PHYSICS

BOOKS - AAKASH SERIES

COMMUNICATION SYSTEMS

Problems

1. The number of amplitude modulated broadcast stations that can be accomdated in a 300 kHz band width for the highest modulating frequency $15 kHz$ will be

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2. How many 660kHz waves can be on a 5 mile transmission line simultaneously?

3. The characteristic impedance of a co-axial cableis of the order of:

4. The frequency of amplitude modulated wave is equal to

5. TV transmission tower at Kota has a height of 80 m. Radius of earth is

6400 km

(i) What is its coverage range

(ii) How much population is covered by transmission if the average

population density around the tower is $2000 km^{-2}$?

6. In an amplitude modulator circuit, the carrier wave is given by, $C(t) = 4\sin(20000\pi t)$ while modulating signal is given by, $m(t) = 2\sin(2000\pi t)$. The values of modulation index and lower side band frequency are :

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7. A transmitting antenna at the top of a tower has a height 32 m and the height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in the line of sight mode. Given radius of earth 6.4×10^6 m

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8. The antenna current of an AM transmitter is 8 A when only the carrier is sent, but it increases to 8.93 A when the carrier is modulated by a single sine wave. Find the percentage modulation.

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9. A 400 W carner wave is modulated to a depth of 75%. Calculate the total power in the modulated wave.

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10. A message signal of frequency 10 KHz and peak voltage of 10V is u sed to modulate a carrier of frequency 1 MHz and peak voltage of 20V. The frequency of the side bands produced is

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11. The load current in the transmitting antenna of an unmodulated AM transmitter is 6 Amp. What will be the antenna current when modulation is 60 % .

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1. An antenna

    A. Converts AF wave to RF wave

    B. RF signal into electromagnetic energy

    C. Converts the guided em waves into free space em waves and vice

       versa

    D. Super imposes AF wave on RF wave.

Answer: C

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2. An antenna behaves as resonant circuit only when its length is

    A. equal to $\dfrac{\lambda}{4}$

    B. equal to $\dfrac{\lambda}{2}$

C. equal to the integral multiples of $\frac{\lambda}{2}$

D. equal to $\frac{3\lambda}{4}$

Answer: A

3. The Q of a resonant transmission line is:

A. a & b are true

B. b & c are true

C. c & a are true

D. a, b & c are true

Answer: A

4. The height of a TV antenna is 200 m. The population density is $4000km^{-2}$. Find the population benefited

    A. a & b are true

    B. b & c are true

    C. c & a are true

    D. a, b & c are true

Answer: D

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5. Find the ratio of frequencies of light waves of wavelengths 4000 A and 8000 A.

    A. 15 km

    B. 1500 m

    C. 300 m

D. 3 km

Answer: A

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6. Increase in BMR is due to

A. Interference

B. Diffraction

C. Polarization

D. Due to unknown reason

Answer: B

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7. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

    A. $h^{1/2}$

    B. h

    C. $h^{3/2}$

    D. h^2

Answer: A

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Exercise Ia Modulation

1. This is the process by which the biological information contained in the base sequence of DNA is made available to the cell

    A. Detection

B. Modulation

C. Amplification

D. Demodulation

Answer: B

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2. During the process of mitosis.

A. Modulating wave

B. Modulated wave

C. Carrier wave

D. Audio wave

Answer: C

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3. Genes contain the information that is required to express a particular trait.' Explain.

A. a & b are true

B. b & c are true

C. c & a are true

D. a, b & c are true

Answer: D

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4. In amplitude modulation

A. The amplitude of the carrier wave varies in accordance with the amplitude of the modulating signal

B. The amplitude of carrier wave remains constant, frequency changes in accordance with the modulating signal

C. The amplitude of carrier wave varies in accordance with the

frequency of the modulating signal

D. The amplitude changes in accordance with the wave length of the

modulating signal

Answer: A

5. Assertion: The units of some physical quantities can be expressed as

combination of the base units.

Reason: We need only a limited number of units for expressing the

derived physical quantities.

A. Amplitude only

B. Amplitude and frequency

C. Amplitude, frequency and phase

D. Only frequency

Answer: C

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6. AM is used for broadcasting because

    A. it is more noise immune

    B. it requires less transmitting power

    C. it has simple circuit

    D. it has high fidelity (faithful reproduction)

Answer: C

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7. In amplitude modulation

    A. During transmission extraneous noise creeps in.

B. Most of the transmitting power is wasted , as it does not contain

   useful information.

C. The reception is not clear in the case of weak signals due to noise

D. All the above

Answer: D

8. The tuned circuit the Oscillator in a simple AM transmitter employs a

$50\mu H$ coil and a 1 nF capacitor. If the oscillator output is modulated by

audio frequencies up to 10m kHz calculate the range occupied by the side

bands.

   A. to produce modulating signal

   B. to produce carrier wave

   C. to produce enough power

   D. to reduce the noice

Answer: B

9. In frequency modulation

A. Frequency of CW remains constant but amplitude changes in accordance with modulating wave frequency

B. Frequency of CW changes in accordance with the modulating wave frequency but the amplitude also changes.

C. Frequency of CW changes in accordance with the frequency of modulating wave frequency but the amplitude remains constant.

D. Frequency of CW changes in accordance with the amplitude of modulating wave amplitude

Answer: D

10. In a communication system, noise is most likely to affect the signal

    A. at the transmitter

    B. in the medium of transmission

    C. in the formation source signal

    D. at the destination

Answer: B

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11. The difference between phase and frequency modulation

    A. practically they are same but theoretically they differ

    B. lies in the poorer audio response of phase modulation

    C. lies in the poorer audio response of frequency modulation

    D. lies in the definitions of mudulation and their modulation index

Answer: D

12. While tuning in a certain broadcast station with a receiver, we are actually

    A. varying the local oscillator

    B. varying the resonant frequency of the circuit for the radio signal to

       be picked up

    C. tuning the antenna

    D. all the above

Answer: B

13. Digital signals (i) do not provide a continuous set of values, (ii) represent value as discrete steps, (iii) can utilize decimal as well as binary system. Which of the following options is True :

A. do not provide continuous set of values

B. represent values as discrete steps

C. Utilize binary code system

D. All the above

Answer: D

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14. An amino acid under certain conditions have both positive and negative charges simultaneously in the same molecule. Such a form of amino acid is called

A. audio signal is frequency modulated and video signal is amplitude

   modulated

B. both audio and video signals are frequency modulated

C. audio signal is amplitude modulated and video signal is frequency

   modulated

D. both audio and video signals are amplitude modulated

Answer: A

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15. Assertion: AM detection is the process of recovering the modulating

signal from amplitude modulated waveform wich is carried out using a

rectifier and an evelope detector.

Reason: Amplitude modulated waves can be produced by application of

the message signal and the carrier wave to a non-linear device followed

by band pass filter.

A. Superimposition

B. Amplificaiton

C. Demodulation

D. Modulation

Answer: C

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16. The sound waves after being converted into electrical waves are not

transmitted as such because

A. they travel with the speed of sound

B. the frequency is not constant

C. they are heavily absorbed by the atmosphere

D. the height of antenna has to be increased several times

Answer: C

17. In amplitude modulation

    A. the system will fail

    B. the signal will be distorted

    C. the amplifier will be damaged

    D. the signal will die out quickly

Answer: B

18. Modem is a device which performs

    A. modulation

    B. demodulation

    C. rectification

D. modulation and demodulation

Answer: D

19. Audio signal canot be transmitted because

A. the signal has more noise

B. the signal cannot be amplified for distance communication

C. the transmitting antenna length is very small to design

D. the transmitting antenna length is very large and inpracticable

Answer: D

20. Of the following which is preferred modulation scheme for digital communication.

A. pulse code modulation (PCM)

B. pulse amplitude modulation (PAM)

C. pulse position modulation (PPM)

D. pulse with modulation (PWM)

Answer: A

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21. A basic communication system consists of

(A) transmitter (B) information source

(C) user of information (D) channel

(E) reciever

Choose the correct sequence in which these are arranged in a basic communication system.

A. ABCDE

B. BADEC

C. BDACE

D. BEADC

Answer: B

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22. Digital signals (i) do not provide a continuous set of values, (ii) represent value as discrete steps, (iii) can utilize decimal as well as binary system. Which of the following options is True :

A. 1 and 2 only

B. 2 and 3 only

C. 1,2,3 but not 4

D. all 1,2,3, and 4

Answer: C

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23. Identify the mathematical expression for amplitude modulated wave.

A. $A_c \sin[\{\omega_c + K_1 V_m(t)\} + \phi]$

B. $A_c \sin\{\omega_c t + \phi + K_2 V_m(t)\}$

C. $\{A_c + K_2 V_m(t)\}\sin\{\omega_c t + \phi\}$

D. $A_c V_m(t)\sin(\omega_c t + \phi)$

Answer: C

Exercise Ia Sky Wave Propagation

1. When a sound wave is reflected from a wall, the phase difference between the reflected and incident pressure wave is :

A. frequency of the reflected wave is different to that of incident wave

B. there is a phase difference of $\pi/2$ is introduced to the reflected wave

C. the reflected wave is out of phase of incident wave and reach the receiving antenna along with the direct wave from transmitting antenna causing interference.

