to each other?

a) Inversely proportional

b) Directly proportional

c) Independent

d) Proportionality depends on input power

Answer: b

Explanation: The directivity D is directly proportional to the effective aperture of antenna. $A_e = D\lambda^2/4\pi$

33 What is the directivity of half-wave dipole?

a) 1.64

b) 1.5

c) 1.43

d) 1.44

Answer: a

Explanation: Directivity $D = U_{max}/U_{av} = 4\pi U_{max}/P_{rad}$

$P_{rad} = 36.54 I_0^2$ Since the radiation resistance for Half-wave dipole is 36.54Ω.

Maximum radiation intensity is given by $U_{max} = P_{max}.r^2 = |E\theta|^2_{max}/2\eta.r^2$

Where $E\theta = j\eta I_0 e^{-jkr} \cos(\pi\cos\theta/2)/2\pi r\sin\theta$

⇨ $D = 4\pi 1\eta I^2/8\pi^2 136.54 I^2_0 = 1.64$.

34 What is the directivity of antenna having effective aperture 1 m2?

a) $4\pi\lambda^2$

b) $\lambda^2/4\pi$

c) 1

d) 4π

Answer: a

Explanation: Directivity $D = 4\pi\lambda^2/A_e$

Given effective aperture $A_e = 1 m^2$

⇨ $D = 4\pi\lambda^2/A_e = 4\pi\lambda^2 \times 1 = 4\pi\lambda^2$

35 The ratio of power radiated in a particular direction to the total input power of antenna is called as

a) Directive gain

b) Power gain

c) Directivity

d) Partial directivity

Answer: b

Explanation: The ratio of power radiated in a particular direction to the actual power input to antenna is called Power gain. $G_p = P_d(\theta,\emptyset)/P_{in}$. Directive gain is the ratio of power radiated in desired direction to the average power radiated from the antenna. Partial directivity is the part

of radiation intensity in a particular polarization to radiation intensity in all directions.

36 What is the maximum power gain of antenna with radiation efficiency 98% and directive gain 1?

a) 0.98
b) 1.02
c) 1.98
d) 1
Answer: a
Explanation: Gpmax=ηr Gdmax where ηr is radiation efficiency
∴ Gpmax=0.98×1=0.98.

37 What is the maximum power gain when the radiation resistance is 72Ω, loss resistance is 8Ω and the maximum directive gain is 1.5?

a) 1.15
b) 1.35
c) 1.25
d) 1.53
Answer: b
Explanation: Maximum power gain Gpmax=ηr Gdmax
Radiation efficiency ηr=RrRr+Rl=7272+8=7280=0.9
Now, Gpmax=ηr Gdmax=0.9×1.5=1.35

38 The radiation efficiency value is

a) 0
b) 1<η<∞
c) 0≤η≤1
d) ∞
Answer: c
Explanation: Radiation efficiency ηr=RrRr+Rl
Rr+Rl>Rr So RrRr+Rl < 1 and If Rl=0 then ηr=1
Therefore, the value of efficiency lies in the range 0 to 1.

39 If directivity of antenna increases, then the coverage area

a) decreases
b) increases
c) increases and then decreases
d) remains unchanged
Answer: a
Explanation: As the directivity increases, the beam area decreases. So, the coverage area of beam decreases and takes more time to scan a target for target detection

40 The directivity of Yagi-Uda antenna is increased by adding

a) reflectors

b) driven element

c) directors

d) boom

Answer: a

Explanation: Addition of directors leads to focus the beam in the forward direction. So, directors will increase the gain of antenna. Folded dipole acts like a feed or driven element. Reflectors will increase the directivity of antenna by reflecting all energy towards radiation direction of antenna.

Boom is a center rod on which elements are mounted.

41 Directors are used to increase of the Yagi-Uda antenna.

a) Directivity

b) Gain

c) Back lobe

d) Reflection away from the radiation

Answer: b

Explanation: Reflectors will increase the directivity of antenna by reflecting all energy towards radiation direction of antenna. Addition of directors leads to focus the beam in the forward direction. So, directors will increase the gain of antenna.

42 What is the radiation pattern of a Yagi-Uda antenna?

a) Broad-side

b) End-fire

c) Collinear

d) Both Broadside and End-fire

Answer: b

Explanation: Radiation pattern of a Yagi-Uda antenna is end-fire. It has its main beam parallel to the axis of antenna (boom). The addition of directors will increase the gain of antenna while reflectors will increase the directivity of antenna.

43 The dipole to which the power is applied directly from the feeder in the Yagi-Uda antenna is called as

a) Director

b) Reflector

c) Driven element

d) Boom

Answer: c

Explanation: The dipole to which the power is applied directly from the feeder in the Yagi-Uda

antenna is called driven element. Directors add the field of the driven element and will excite the next parasitic element. Reflectors will increase the directivity of antenna.

44 Folded dipole is used than a single dipole in Yagi-Uda to obtain wider frequency range.

a) True

b) False

Answer: a

Explanation: Folded dipole produces flatter impedance v/s frequency compared to single dipole. So, folded dipole is used in Yagi-Uda to obtain wider frequency range.

45 In which of the following bands Yagi-Uda antenna operates?

a) HF-UFH

b) VLF-MF

c) LF-HF

d) UHF-EHF

Answer: a

Explanation: Yagi-Uda antenna operates mostly in the HF to UFH band frequency. IT ranges from 3MHz to 3GHz.

VLF-MF: 3 kHz to 3MHz

LF-HF: 30 kHz to 30MHz

UHF –EHF: 300MHz to 300GHz.

