PHYSICS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

COMMUNICATION SYSTEM

Example

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

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

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

(a) What is the inductance per metre of this cable?

(b) Determine the impedance of an infinitely long section of such cable.

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

(a) What is the coverage range?

(*b*) How much population is covered by transmission, if the average population density around the tower is $1200 per\,km^2$?

(*c*) What should be the height of tower to double the coverage range

5. 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

(*a*) Percent modulation

(*b*) Frequency spectrum of the modulated wave.

6. The antenna current of an AM transmitter is $8A$ when only the carrier is sent but increases to $8.96A$ when the carrier is modulated sinusoidally . The percentage modulation is

7. A sinusoidal carrier voltage of 80volts amplitude and $1MHz$ 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.

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

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

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10. A transmitting antenna at the top of a tower has a height $32m$ and the height of the receiving antenna is $50m$. What is the maximum distance between them for satisfactory communication in LOS mode? Given radius of earth $6.4 \times 10^6 m$.

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11. A message signal of frequency $10kHz$ and peak voltage of 10volts is used to modulate a carrier of frequency $1MHz$ and peak voltage of 20volts. Determine
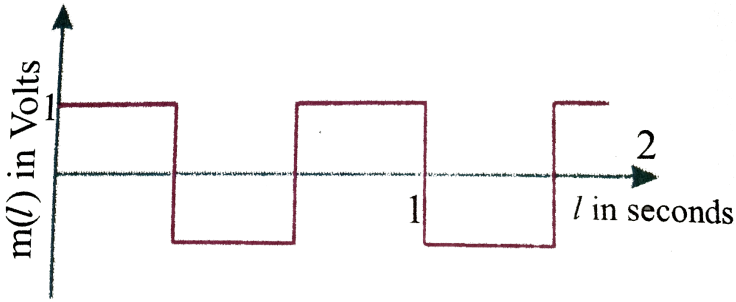
(*a*) modulation index

(*b*) the side bands produced.

12. A modulating signal is a square wave as shown in figure.

The carrier wave is given by

$$c(t) = 2\sin(8\pi t)\text{volt.}$$

(*i*) Sketch the amplitude modulated wave from

(*ii*) What is the modulation index?

13. An amplitude modulated wave is modulated to 50%. What is the saving in power if carrier as well as one of the side band are suppressed?

14. The carrier frequency is $500kHz$. The modulating frequency is 15 kilohertz and the deviation frequency is 75 kilohertz. Find

(a) modulation index

(b) Number of side bands

(c) Band width

15. The load on an Am diode detector consists of a resistance of $50K\Omega$ in parallel with a capacitor of $0.001\mu F$. Determine the

maximum modulation index that the detector can handle without distortion when modulation frequency is (i) $1kHz$ (ii) $5kHz$

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1. A transducer used at the transmitting end, serves the purpose of converting

    A. electrical signal to sound form

    B. sound signal to electrical form

    C. electrical signal to magnetic form

    D. sound signal to magnetic form

Answer: B

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

A. at the transmitter

B. in the medium of transmission

C. information source signal

D. at the destination

Answer: B

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3. Device that converts one form of energy into another is called

A. transmitter

B. transducer

C. receiver

D. channel

Answer: B

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4. The part of communication system that extracts the signal at the output of the channel is

A. transducer

B. transmitter

C. receiver

D. receiver or transmitter

Answer: C

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5. The attenuation of a signal is compensnsated by

    A. rectifier

    B. oscillator

    C. modulator

    D. amplifier

Answer: D

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6. Modern communication systems use

    A. analog circuits

    B. digital circuits

C. combination of analog & digital circuits

D. radio circuits

Answer: B

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7. The audio signal

A. can be sent directly over the air for large distance

B. can not be sent directly over the air for large distance

C. possesses very high frequency

D. possesses very low frequency

Answer: B

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8. A digital signal possess

    A. continuously varying values

    B. only two discrete values

    C. only four discrete values

    D. constant values

Answer: B

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9. Digital signals

    A. provide continuous set of values

    B. represent values are randomly

    C. Utilise Decimal code system

D. Utilise binary code system

Answer: D

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10. Digital signals

(i) do not provide a continuous set of values. (ii) represents values as descrete steps.