D. the waves are not reflected by the ground.

Answer: C

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2. Find the ratio of 3 km to 300 m

A. 2 & 3

B. 1 & 4

C. 1 & 3

D. 2 & 4

Answer: B

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3. The frequency band used in the downlink of satellite communication is

A. Most useful reflecting layer for low frequency waves

B. Most useful reflecting layer for high frequency wave

C. Most useful reflecting layer for medium frequency wave

D. Most useful reflecting layer for all frequencies

Answer: B

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4. Ground wave have wavelength

    A. less than 200m

    B. equal to 200m

    C. more than 200m

    D. all of these

Answer: A

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5. In sky wave mode of propagation, why is the frequency rangy of tranmitting signals restricted to less than 30 MHz?

    A. less than 40MHz

    B. equal to 40MHz

    C. more than 40MHz

    D. all of these

Answer: C

6. PCT is responsible for

    A. mesosphere

    B. photosphere

    C. troposphere

    D. ionosphere

Answer: D

7. Explain the following:

Aniline is less basic than ammonia.

A. 1 is true 2 is false

B. 1 is false 2 is true

C. Both a & 2 are true

D. Both 1 & 2 are false

Answer: A

8. With increases of ionic density, the R.I, of ionosphere

A. decreases

B. increases

C. does not change

D. may increase (or) decrease

Answer: A

9. The frequency of amplitude modulated wave is equal to

    A. maximum usable frequency

    B. critical frequency

    C. launching frequency

    D. threshold frequency

Answer: B

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10. The highest frequency of transmitted wave that is returned to the earth by the layer of ionosphere after having been sent at some angle to normal is called

    A. maximum usable frequency

    B. critical frequency

C. launching frequency

D. threshold frequency

Answer: A

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11. Explain the principle and working of a cyclotron with the help of a schematic diagram. Write the expression for cyclotron frequency.

A. $f_c = \sqrt{\dfrac{N_{\text{max}}e^2}{4\pi^2\varepsilon_0 m}}$

B. $f_c = \sqrt{81 N_{\text{max}}}$

C. $f_c = (\text{MUF})\cos\theta$

D. All 1,2,3

Answer: D

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12. Two waves A and B of frequencies 2MHz and 3MHz, respectively are beamed in the same direction for communication via sky wave. Which one of these is likely to travel longer distance in the ionosphere before suffering total internal reflection?

    A. A travels longer distance

    B. B travels longer distance

    C. both A & B travels same distance

    D. A & B cannot suffer T.I.R

Answer: B

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13. Electromagnetic waves with frequencies greater than the critical frequency of Ionosphere cannot be used for communication using sky wave propagation because

    A. R.I of ionosphere becomes very high for $f > f_c$

B. R.I of ionosphere becomes very low for $f > f_c$

C. R.I of ionosphere becomes very high for $f < f_c$

D. None

Answer: A

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14. The skip zone in radio wave trasmission is that range where

A. there is no reception of either ground wave (or) sky wave

B. the reception of ground wave is maximum but that of sky wave is

minimum

C. the reception of ground is minium and that of sky wave is maximum

D. the recption of both ground wave and sky are minimum

Answer: A

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15. Ozone layer above earth's atmosphere will not

    A. It is a top most layer in earth's atmosphere which is highly ionized and inspite of recombination, ionization persists to some degree.

    B. The actual air density in the F layer is low but ionization density in this layer is high so most of the molecules in this layer are in ionized state at night.

    C. Due to low density of air in layer, the molecular have a large free path. The molecular collision rate is low.

    D. All the above

Answer: D

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16. A wave has velocity u In medium P and velocity $2u$ in medium Q. If the wave is refracted from medium P medium Q at an angle of incidence $30°$, then the angle of refraction will be

A. $30°$

B. $60°$

C. $45°$

D. $90°$

Answer: A

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17. A gene is said to be dominant if

A. fidelity

B. distortion

C. sensitivity

D. sensibility

Answer: A

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18. Refractive index of Ionosphere is

A. zero

B. more than one

C. less than one

D. one

Answer: C

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19. Three waves A,B and C of frequencies 1600 KHz, 5MHz and 60 MHz, respectively are to be trasnmitted from one place to another which of the following is the most appropriate mode of communication?

A. A is transmitted via space wave while B and C are transmitted via sky wave

B. A is transmitted via ground wave, B via sky wave and C via space wave

C. B and C are transmitted via ground wave while A is transmitted via sky wave

D. B is transmitted via ground wave while A and C are transmitted via space wave

Answer: B

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20. Which of the following frequency will be suitable for beyond the horizon communication using sky waves?

    A. 10 kHz

    B. 10 MHz

    C. 1 GHz

    D. 1000 GHz

Answer: B

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Exercise Ia Space Communication

1. Assertion: Long distance communication between two points on the earth is achieved using sky waves.

Reason: sky wave propagation takes place above. The frequency of 30 MHz.

A. Space wave communication

B. Sky wave communication

C. Satellite wave communication

D. Line of sight transmission

Answer: B

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2. A source S and a detector D high frequency waves are a distance d apart on the ground. The direct wave from S is found to be in phase at D with the wave from S that is reflected from horizontal layer at an altitude H. The incident and reflected rayes make the same angle with the reflecting layer. When the layer rises a distance h, no signal is detected at D . Negle ct absorption in the atmosphere and find the relation between

d,h, H and the wavelength λ of the waves.
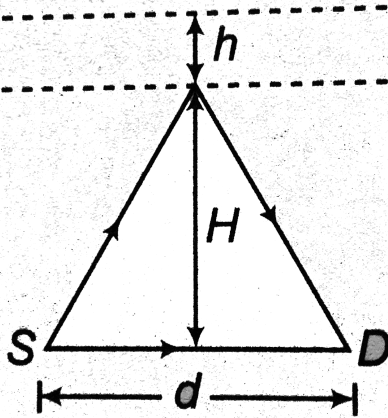
A. absorbed by F layer

B. reflected by the E layer

C. capable of use for long distance transmission

D. affected by the solar cycle

Answer: B

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3. The electromagnetic waves travel in free space with the velocity of

A. absorption takes place

B. attenuation takes place

C. refraction takes place

D. reflection takes place

Answer: B

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4. Ground wave have wavelength

A. less than 200m

B. equal to 200m

C. more than 200m

D. all of these

Answer: C

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5. Which basic mode of communication is used for telephonic communication ?

A. Space wave

B. Sky wave

C. Ground wave

D. Microwave

Answer: A

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6. The space wave propagation is utilized in

A. Microwave communication

B. Sayellite communication

C. TV transmission

D. All the above

Answer: D

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7. Frequencies in the UHF range normally propagate by means of

A. ground waves

B. sky waves

C. surface waves

D. space waves

Answer: D

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8. For television broadcasting, the frequency employed is normally.

A. 30-300 MHz

B. 30 - 300 GJz

C. 30 - 300 KHz

D. 30 - 300 Hz

Answer: A

9. Estimate the fastest bit rate capable of being carried by light of wavelength 1.3 μm. How many phone calls could be carried at this bit rate? Band width of optical fibre =2 GHz.

A. more than 100 GHz

B. few kHz

C. less than 1 MHz

D. less than 1 GHz

Answer: A

10. The most commonly used bioreactor is

    A. amplitude modulation

    B. frequency modulation

    C. phase modulation

    D. all the above

Answer: B

11. Frequency of matter wave is equal to

    A. 540 KHz to 1600 KHz

B. 30 KHz to 300 KHz

C. 3 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: A

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12. The short wave Radio broadcasting band is

A. 7 MHz to 22 MHz

B. 88 MHz to 108 MHz

C. 30 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: A

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13. The frequency band of FM broadcast is

A. 5 MHz to 30 MHz

B. 88 MHz to 108 MHz

C. 30 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: B

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14. Dark bands are

A. MF and HF bands

B. VHF and UHF bands

C. UHF and SHF bands

D. SHF and EHF band

Answer: B

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15. The scientific principle involved in radio and TV broadcast is

A. 1

B. 2

C. 3

D. 4

Answer: D

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16. What is the range of frequencies used for TV transmission ? What is common between these waves and light waves ?