46 A Yagi-Uda antenna is

a) Only a super directive antenna

b) Only a super gain antenna

c) Both super directive and super gain

d) Neither super directive nor super gain

Answer: c

Explanation: A Yagi-Uda antenna provides high directivity by increasing reflectors and gain due to the directors. Directors will increase the forward gain of the antenna. So it is both super directive and super gain antenna.

47 In order to convert the bidirectional dipole to unidirectional system, we use

a) Active element

b) Driven element

c) Parasitic element

d) Isolator

Answer: c

Explanation: We use reflectors and directors which are passive elements also known as the

parasitic elements to increase the directivity and gain if the antenna.

48 Which of the following will add the field of the driven element and will excite the next parasitic element to increase the gain of the antenna?

a) Director

b) Reflector

c) Active element

d) Boom

Answer: a

Explanation: Directors add the field of the driven element and will excite the next parasitic element. Directors will increase the gain of the antenna in the forward direction. Reflectors will add fields of the driven element in the direction from reflector to driven element.

49 Which of the following statement is not correct?

a) Folded dipole antenna has less impedance than half dipole

b) Folded dipole is a balanced antenna

c) Folded dipole antenna is a dipole antenna with its end folded back forming a loop

d) Balun is used at the feeder when unbalanced feed is used in the folded dipole

Answer: a

Explanation: The impedance of folded dipole is four times the impedance of the half dipole. So its impedance is higher than the half dipole. Since folded dipole is a balanced antenna we use a balanced feeder so Balun is used.

50 Folded dipole antenna belongs to which type of antenna?

a) Reflector

b) Aperture

c) Lens

d) Wire

Answer: d

Explanation: Folded dipole antenna belongs to wire antenna. It is a dipole antenna with two ends folded back and connected to each other forming a loop.

51 What is the input impedance of a half wave folded dipole?

a) 73Ω

b) 292Ω

c) 146Ω

d) 36.5Ω

Answer: b

Explanation: The input impedance of a half wave folded dipole is four times the half wave dipole.

So Z= 4×73=292Ω

52 A half wave folded dipole of 3 wires has the impedance Ω.

a) 675

b) 657

c) 219

d) 292

Answer: b

Explanation: For a half wave folded dipole of 3 wires the impedance = n2×73=9×73=657

53 Which of the following causes the shortening effect on multi conductor folded dipole?

a) Only thickness of conductors

b) Space between conductors

c) Radiation resistance of the dipole

d) Both the radii and radiation resistance

Answer: a

Explanation: The shortening effect on the multi conductors depends on the thickness of the conductor whereas in wires it depends on the length and the frequency of operation.

54 A dipole antenna is also called as?

a) Marconi antenna

b) Yagi antenna

c) Bidirectional antenna

d) Hertz antenna

Answer: d

Explanation: One of the most widely used antenna types is the half-wave dipole antenna. This antenna is also formally known as the Hertz antenna after Heinrich Hertz, who first demonstrated the existence of electromagnetic waves.

55 The impedance at the center of the antenna is known as?

a) Characteristic impedance

b) Radiation resistance

c) Transmission impedance

d) Recovery resistance

Answer: b

Explanation: The transmission line is connected at the center. The dipole has an impedance of 73 V at its center, which is the radiation resistance. At the resonant frequency, the antenna appears to be a pure resistance of 73 V.

56 What happens when the radiation resistance of the antenna matches the characteristic impedance of the transmission line?

a) No transmission occurs

b) No reception occurs

c) SWR is maximum

d) SWR is minimum

Answer: d

Explanation: When the radiation resistance of the antenna matches the characteristic impedance of the transmission line, the SWR is minimum and maximum power reaches the antenna. This allows maximum power to be transmitted.

57 The type of dipole antenna that has a higher band width is called as?

a) Conical antenna

b) Yagi antenna

c) Helical antenna

d) Marconi antenna

Answer: a

Explanation: A common way to increase bandwidth in the antenna is to use a version of the dipole antenna known as the conical antenna. The overall length of the antenna is 0.73λ or 0.73(984)/f = 718.32/f. This is longer than the traditional one-half wavelength of a dipole antenna, but the physical shape changes the necessary dimensions for resonance.

58 The radiation pattern of a half-wave dipole has the shape of a

a) Doughnut

b) Sphere

c) Hemisphere

d) Circular

Answer: a

Explanation: The radiation pattern of any antenna is the shape of the electromagnetic energy radiated from or received by that antenna. Typically that radiation is concentrated in a pattern that has a recognizable geometric shape. The radiation pattern of a half-wave dipole has the shape of a doughnut.

59 What is the beam width for a half wave dipole antenna?

a) 90°

b) 180°

c) 50°

d) 250

Answer: a

Explanation: The beam width is measured between the points on the radiation curve that are 3 dB down from the maximum amplitude of the curve. The maximum amplitude of the pattern occurs at 0° and 180°. The 3-dB down points are 70.7 percent of the maximum. The angle formed with two lines extending from the center of the curve to these 3-dB points is the beam width. The beam width is 90°. The smaller the beam width angle, the more directional the antenna.

60 What does the beam width of an antenna tell us?

a) Signal strength

b) Signal power

c) Directivity

d) Degradation

Answer: c.

Explanation: The measure of an antenna's directivity is beam width, the angle of the radiation pattern over which a transmitter's energy is directed or received. Beam width is measured on an antenna's radiation pattern.

Prepared By S P Dolli	Verified By S.L.Dawkhar Module Coordinator	Re-Verified By S N Navale Academic Coordinator	Approved By S.G.Tupe HOD EJ