(iii) can utillize binary system

(iv) can utillize decimal as well as binary system.

The true option is.

    A. (i) & (ii) only

    B. (ii) & (iii) only

    C. (i), (ii) & (iii) only

    D. (i), (ii), (iii) & (iv)

Answer: C

11. A digital signal

    A. is less reliable than analog signal

    B. is more reliable than analog signal

    C. is equally reliable as the analog signal

    D. Not at all reliable

Answer: B

12. The band width required for transmiting video signal is

A. $50KHz$

B. $1MHz$

C. $4.2MHz$

D. $6MHz$

Answer: C

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13. Band width of an optical fiber is

A. more than $100GHz$

B. few KHz

C. less than $1MHz$

D. less than $1GHz$

Answer: A

14. The short wave Radio broadcasting band is

A. $7MHz$ to $22MHz$

B. $88MHz$ to $108MHz$

C. $30KHz$ to $300KHz$

D. $3GHz$ to $30GHz$

Answer: A

15. the FM Radio broad casting band is

A. $5MHz$ to $30MHz$

B. $88MHz$ to $108MHz$

C. $30KHz$ to $300KHz$

D. $3GHz$ to $30GHz$

Answer: B

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16. The TV brod 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

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17. A: Satellite communication uses different frequency bands for uplink and downlink B: Banwidth of video signals is $4.2MHz$

    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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18. A: The frequency band of VHF is greater than UHF of TV transmission

B: Optical fiber transmission has frequency band of $1THz$ to $1000THz$

    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: B

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19. The higher frequency TV broad casting bands range is

    A. $54 - 72MHz$ and 76 to $88MHz$

    B. $174 - 216MHz$ and 420 to $890MHz$

    C. 896 to $901MHz$ and 840 to $935MHz$

D. 5.925 to 6.425GHz and 3.7 to 4.2GHz

Answer: B

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20. Frequency ranges for micro waves are:

A. 3×10^9 to $3 \times 10^4 Hz$

B. 3×10^{13} to $3 \times 10^9 Hz$

C. 3×10^{14} to $3 \times 10^9 Hz$

D. 3×10^{11} to $3 \times 10^9 Hz$

Answer: B

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21. The frequency band used for radar relay systems & T.V is

A. UHF

B. VLF

C. VHF

D. EHF

Answer: A

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22. For TV transmission the frequency range employed

A. $30 - 300MHz$

B. $30 - 300GHz$

C. $30 - 300KHz$

D. $30 - 300Hz$

Answer: A

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23. The frequency which is not part of AM broadcast

A. $100kHz$

B. $700kHz$

C. $600kHz$

D. $1500kHz$

Answer: A

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24. Cellular Mobile works in the frequency range of

    A. 840 to $935MHz$

    B. 3.7 to $4.2GHz$

    C. 420 to $890MHz$

    D. 30 to $300GHz$

Answer: A

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25. Frequency range used in down linking in satellite communication is

    A. 0.896 to $0.901GHz$

    B. 0.420 to $0.890GHz$

C. 5.925 to $6.425GHz$

D. 3.7 to $4.2GHz$

Answer: D

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26. In the satellite communication, the uplinking frequency range is

A. 0.896 to $0.901GHz$

B. 0.420 to $0.890GHz$

C. 5.925 to $6.425GHz$

D. 3.7 to $4.2GHz$

Answer: C

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

    A. at the transmitter

    B. In the channel or in the transmission line

    C. In the information source

    D. At the receiver

Answer: B

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28. The frequency of a FM transmitter without signal input is called

    A. Lower side band frequency

    B. Upper side band frequency

C. Resting frequency

D. None of these

Answer: C

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29. Indicate which one of the following system is digital