A. 0.54 KHz to 1.6 KH, 80 MHz to 108 MH

B. 896 to 901 MHz, 0.84 to 0.9356 Hz

C. 54 MHz to 72 MHz, 76 MHz to 88 MHz

D. 174 MHz to 216 MHz, 420 MHz to 890 MHz

Answer: C

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17. Skin casting of Frog is

A. 54 - 72 MHz, 76 to 88 MHz

B. 174 - 216 MHz , 420 to 890 MHz

C. 896 to 901 MHz, 840 to 935 MHz

D. 5.925 to 6.425 GJz, 3.7 to 4.2 GHz

Answer: B

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18. 3-30 MHz frequency range is known as

    A. 840 to 935 MHz

    B. 3.7 to 4.2 GHz

    C. 420 to 890 MHz

    D. 30 to 300 GHz

Answer: A

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19. The frequency band used in the downlink of satellite communication is

    A. 0.896 to 0.901 GHz

    B. 0.420 to 0.890 GHz

    C. 5.925 to 6.425 GHz

D. 3.7 to 4.2 GHz

Answer: D

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20. For base station to mobile communication, the required frequency band is

A. 0.896 to 0.901 GHz

B. 0.420 to 0.890 GHz

C. 5.925 to 6.425 GHz

D. 3.7 to 4.2 GHz

Answer: C

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21. Sky Wave Propagation

    A. upto 3 MHz

    B. from 2MHz to 20 MHz

    C. from 2 MHz to 30 MHz

    D. none of the above

Answer: C

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22. In which of the following remote sensing technique is not used?

    A. Aryabhatt

    B. INSAT 2B

    C. Sputnik - I

    D. IRS IB

Answer: D

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23. Write a note on synchronous satellite.

    A. located at a height of 34860 km to ensure global coverage

    B. appears stationary over a place on earth's magnetic pole

    C. not stationary at all, but orbits the earth within 24 hours

    D. always at a fixed location in state and simply spins about its own

       axis.

Answer: C

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24. A signal emiited by an antenna form a certain point can be received at

another point of the surface in the form of

A. sky wave

B. ground wave

C. sea wave

D. both 1 and 2

Answer: D

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25. The electromagnetic waves of frequency 80 MHz to 200 MHz

A. can be reflected by troposphere

B. can be reflected by ionosphere

C. can be reflected by mesosphere

D. cannot be reflected by any layer of earth's atmosphere

Answer: D

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26. Which of the following is better propagation mode to propagate television frequency and radar signals ?

    A. satellite communication

    B. ground propagation

    C. polarized communication

    D. none of these

Answer: A

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27. Radiowaves of constant amplitude can be generated with

    A. Filter

    B. Rectifier

    C. FET

D. Oscillator

Answer: D

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28. If interference is complete or cent percent then the frequency of observed crossover will be

A. 1-3 MHz

B. 150-500 kHz

C. 8-25 MHz

D. 80-150 MHz

Answer: C

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29. Among the following the waves which can penetrate the ionosphere are

A. 10 GHz

B. 10 MHz

C. 20 MHz

D. 25 MHz

Answer: A

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30. Which of the following is a true nut?

A. long - wave

B. short - wave

C. medium-wave

D. amplitude - modulated

Answer: B

31. Intelset satellite works as a -

    A. transmitter

    B. receiver

    C. absorber

    D. repeater

Answer: D

32. The space waves which are affected seriously by atmospheric conditions are

A. MF

B. HF

C. VHF

D. UHF

Answer: D

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33. When a low flying aeroplane passes over head, we sometimes notice a slight shaking of the picture on our TV screen. This is due to

A. diffraction of the signal received from the antenna.

B. interference of the direct signal received by the antenna with the weak signal reflected by the passing aircraft.

C. change of magnetic flux occurring due to the passage of aircraft.

D. vibrations created by the passage of aircraft.

Answer: C

34. In satellite communication

1. The frequency used lies between 5 MHz and 10 MHz.

2. The uplink and downlink frequencies are different.

3. The orbit of geostationary satellite lies in the equatorial plane at an inclination of $0°$

    A. only 2 and 3 true

    B. all are true

    C. only 2 true

    D. only 1 and 2 true

Answer: A

35. Which of the following devices is full duplex?

A. Mobile phone

B. Walky talky

C. Loud speaker

D. Radio

Answer: A

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Exercise Ia Line Communication

1. Micro wave link repeaters are typically 50 km apart

A. because of atmospheric attenuation

B. because of the earths curvature

C. to ensure that signal voltage may not harm the repeater

D. to reduce the interference of microwaves

Answer: B

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2. The concepts of communication are

(a) mode of communication

(b) need for modulation

(c) types of modulation

(d) detection of modulated wave

A. a,b and c are true

B. b,c and d are true

C. c,d and a are true

D. a,b,c and d are true

Answer: D

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3. Optical fibre communication uses the frequency range of

A. $10^9 - 10^{10}$ Hz

B. 10^5 to 10^6 Hz

C. 10^{14} to 10^{15} Hz

D. 10^{16} to 10^{17} Hz

Answer: C

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4. Statement A : If the antenna is vertical the vertically polarized EM wave is radiated

Statement B : The vertically polarized EM wave has electrical variations in the vertical plane

A. A is true but B is false

B. A is false but B is true

C. A and B are false

D. A and B are true

Answer: D

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5. Attenuation of ground waves is due to

(a) Diffraction effect

(b) Ratio waves induce currents in the ground because of the polarization

A. a & b are true

B. only a is true

C. only b is true

D. both a & b false

Answer: A

6. The attenuation of a signal is compensated by

A. rectifier

B. oscillator

C. modulator

D. amplifier

Answer: D

7. The range of ground wave transmission can be increased by

A. increasing the power of transmitter with the use of HF

B. increasing the power of transmitter with the use of VLF

C. decreasing the power and increasing the frequency of radio waves

D. decreasing both power and frequency of radio waves

Answer: B

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8. Advantage of HF transmission is

A. That the length of antenna is small

B. That the antenna can be mounted at larger heights

C. That the power radiated is more a given length of antenna

D. All the above

Answer: D

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9. Match the frequency band with the type of use Frequency Band Type of use

(a) LF   (e) Radio Broad casting
(b) HF   (f) Marine and navigational aid
(c) VHF   (g) Satellite communication
(d) SHF   (h) TV Broad casting

A. a-e,b-f,c-h,d-g

B. a-f,b-e,c-g,d-h

C. a-f,b-e,c-h,d-g

D. a-e,b-g,c-f,d-h

Answer: C

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10. Match the following

(a) Amplitude   (e) Amplitude and angular frequency remain
(b) Frequency modulation   (f) Digital transmission
(c) Phase modulation   (g) noise creeps in
(d) Pulse code modulation   (h) Stereophonic transmission

A. a-e,b-h,c-e,d-f

B. a-e,b-f,c-g,d-h

C. a-g,b-h,c-e,d-f

D. a-h,b-g,c-e,d-f

Answer: A

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Exercise Ib Assertion A Reason R Type Questions

1. (A) : The maximum range of coverage by the ground wave propagation is limited up to a few MHz.

(R) : The attenuation of ground wave increases very rapidly with frequency.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

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2. (A) : Repeaters are used to extend the range of communication

(R) : Repeater is combination of a receiver and a transmitter.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ Watch Video Solution

3. (A) : Sometimes HF waves can also pass through ionosphere.

(R) : The sky wave propagation depends on the vertical angle with which the radio waves are radiated from the antenna.

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

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4. (A) : The area to be covered for T.V. telecast is doubled, then the height of trans - mitting antenna will have to be doubled

(R) : For T.V. signal propulation covered is equal to product of population density abd area covered

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: B

▶ Watch Video Solution

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5. It is necessary ton use satellites for long distance TV transmission.

Explain why?

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: C

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6. This question has Statement-1 and Statement-2. Of the four choices given after the statements, choose the one the best decribes the two statements.

Statement-1 : Sky wave signals are used for long distance radio communication. These signals are in general less stable than ground wave signals and

Statement-2 : The state of ionosphere varies from hour to hour, day to day and season to season.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

7. (A) : Greater is the height of T.V. transmitting antenna, greater is its range.

(R) : The range of T.V. transmitting antenna is proportional to square root of its height.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

8. Assertion: Short wave hands are used for transmission of radio wave to a large distance.

Reason: Short waves are reflected from ionosphere.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ Watch Video Solution

9. (A) : The sky waves are not used in the transmission of television signals.

(R) : Sky waves are mechanical waves.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: C

10. A long solenoid having n = 200 turns per metre has a circular cross-section of radius $a_1 = 1cm$. A circular conducting loop of radius $a_2 = 4cm$ and resistance $R = 5(\Omega)$ encircles the solenoid such that the centre of circular loop coincides with the midpoint of the axial line of the solenoid and they have the same axis as shown in Fig.
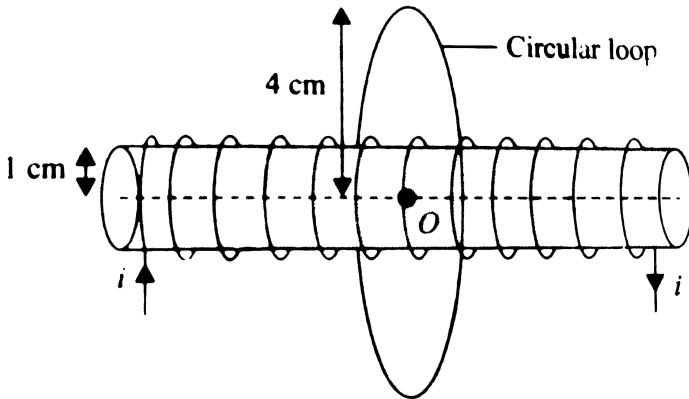
A current 't' in the solenoid results in magnetic field along its axis with magnitude $B = (\mu)ni$ at points well inside the solenoid on its axis. We can neglect the insignificant field outside the solenoid. This results in a magnetic flux $(\phi)_B$ through the circular loop. If the current in the winding of solenoid is changed, it will also change the magnetic field $B = (\mu)_0 ni$ and hence also the magnetic flux through the circular loop.

Obvisouly, it will result in an induced emf or induced electric field in the circular loop and an induced current will appear in the loop. Let current in the winding of solenoid be reduced at a rate of $75 A / \sec$.

When the current in the solenoid becomes zero so that external magnetic field for the loop stops changing, current in the loop will follow a differenctial equation given by [You may use an approximation that field at all points in the area of loop is the same as at the centre

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

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11. This question has Statement-1 and Statement-2. Of the four choices given after the statements, choose the one the best decribes the two

statements.

Statement-1 : Sky wave signals are used for long distance radio communication. These signals are in general less stable than ground wave signals and

Statement-2 : The state of ionosphere varies from hour to hour, day to day and season to season.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: B

▶ Watch Video Solution

12. Assertion (A) : $Na^{\oplus}$ ions are discharged in preference to $H^{\oplus}$ ions at Hg cathode.

Reason (R) : The nature of the cathode can affect the order of discharge

of ions.

(a)If both (A) and (R) are correct, and (R) is the correct explanation of (A).

(b)If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

(c)If (A) is correct, but (R) is incorrect.

(d) If (A) is incorrect, (R) is correct.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

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13. (A) : Optical communication is preferred to microwave communication

(R) : Microwaves provide large number of channels and bandwidth as

compared to optical signals.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: C

▶ **Watch Video Solution**

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14. Statement-I : The surface wave propagation is used for medium wave band and for television broadcasting.

Statement-II : The surface the waves travel directly from transmitting antenna to receiver antenna through atmosphere.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

▶ Watch Video Solution

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15. Statement-I : The television broadcasting becomes weaker with increasing distance

Statement-II : The power transmitted from T.V transmitter varies inversely as the distance of the receiver.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: C

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16. (A) : For long distance transmission of radio waves, short wave bands are used.

(R) : Short waves are reflected from ionosphere.

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: A

▶ **Watch Video Solution**

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17. (A) : Propagation of electromagnetic waves as microwaves is better than that as sky waves.

(R) : Microwaves have frequencies 100 GHz to 300 GHz with very good directional properties.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

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18. (A) : The lectromagnetic waves of shorter wavelengths can travel longer distances wavelengths.

(R) : Shorter the wavelength, the large is the speed of propagation of the wave.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: C

19. (A) : In case of frequency modulation, the frequency of the RF carrier is changed by the AF signal and the change is proportional to the amplitude of the AF signal at any instant.

(R) : When the AF signal is positive, the carrier frequency increases but it decreases when the AF signal is negative.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

20. (A) : Digital signals are preferred to analog signals for transmission of information.

(R) : Analog signals require amplification and correction at suitable intervals.

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: B

▶ **Watch Video Solution**

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21. (A) : A portable AM radio set must be kept horizontal to receive the signals properly.

(R) : Radio waves are polarised electromagnetic waves.

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: B

22. Assertion: Telephony is an example of point-to-point communication mode.

Reason: In point to-point communication modes, communication takes place over a link between a single transmitter and a receiver.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: B

---

23. (A) : Range is the largest distance between a source and a destination upto which the signal is received with sufficient strength

(R) : Use of repeater station to increase the range of communication

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: B

24. (A) : For transmitting a signal, the antenna should have a size comparable to wave length of the signal at least $\lambda/4$ in dimension

(R) : The antenna properly senses the time variation of the signal

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

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25. (A) : At frequencies above 40 MHz, communication is essentially limited to line of sightpath.

(R) : At these frequencies, the antenna is relatively smaller and can be placed at heights of many of wavelengths above the ground.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: B

26. (A) : Sky wave is reflected by ionosphere

(R) : The reflected wave is out of phase of incident waveand reach the receiving antenna along with the direct wave from transmitting antenna causes in interference.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

C. A' is true abd 'R' false

D. A' is false and 'R' is false

Answer: A

---

27. (A) : Communication in UHF/VHF regions can be established by space wave or tropospheric wave

(R) : Communication in UHF/VHF regions is limited to line of sight distance

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: B

28. (A) : In a communication system based on amplitude modulation the modulation index is kept less than 1

(R) : If modulation index is less than 1, there is minimum distortion of signal

    A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.

    B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.

    C. A' is true abd 'R' false

    D. A' is false and 'R' is false

Answer: A

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Exercise Ii Antenna

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1. What should be the height of transmitting antenna if the TV telecast is to cover a radius of . 128 km?

A. 1560 m

B. 1280 m

C. 1050 m

D. 79 m

Answer: B

2. A transmitting antenna is a height of 40 m and the receiving antenna is at a height of 60 m The maximum distance between them for satisfactory communication is nearly

A. A) 22.5 km

B. B) 27.5 km

C. C) 50 km

D. D) 25 km

Answer: C

3. A T V transmitting antenna is 80 m tall. If the receiving antenna is on the ground The service area is

   A. 12π sq km

   B. 144π sq km

   C. 1024π sq km

   D. 32π sq km

Answer: C

4. The maximum distance between the transmitting and receiving TV towers is 72 km. If the ratio of the heights of the TV transmitting tower to

receiving tower is $16:25$, the heights of the transmitting and receiving towers are

A. 51.2 m , 80 m

B. 40 m , 80 m

C. 80 m , 125 m

D. 25 m , 75 m

Answer: C

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5. If height of transmitting tower increases by 21% then the area to be covered increases by

A. A) 10%

B. B) 21%

C. C) 42%

D. D) 84 %

Answer: B

6. A T.V tower is 150 m tall. If the area around the tower has a population density of $750 \ \mathrm{km}^{-2}$, then the population covered by the broadcasting tower is about , (Re = 6400 km)

A. 4.5×10^6

B. 2.5×10^6

C. 4.5×10^5

D. 2.5×10^5

Answer: A

7. If the whole earth is to be connected by LOS communication using space waves (no restriction of antenna size or tower height), what is the minimum number of antennas required? Calculate the tower height of these antennas in terms of earth's radius.

A. 1

B. 3

C. 4

D. 6

Answer: D

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Exercise Ii Modulation Power

1. The modulating wave is given by $V_m = 6 \sin \omega t$ and the carrier wave is given by $V_c = 12 \sin \omega t$. The percentage of modulation is

A. 20

B. 40

C. 50

D. 60

Answer: C

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2. The maximum value of modulation index in case of amplitude modulation system is

A. $\mu < 1$

B. $\mu > 1$

C. $\mu \geq 1$

D. $\mu \leq 1$

Answer: D

3. A carrier wave is modulated by a number of sine waves with modulation indices 0.1, 0.2, 0.3 The totaal modulation index (m) of the wave is

A. 0.6

B. 0.2

C. $\sqrt{0.14}$

D. $\sqrt{0.07}$

Answer: C

4. If modulation index is $1/2$ and power of carrier wave is 2W. Then what will be the total power in modulated wave ?

A. A) 0.5 W

B. B) 1 W

C. C) 0.25 W

D. D) 2.25 W

Answer: D

---

5. An sudio signal $V_m = 15w_1t$ is modulated on a CW of $V_c = 60\sin w_2t$.

The percentage modulation is

A. 50 %

B. 40 %

C. 25 %

D. 2.5 %

Answer: C

6. The maximum amplitude of the modulated wave is 16 v and minimum amplitude is 4 V. The percentage modulation is

    A. 25 %

    B. 40 %

    C. 60 %

    D. 75 %

Answer: C

▶ **Watch Video Solution**

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7. An audio signal $V_m = 5 \sin 6\pi \times 10^3 t$ is to be modulated on a carrier wave given by $V_c = 15 \sin 2\pi \times 10^5 t$ The frequencies of side bands and band width

    A. 103 KHz , 97 KHz , 6 KHz

B. 130 KHz , 70 KHz , 6 KHz

C. 130 KHz , 97 KHz , 3 KHz

D. 103 KHz , 97 KHz , 3 KHz

Answer: A

▶ **Watch Video Solution**

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8. The power of transmitter 19 kW. The power of the Carrier wave is, if the

amplitude of modulated wave is 10 V and that of Carrier is 30 V,

A. 18kW

B. 1kW

C. 4.75 kW

D. 9.5kW

Answer: A

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9. The power of a AM transmitter is 100 W. If the modulation index is 0.5 and the transmission is having signal side band, the percentage of useful power is

A. 1.1 W

B. 11 W

C. 2.2 W

D. 22W

Answer: B

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10. On certain day, it is observed that the signals of higher than 5 MHz are not recived by reflection from F_1 layer of ionosphere. The approximate maximum electron density of F_1 layer ontheday is

A. $7.9 \times 10^{11} / m^3$

B. $5 \times 10^{11} / m^3$

C. $4.2 \times 10^{11} / m^3$

D. $3 \times 10^{11} / m^3$

Answer: D

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11. For sky wave propagation of a 10MHz signal, what should be the minimum electron density in Ionosphere?

A. $10^{12} / m^3$

B. $10^6 / m^3$

C. $10^9 / m^3$

D. $10^{14} / m^3$

Answer: A

Exercise Iii Modulation Power

1. The total power content of an AM signal is 3000 w. For $100\,\%$ modulation, the power of CW and that of each side band are,

    A. 2kW, 0.5 kW

    B. 3 kw, 0.75 kW

    C. 4 KW, 1 kW

    D. 2 KW, 1 kW

Answer: A

2. The total power content of an AM wave is 2.64 KW at a modulation factor of $80\,\%$. The power content of each side band is

A. 160 w

B. 320 w

C. 480 w

D. 640 w

Answer: B

3. When a broad cast AM transmitter is 50 percent modulated, its antenna current is 12 A. When the modulation depth is increased to 0.9 the current would be in amperes

A. $4\sqrt{11.24}$

B. $4\sqrt{8.24}$

C. $2\sqrt{11.24}$

D. $6\sqrt{8.24}$

Answer: A

4. Modulation index in FM signal

    A. varies inversely as the frequency deviation

    B. varies directly as the modulating frequency

    C. varies directly as the frequency deviation

    D. varies inversely as the square of the modulating frequency.

Answer: D

5. The carrier wave is given by

C(t) = $2\sin(8\pi t)$ volt.

The modulating signal is a square wave as shown. Find modulation index.

A. 2.0 kHz

B. 1.0 kHz

C. 12.5 kHz

D. 50 kHz

Answer: A

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6. A message signal of frequency 10 KHz and peak voltage of 10V is u sed to modulate a carrier of frequency 1 MHz and peak voltage of 20V. The frequency of the side bands produced is

A. 0.5 , 1010 kHz and 990 kHz

B. 2, 1010 kHz and 990 kHz

C. 0.5, 505 kHz and 495 kHz

D. 2, 505 kHz and 495 kHz

Answer: A

7. A radio signal has a frequency of 10 M Hz. The least length of the antenna required for the trans mission of the signal is

A. 7.5 m

B. 5 m

C. 5.5 m

D. 3.5 m

Answer: A

8. The maximum peak to peak voltage of an AM wire is 24 mV and the minimum peak to peak voltage is 8 mV. The modulation factor is

A. 25 %

B. 50 %

C. 75 %

D. 10 %

Answer: B

9. A carrier wave of peak voltage 12V is used to transmit a message signal. The peak voltage of the modulating signal in order to have a modulation index of 75% is

A. 12V

B. 9V

C. 6 V

D. 3V

Answer: B

Problem

1. How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest modulating frequency of carrier is 5 kHz. ?

2. How many 500 kHz waves can be on a 10 km transmission line simultaneously ?

3. A two wire transmission line has a capacitance of $20 Pf/m$ and a characteristic impedance of 50Ω

What is the inductance per metre of this cable ?

4. A two wire transmission line has a capacitance of $20Pf/m$ and a characteristic impedance of 50Ω

Determine the impedance of an infinitely long section of such cable.

5. T.V. transmission tower at a particular station has a height of 160 m.

What is the coverage range ?

6. T.V. transmission tower at a particular station has a height of 160 m.

How much population is covered by transmission, if the average population density around the tower is 1200 per km?

7. T.V. transmission tower at a particular station has a height of 160 m.

What should be the height of tower to double the coverage range

8. An audio signal given by $e_s = 15 \sin 2\pi(200t)$ modulates a carrier wave

given by $e_s = 60 \sin 2\pi(100, 000t)$. If calculate

Percent modulation

9. An audio signal given by $e_s = 15 \sin 2\pi(200, 10t)$ modulates a carrier

wave given by $e_s = 60 \sin 2\pi(10, 1000t)$. If calculate

Frequency spectrum of the modulated wave.

10. The antenna current of an AM transmitter is 8A when only the carrier is sent, but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation

11. A sinusoidal carrier voltage of 80 volts amplitude and I MHz frequency is amplitude modulated by a sinusoidal voltage of frequency 5kHz producing 50% modulation. Calculate the amplitude and frequency of lower and upper side bands.

12. The load current in the transmitting antenna of an unmodulated AM transmitter is 6 Amp. What will be the antenna current when modulation is 60%.

13. A carrier wave of 1000 W is subjected to $100\,\%$ modulation. Calculate (i) Power of modulated wave, (ii) Power in USB, (iii) Power in LSB.

14. A transmitting antenna at the top of a tower has a height 32 m and the height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in the line of sight mode. Given radius of earth 6.4×10^6 m

15. A message signal of frequency 10 KHz and peak voltage of 10V is u sed to modulate a carrier of frequency 1 MHz and peak voltage of 20V. The frequency of the side bands produced is

1. An antenna

    A. Converts AF wave to RF wave

    B. RF signal into electromagnetic energy

    C. Converts the guided em waves into free space em waves and vice versa.

    D. Super imposes AF wave on RF wave.

Answer: C

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2. An antenna behaves as resonant circuit only when its length is

    A. equal to $\dfrac{\lambda}{4}$

    B. equal to $\dfrac{\lambda}{42}$

C. equal to the integral multiples of $\dfrac{\lambda}{2}$

D. equal to $\dfrac{3\lambda}{4}$

Answer: A

3. The length of the antenna

a) limits the frequency of EM waves to be radiated

b) makes the users to opt for Higher frequency transmission

c) is insignificant during transmission.

A. a & b are true

B. b & c are true

C. c & a are true

D. a, b & c are true

Answer: A

4. The height of the Antenna

a) limits the population covered by the transmission

b) limits the ground wave propagation

c) effectively used in line communication of sight communication

    A. a & b are true

    B. b&c are true

    C. c & a are true

    D. a, b & c are true

Answer: D

5. The length of the antenna required for the transmission of frequencies

of em waves of band width having AF range is

A. 15 km

B. 1500 m

C. 300 m

D. 3.75km

Answer: A

6. The intensity of the ground waves decrease with increase of distance due to

A. Interference

B. Diffraction

C. Polarization

D. Due to unknown reason

Answer: B

7. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

A. $h^{1/2}$

B. h

C. $h^{3/2}$

D. h^2

Answer: A

Exercise I Modulation

1. The process of translating the information conta-ined by the low base band signal to high frequencies is called

A. Detection

B. Modulation

C. Amplification

D. Demodulation

Answer: B

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2. During the process of modulation the RF wave is called

A. Modulating wave

B. Modulated wave

C. Carrier wave

D. Audio wave

Answer: C

▶ **Watch Video Solution**

3. Modulation is required to

a) distinguish different transmissions

b) ensure that the information may be trans mitted over long distances

c) allow the information accessible for different people

    A. a & b are true

    B. b & c are true

    C. c & a are true

    D. a, b & c are true

Answer: D

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4. The physical quantities of the wave used for modulation

    A. Amplitude only

B. Amplitude and frequency

C. Amplitude, frequency and phase

D. Only frequency

Answer: C

▶ **Watch Video Solution**

5. In amplitude modulation

A. The amplitude of the carrier wave varies in accordance with the amplitude of the modulating signal

B. The amplitude of carrier wave remains constant, frequency changes in accordance with the modulating signal

C. The amplitude of carrier wave varies in accordance with the frequency of the modulating signal

D. The amplitude changes in accordance with the wave length of the

   modulating signal

Answer: A

▶ Watch Video Solution

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6. AM is used for broadcasting because

   A. it is more noise immune

   B. it requires less transmitting power

   C. it has simple circuit

   D. it has high fidelity (faithful reproduction)

Answer: C

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7. Draw backs of Amplitude modulation

    A. During transmission extraneous noise creeps in.

    B. Most of the transmitting power is wasted, as it does not contain

       useful information

    C. The reception is not clear in the case of weak signals due to noise

    D. All the above

Answer: D

▶ **Watch Video Solution**

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8. Purpose of oscillator in the AM transmitter

    A. to produce modulating signal

    B. to produce carrier wave

    C. to produce enough power

D. to reduce the noise

Answer: B

9. In frequency modulation

A. Frequency of CW remains constant but amplitude changes in

accordance with modulating wave frequency

B. Frequency of CW changes in accordance with the modulating wave

frequency but the amplitude also changes.

C. Frequency of CW changes in accordance with the frequency of

modulating wave frequency but the amplitude remains constant.

D. Frequency of CW changes in accordance with the amplitude of

modulating wave amplitude

Answer: C

10. In a communication system, noise is most likely to affect the signal

A. at the transmitter

B. in the medium of transmission

C. in the formation source signal

D. at the destination

Answer: B

11. The difference between phase and frequency modulation

A. practically they are same but theoretically they differ

B. lies in the poorer audio response of phase modulation

C. lies in the poorer audio response of frequency modulation

D. lies in the definitions of modulation and their modulation index

Answer: D

▶ **Watch Video Solution**

12. While tuning in a certain broadcast station with a receiver, we are actually

A. varying the local oscillator

B. varying the resonant frequency of the circuit for the radio signal to

be picked up

C. tuning the antenna

D. All the above

Answer: B

▶ **Watch Video Solution**

13. Digital signals

    A. do not provide continuous set of values

    B. represent values as discrete steps

    C. Utilize binary code system

    D. All the above

Answer: D

▶ **Watch Video Solution**

---

14. In T.V. broadcasting both picture and sound are transmitted simultaneously. In this

    A. audio signal is frequency modulated and video signal is amplitude

       modulated

    B. both audio and video signals are frequency modulated

C. audio signal is amplitude modulated and video signal is frequency modulated

D. both audio and video signals are amplitude modulated

Answer: A

▶ Watch Video Solution

15. The process of separating radio signal from the modulated wave is known as

A. Superimposition

B. Amplification

C. Demodulation

D. Modulation

Answer: C

▶ Watch Video Solution

16. In amplitude modulation, carrier wave frequencies are:

A. lower

B. higher

C. same

D. lower sometimes and higher sometimes

Answer: A

▶ **Watch Video Solution**

17. In amplitude modulation

A. the system will fail

B. distortion will result

C. amplifier will be damaged

D. none of these

Answer: B

Exercise I Space Communication

1. High frequency waves are

    A. absorbed by F layer

    B. reflected by the E layer

    C. capable of use for long distance transmission

    D. affected by the solar cycle

Answer: B

2. As the e.m. waves travel in free space

A. absorption takes place

B. attenuation takes place

C. refraction takes place

D. reflection takes place

Answer: B

▶ **Watch Video Solution**

3. The ground wave eventually disappears, as one moves away from the transmitter, because of

A. interference from the sky wave

B. loss of line of signal condition

C. maximum single hop distance limitation

D. diffraction effect causing tilting of the wave

Answer: D

4. Frequencies in the UHF range normally propagate by means of

A. ground waves

B. sky waves

C. surface waves

D. space waves

Answer: D

5. For TV transmission the frequency range employed

A. 30 - 300 MHz

B. 30 - 300 GHz

C. 30 - 300 KHz

D. 30 - 300 Hz

Answer: A

▶ **Watch Video Solution**

6. Band width of an optical fiber is

A. more than 100 GHz

B. few kHz

C. less than 1MHz

D. less than 1GHz

Answer: A

▶ **Watch Video Solution**

7. The most commonly employed analog modulation technique in satellite communication is the

    A. amplitude modulation

    B. frequency modulation

    C. phase modulation

    D. all the above

Answer: B

▶ **Watch Video Solution**

---

8. The frequency band of medium wave Radio broad casting transmission is

    A. 540 KHz to 1600 KHz

    B. 30 KHz to 300 KHz

    C. 3 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: A

▶ Watch Video Solution

9. The short wave Radio broadcasting band is

A. 7 MHz to 22 MHz

B. 88 MHz to 108 MHz

C. 30 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: A

▶ Watch Video Solution

10. The FM radio broadcasting band is,

A. 5 MHz to 30 MHz

B. 89 MHz to 108 MHz

C. 30 KHz to 300 KHz

D. 3 GHz to 30 GHz

Answer: B

▶ **Watch Video Solution**

11. The TV broad casting bands are

A. MF and HF bands

B. VHF and UHF bands

C. UHF and SHF bands

D. SHF and EHF band

Answer: B

▶ **Watch Video Solution**

12. The number of bands in TV broad casting is

A. 1

B. 2

C. 3

D. 4

Answer: D

▶ **Watch Video Solution**

13. The lower frequencies used in TV broad casting are

A. 0.54 KHz to 1.6 KH, 80 MHz to 108 MH

B. 896 to 901 MHz, 0.84 to 0.9356 Hz

C. 54 MHz to 72 MHz, 76 MHz to 88 MHz

D. 174 MHz to 216 MHz, 420 MHz to 890 MHz

Answer: C

▶ **Watch Video Solution**

14. The higher frequency TV broad casting bands range is

A. 54 - 72 MHz, 76 to 88 MHz

B. 174 - 216 MHz, 420 to 890 MHz

C. 896 to 901 MHz, 840 to 935 MHz

D. 5.925 to 6.425 GHz, 3.7 to 4.2 GHz

Answer: B

▶ **Watch Video Solution**

15. Cellular Mobile radio works on the frequency range is

A. 840 to 935 MHz

B. 3.7 to 4.2 GHz

C. 420 to 890 MHz

D. 30 to 300 GHz

Answer: A

▶ Watch Video Solution

16. The frequency band used in the downlink of satellite communication is

A. 0.896 to 0.901 GHz

B. 0.420 to 0.890 GHz

C. 5.925 to 6.425 GHz

D. 3.7 to 4.2 GHz

Answer: D

▶ Watch Video Solution

17. In the satellite communication, the up linking frequency range is

A. 0.896 to 0.901 GHz

B. 0.420 to 0.890 GHz

C. 5.925 to 6.425 GHz

D. 3.7 to 4.2 GHz

Answer: C

▶ **Watch Video Solution**

18. The sky wave propagation is suitable for radio waves of frequency

A. upto 2 MHz

B. from 2MHz to 20 MHz

C. from 2 MHz to 30 MHz

D. none of the above

Answer: C

▶ **Watch Video Solution**

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19. A geosynchronous satellite is

A. located at a height of 34860 km to ensure global coverage

B. appears stationary over a place on earth's magnetic pole

C. not really stationary at all, but orbits the earth within 24 hours

D. always at a fixed location in state and simply spins about its own

axis.

Answer: C

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20. The Indian remote sensing satellite is

A. Aryabhatt

B. Sputnik - I

C. INSAT 2B

D. IRS IB

Answer: D

▶ **Watch Video Solution**

21. A signal emiited by an antenna form a certain point can be received at another point of the surface in the form of

A. sky wave

B. ground wave

C. sea wave

D. both 1 and 2

Answer: D

---

22. The electromagnetic waves of frequency 80 MHz to 200 MHz

A. can be reflected by troposphere

B. can be reflected by ionosphere

C. can be reflected by mesophere

D. cannot be reflected by any layer of earth's atmosphere

Answer: D

---

23. Which of the following is better propagation mode to propagate television frequency and radar signals ?

A. satellite communication

B. ground propagation

C. polarized communication

D. none of these

Answer: A

24. Radiowaves of constant amplitude can be generated with

A. filter

B. rectifier

C. FET

D. Oscillator

Answer: D

25. Among the following the waves which can penetrate the ionosphere are

A. 10GHz

B. 10MHz

C. 20MHz

D. 25 MHz

Answer: A

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26. Audio signal canot be transmitted because

A. the signal has more noise

B. the signal cannot be amplified for distance communication

C. the transmitting antenna length is very small to design

D. the transmitting antenna length is very large and impracticable

Answer: D

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27. Long range radio transmission is possible when the radiowaves are reflected from the ionosphere. For this to happen the frequency of the radio waves must be in the range:

A. 1 - 3 MHz

B. 150 - 500 kHz

C. 8 - 25 MHz

D. 80 - 150 MHz

Answer: C

▶ **Watch Video Solution**

28. Which of the following modulated signal has the best noise-tolerance ?

    A. long-wave

    B. short-wave

    C. medium-wave

    D. amplitude-modulated

Answer: B

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Exercise I Line Communication

1. Micro wave link repeaters are typically 50 km apart

    A. because of atmospheric attenuation

    B. because of the earths curvature

C. to ensure that signal voltage may not harm the repeater

D. to reduce the interference of microwaves

Answer: B

▶ Watch Video Solution

2. Optical fibre communication uses the frequency range of

A. $10^9 - 10^{10}$ Hz

B. $10^5 - 10^6$ Hz

C. $10^{14} - 10^{15}$ Hz

D. $10^{16} - 10^{17}$ Hz

Answer: C

▶ Watch Video Solution

3. The concepts of communication are

(a) mode of communication

(b) need for modulation

(c) types of modulation

(d) detection of modulated wave

A. a, b, c are true

B. b, c, d are true

C. c, d, a are true

D. a, b, c & d are true

Answer: D

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4. Statement A : If the antenna is vertical the vertically polarized EM wave

is radiated

Statement B : The vertically polarized EM wave has electrical variations in the vertical plane

    A. A is true but B is false

    B. A is false but B is true

    C. A and B are false

    D. A and B are true

Answer: D

5. Attenuation of ground waves is due to

(a) Diffraction effect

(b) Ratio waves induce currents in the ground because of the polarization

    A. a & b are true

    B. Only a is true

    C. Only b is true

D. Both a & b false

Answer: A

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6. The range of ground wave transmission can be increased by

    A. increasing the power of transmitter with the use of HF

    B. increasing the power of transmitter with the use of VLF

    C. decreasing the power and increasing the frequency of radio waves

    D. decreasing both power and frequency of radio waves

Answer: B

▶ Watch Video Solution

7. The attenuation of a signal is compensated by

A. rectifier

B. oscillator

C. modulator

D. amplifier

Answer: D

8. The space wave propagation is utilized in

A. microwave communication

B. satellite communication

C. TV transmission

D. all the above

Answer: D

9. When a sky wave is reflected on to the ground

    A. frequency of the reflected wave is different to that of incident wave

    B. there is a phase difference of $\pi/2$ is introduced to the reflected

      wave

    C. the reflected wave is out of phase of incident wave and reach the

      receiving antenna along with the direct wave from transmitting

      antenna causing interference.

    D. the waves are not reflected by the ground.

Answer: C

▶ **Watch Video Solution**

10. Advantage of HF transmission is

A. That the length of antenna is small

B. That the antenna can be mounted at larger heights

C. That the power radiated is more for a given length of antenna

D. all the above

Answer: D

▶ **Watch Video Solution**

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11. Match the frequency Band with the type of use

Frequency Band	Type of use
a) LF	e) Radio Broad casting
b) HF	f) Marine and navigational aid
c) VHF	g) Satellite communication
d) SHF	h) TV Broad casting

A. a - e, b - f, c - h, d - g

B. a - f, b - e, c- g, d- h

C. a - f, b - e, c - h, d - g

D. a- e, b - g, c - f, d-h

Answer: C

a) Amplitude Modulation

e) Amplitude and angular frequency remains constant

b) Frequency modulation

f) Digital transmission

c) Phase

g) noise creeps in modulation

d) Pulse code modulation

h) Stereophonic transmission

12.

A. a - g, b - h, c- e, d - f

B. a - e, b -f, c - g, d - h

C. a - g, b - h, c- e, d - f

D. a- h, b - g, c - e, d-f

Answer: A

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Exercise I Assertion Reason

1. (A) : The maximum range of coverage by the ground wave propagation is limited up to a few MHz.

(R) : The attenuation of ground wave increases very rapidly with frequency.

    A. Assertion and reason are true and reason is the correct explanation of assertion

    B. Assertion and reason are true but reason is not correct explanation of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

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2. (A) : Repeaters are used to extend the range of communication

(R) : Repeater is combination of a receiver and a transmitter.

A. Assertion and reason are true and reason is the correct explanation

of assertion

B. Assertion and reason are true but reason is not correct explanation

of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

3. (A) : Sometimes HF waves can also pass through ionosphere.

(R) : The sky wave propagation depends on the vertical angle with which the radio waves are radiated from the antenna.

A. Assertion and reason are true and reason is the correct explanation

of assertion

B. Assertion and reason are true but reason is not correct explanation

of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

4. (A) : The area to be covered for T.V. telecast is doubled, then the height of trans - mitting antenna will have to be doubled

(R) : For T.V. signal propulation covered is equal to product of population density abd area covered

    A. Assertion and reason are true and reason is the correct explanation

       of assertion

    B. Assertion and reason are true but reason is not correct explanation

       of assertion

    C. Assertion is true but reason is false

    D. Assertion is false but Reason is true.

Answer: D

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5. (A): It is necessary to use satellites for long distance T.V transmission

(R): The television signals are low frequency signals.

   A. Assertion and reason are true and reason is the correct explanation

      of assertion

   B. Assertion and reason are true but reason is not correct explanation

      of assertion

   C. Assertion is true but reason is false

   D. Assertion is false but Reason is true.

Answer: C

▶ **Watch Video Solution**

---

6. Statement-1: Sky wave signals are used for long distance radio communication. These signals are in general less stable than ground wave signals

Statement-2 : The state of ionosphere varies from hour to hour, day to day and season to season

A. Assertion and reason are true and reason is the correct explanation of assertion

B. Assertion and reason are true but reason is not correct explanation of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

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7. (A): A FM signal is less susceptible to noise than an AM signal.

(B) : In FM transmission, the message signal is in the form of frequency variations of carrier waves. During modulation process, the noise gets amplitude modulated.

A. Assertion and reason are true and reason is the correct explanation of assertion

B. Assertion and reason are true but reason is not correct explanation of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

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8. (A): Low frequency audio signals can not be transmitted directly over long distances

(B) : To transmit low frequency audio signals over long distances, the audio signals are super imposed on a high frequency carrier signal

A. Assertion and reason are true and reason is the correct explanation of assertion

B. Assertion and reason are true but reason is not correct explanation

of assertion

C. Assertion is true but reason is false

D. Assertion is false but Reason is true.

Answer: A

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Exercise Ii Tv Antenna

1. What should be the height of transmitting antenna if the TV telecast is

to cover a radius of . 128 km?

A. 1560 m

B. 1280 m

C. 1050 m

D. 79 m

Answer: B

2. A transmitting antenna is a height of 40 m and the receiving antenna is at a height of 60 m The maximum distance between them for satisfactory communication is nearly

A. 22.5 km

B. 27.5 km

C. 50 km

D. 25km

Answer: C

3. A T V transmitting antenna is 80 m tall. If the receiving antenna is on the ground The service area is

    A. $12\pi\, sqkm$

    B. $144\pi\, sqkm$

    C. $1024\pi\, sqkm$

    D. $32\pi\, sqkm$

Answer: C

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4. The maximum distance between the transmitting and receiving TV towers is 72 km. If the ratio of the heights of the TV transmitting tower to receiving tower is $16:25$, the heights of the transmitting and receiving towers are

    A. 51.2 m , 80 m

B. 40 m , 80 m

C. 80 m, 125 m

D. 25 m, 75 m

Answer: C

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5. If height of transmitting tower increases by 21% then the area to be covered increases by

A. 10%

B. 21%

C. 42%

D. 84%

Answer: B

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6. A T.V tower is 150 m tall. If the area around the tower has a population density of 750 km^{-2}, then the population covered by the broadcasting tower is about , (Re = 6400 km)

A. 4.5×10^6

B. 2.5×10^6

C. 4.5×10^5

D. 2.5×10^6

Answer: B

▶ **Watch Video Solution**

---

7. The modulating wave is given by $V_m = 6 \sin \omega t$ and the carrier wave is given by $V_c = 12 \sin \omega t$. The percentage of modulation is

A. 20

B. 40

C. 50

D. 60

Answer: C

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8. The modulation index μ in Amplitude modulating, value is

A. $\mu < 1$

B. $\mu > 1$

C. $\mu \geq 1$

D. $\mu \leq 1$

Answer: D

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9. A carrier wave is modulated by a number of sine waves with modulation indices 0.1, 0.2, 0.3 The totaal modulation index (m) of the wave is

A. 0.6

B. 0.2

C. $\sqrt{0.14}$

D. $\sqrt{0.07}$

Answer: C

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10. An sudio signal $V_m = 15w_1t$ is modulated on a CW of $V_c = 60\sin w_2t$. The percentage modulation is

A. 50 %

B. 40 %

C. 25 %

D. 2.5 %

Answer: C

11. The maximum amplitude of the modulated wave is 16 v and minimum

amplitude is 4 V. The percentage modulation is

A. 25 %

B. 40 %

C. 60 %

D. 75 %

Answer: C

12. An audio signal $V_m = 5 \sin 6\pi \times 10^3 t$ is to be modulated on a carrier wave given by $V_c = 15 \sin 2\pi \times 10^5 t$ The frequencies of side bands and band width

    A. 103 KHz, 97 KHz, 6 KHz

    B. 130 KHz, 70 KHz, 6 KHz

    C. 130 KHz, 97 KHz, 3 KHz

    D. 103 KHz, 97 KHz, 3 KHz

Answer: A

▶ **Watch Video Solution**

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13. The power of transmitter 19 kW. The power of the Carrier wave is, if the amplitude of modulated wave is 10 V and that of Carrier is 30 V,

    A. 18 kW

    B. 1 kW

C. 4.75 kW

D. 9.5 kW

Answer: A

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14. The power of a AM transmitter is 100 W. If the modulation index is 0.5 and the transmission is having signal side band, the percentage of useful power is

A. 1.1 W

B. 11 W

C. 2.2 W

D. 22 W

Answer: B

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1. The height of a TV transmitting antenna is 20m. The telecast can cover a radius of

    A. 8km

    B. 16km

    C. 32km

    D. 64 km

Answer: B

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2. A transmitting antenna is at a height of 20m and receiving antenna is at a height of 80m. The maximum distance between satisfactory communication is them for

A. 16 km

B. 32km

C. 48 km

D. 96 km

Answer: C

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3. TV tower has a height of 80m. The height of the tower to be increased to, so that the coverage area is doubled is

A. 80m

B. 160m

C. 240m

D. 320 m

Answer: B

4. The maximum distance between the transmitting and receiving TV towers is D. If the heights of both transmitting and receiving tower are doubled then the maximum distance between them becomes.

A. $\sqrt{2}D$

B. 2D

C. 4D

D. $D/2$

Answer: A

5. The area to be covered for TV telecast is doubled. Then the height of the transmitting antenna will have to be

A. doubled

B. halved

C. quadrupled

D. kept unchanged

Answer: A

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6. A TV tower has a height of 100m. How much population is covered by TV broadcast. If the average population density around the tower is $1000km^{-2}$? (radius of earth $=6.4 \times 10^6 m$)

A. 40×10^5

B. 20×10^6

C. 30×10^7

D. 10×10^4

Answer: A

---

7. A TV tower has a height of 70 m. If the average population density around the tower is $1000km^{-2}$, the population Covered by the TV tower

A. 2.816×10^6

B. 2.86×10^9

C. 2.816×10^3

D. 2.186×10^{12}

Answer: A

---

8. A TV tower has a height of 100 m. The population density around the TV if the population covered is 60.288 lac, is

A. $5 \times 10^3 \, km^{-2}$

B. $1.5 \times 10^3 \, km^{-2}$

C. $7.5 \times 10^3 \, km^{-2}$

D. $10^4 \, km^{-2}$

Answer: B

▶ Watch Video Solution

9. To cover a population of 20 lakh, a transmission tower should have a height of (radius of the earth = 6,400 km, population $1000/km^2$).

A. 25 m

B. 50 m

C. 75 m

D. 100 m

Answer: B

10. The amplitude of the modulating wave is $2/5$ th of the amplitude of the carrier wave. The percentage modulation

A. 20

B. 40

C. 50

D. 60

Answer: B

11. The audio signal voltage is given by $V_m = 2 \sin 12\pi \times 10^3 t$. The band width and LSB if carrier wave has a frequency $3.14 \times 10^6 \text{rad}/s$.

A. 12 KHz, 494 KHz

B. 6 KHz, 313 KHz

C. 6 KHz, 494 KHz

D. 18 KHz, 494 KHz

Answer: A

▶ **Watch Video Solution**

12. The tuned circuit the Oscillator in a simple AM transmitter employs a $50\mu H$ coil and a 1 nF capacitor. If the oscillator output is modulated by audio frequencies up to 10m kHz calculate the range occupied by the side bands.

A. 210 to 230

B. 258 to 278

C. 308 to 328

D. 118 to 128

Answer: C

13. Match Column-I (layers in the ionosphere for skywave propagation) with Column-II (their height range) :

Column-I	Column-II
I) D-layer	a) 250-400 km
II) E-layer	b) 170-190 km
III) F_1-layer	c) 95-120 km
IV) F_2-layer	d) 65-75 km

The correct answer is :

A.
I	II	III	IV
a	b	c	d

B.
I	II	III	IV
d	c	a	b

C.
I	II	III	IV
d	c	b	a

D.
I	II	III	IV
c	d	a	b

Answer: B

14. A radar has a power of 1 Kw and is operating at a frequency of 10 GHz. It is located on a mountain top of height 500 m. The maximum distance upto which it can detect object located on the surface of the earth (Radius of earth = 6.4×10^6 m) is

A. 80 km

B. 16 km

C. 40 km

D. 64 km

Answer: A

▶ **Watch Video Solution**

15. If the percentage of modulation is 50% then the useful power in the AM wave is

A. 44 %

B. 33 %

C. 22 %

D. 11 %

Answer: D

▶ **Watch Video Solution**

16. The modulation index is 0.75. Then the useful power available in the side bands nearly

A. 11 %

B. 22 %

C. 33 %

D. 44 %

Answer: B

Example

1. An audio signal given by $e_s = 15 \sin 2\pi(200t)$ modulates a carrier wave given by $e_s = 60 \sin 2\pi(100,000t)$. If calculate

Percent modulation

2. The antenna current of an AM transmitter is 8A when only the carrier is sent, but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation

3. A sinusoidal carrier voltage of 80 volts amplitude and I MHz frequency is amplitude modulated by a sinusoidal voltage of frequency 5kHz producing 50% modulation. Calculate the amplitude and frequency of lower and upper side bands.

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4. The load current in the transmitting antenna of an unmodulated AM transmitter is 6 Amp. What will be the antenna current when modulation is 60%.

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5. A carrier wave of 1000 W is subjected to 100% modulation. Calculate (i) Power of modulated wave, (ii) Power in USB, (ii) Power in LSB.

▶ **Watch Video Solution**

1. Sketch a block diagram of a generalised communication system.

▶ **Watch Video Solution**

2. What is Ground wave ? When is it used for communication ?

▶ **Watch Video Solution**

3. What are sky waves?Explain their propagation breifly.

▶ **Watch Video Solution**

4. Sky Wave Propagation

▶ **Watch Video Solution**

5. Sky Wave Propagation

▶ **Watch Video Solution**

6. What is the need for doing modulation ?

▶ **Watch Video Solution**

7. Degree of modulation-

▶ **Watch Video Solution**

8. In amplitude modulation, carrier wave frequencies are:

▶ **Watch Video Solution**

9. Which of the following is/are the limitations of amplitude modulation?

10. What do you understand by modulation factor ? Give its importance.

Exercise Very Short Answer Questions

1. Essential elements of a communication system are

2. What are 3 different modes of propagation of radio waves?

3. Long range radio transmission is possible when the radiowaves are reflected from the ionosphere. For this to happen the frequency of the radio waves must be in the range:

▶ **Watch Video Solution**

4. Sky Wave Propagation

▶ **Watch Video Solution**

5. Mention the various parts of the ionosphere ?

▶ **Watch Video Solution**

6. (A) : The sky waves are not used in the transmission of television signals.

(R) : Sky waves are mechanical waves.

7. It is necessary ton use satellites for long distance TV transmission. Explain why?

8. In frequency modulation

9. Long distance radio broadcasts use short wave bands. Explain why?

10. Name the three different modes of propagation of electromagnetic waves. Explain, using a proper diagram the mode of propagation used in

the frequency range above 40 MHz.

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11. What should be the band width of frequencies. Required for transmission of picutres using video signals?

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12. What is "World Wide Web" (W W W) ?

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13. What type of modulation is employed in india for radio transmission

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Problem Level I

1. A transmitting antenna is a height of 40 m and the receiving antenna is at a height of 60 m The maximum distance between them for satisfactory communication is nearly

2. A T V transmitting antenna is 80 m tall. If the receiving antenna is on the ground The service area is

3. If height of transmitting tower increases by 21% then the area to be covered increases by

4. A T.V tower is 150 m tall. If the area around the tower has a population density of $750 \ km^{-2}$, then the population covered by the broadcasting tower is about , (Re = 6400 km)

▶ Watch Video Solution

1. A modulated carrier wave has maximum and minimum amplitudes of 1500 mV and 500 mV. Calculate the value of percentage modulation

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2. An audio signal given by 10 sin2 π (1500)t is

Superimposed on a carrier of 50 sin2 π (1,00,000)t

by AM technique .Determine

(a)Modulation index

(b)% of modulation

(c)Frequency of audio signal and carrier

(d)Frequency spectrum of modulated wave.

3. An amplitude modulated wave is represented by the expression

$v_m = 5(1 + 0.6\cos 6280t)\sin(211 \times 10^4 t)$ volts.

The miniumum and maximum amplitudes of the amplitude modulated wave are , respectively :

4. Draw amplitude modulated wave forms for

(i)50% modulation

(ii)100 % modulation

(iii)150% modulation

5. The total power contain of an AM wae is 2.64 kW at a modulation factor

of 80% .Calculate

(i)Power of carrier wave

(ii)Power in USB

(iii)Power of LSB

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6. Show that for 100% modulation ,a signal side-band contains 1/6th of

the total power rediated by the transmitter.

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7. What is the power developed by an amplitude modulated wave in a

load of 100 Ω when the peak voltage of the carrier is 100 volts and the

modulation factor is 0.4?

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8. How much audio power is necessary to fully modulate a 100 kW carrier if the modulation system is 75% efficient?

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9. A transmitter transmits a power of 10 KW when modulation is 50% .Find power of carrier wave?

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10. A transmitter supplies 9 KW to the aerial whem modulated to 40% .Find the power radiated?

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11. The total power content of an AM wave is 900 W.for 100% modulation find the power transmitted by each side band?

12. The maximum peak to peak voltage of an AM wire is 24 mV and the minimum peak to peak voltage is 8 mV. The modulation factor is

13. Antenna current of an AM broadcast transmitter modulated by 50% is $11A$. The carrier current is