A. Pulse position modulation

B. Pulse code modulation

C. Pulse width modulation

D. Pulse amplitude modulation

Answer: B

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30. Television signal on earth cannot be recevied at distances greater than $100km$ from the transmission station. The reasion behind this is that

A. The receiver antenna is unable to detect the signal at a distance greater than $100km$

B. The TV programme consists of both audio and video signals

C. The TV signals are less powerful than radio signals

D. The surface of earth is curved like a sphere

Answer: D

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31. Audio signal cannot 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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32. A signal emitted by an antenna from 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

33. An antenna is a device

A. That converts eletromagnetic energy into radio frequency

signal

B. That converts radio frequency signal into electromagnetic

energy

C. That convert guided electomagnetic waves into free space

electromagnetic waves and vice-versa

D. None of these

Answer: C

34. An antenna

    A. Convrets 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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35. An antenna behaves as a resonant circuit only when the length is

    A. equal to $\lambda/4$

B. equal to $\lambda/2$

C. equal to the intergral multiples of $\lambda/2$

D. equal to $3\lambda/4$

Answer: A

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36. If audio signal is tranmitted directly into space, the length of the transmitting antenna required will be

A. extremely small

B. extremely large

C. infinitely large

D. moderate

Answer: B

37. The height of the antenna

(a) limits the population covered by the transmission

(b) limits the ground wave propagation

(c) effectively uesd in line 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

38. Statement A: If the antenna is vertical the vertically polarised EM wave is radiated Statement B: The vertically polarised 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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39. A: It is necessary for transmitting antenna must be at same height as that of receiving antenna for line of sight communition.

B: EM waves of frequency beyond $40MHz$, propagate as space waves.

A. both A and B are correct

B. both A and B are wrong

C. only A is correct

D. only B is correct

Answer: D

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40. Broadcasting antennas are generally

A. Omnidirectional type

B. Vertical type

C. Horizontial type

D. None of these

Answer: B

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41. The process of superimposing signal frequency (i.e. audio wave)

on the carrier wave is known as

A. Transmission

B. Reception

C. Modulation

D. Detection

Answer: C

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42. In frequency modulation

   A. The amplitude of modulated wave varies as frequency of

   carrier wave

   B. The frequency of modulated wave varies as amplitude of

   modulating wave

   C. The amplitude of modulated wave varies as amplitude of

   carrier wave

   D. The frequency of modulated wave varies as frequency of

   modulating wave

Answer: B

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43. For transmitting audio signal properly

A. it is first superimposed on high frequency carrier wave

B. it is first superimposed on low frequency carrier wave

C. It is sent directly without superimposing on any wave

D. it is superposed with carrier wave of high veloctiy

Answer: A

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44. The process of recovering the audio signal from the modulated wave is known as

A. amplification

B. rectification

C. modulation

D. demodulation

Answer: D

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

   A. amplitude modulation

   B. frequency modulation

   C. phase modulation

   D. amplitude modulation

Answer: B

46. The need for doing modulation is

A. to increase the intensity of auido signal

B. to decrease the intensity of audio signal

C. to transmit audio signal to large distances

D. to increase the frequency of the audio signal

Answer: C

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

A. pulse modulation

B. frequency modulation

C. amplitude modulation

D. phase modulation

Answer: C

48. Modulation is not used to :-

    A. reduce the bandwidth

    B. to separate the transmission of different users

    C. to ensure that intelligence may be transmitted to long

       distances

    D. to allow the uses of practical antenna

Answer: A

49. The process of translating the information contained 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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50. During the process of modulation the RF wave is called

A. Modulating wave

B. Modulated wave

C. Carrier wave

D. Audio wave

Answer: C

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51. Modulation is required to

(a) distinguish different transmissions

(b) ensure that the information may be transmitted 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

52. 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

53. 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

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54. Amplitude modulation is used for broad casting 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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55. In amplitude modulation, carrier wave frequencies are..... Than that compared to those in frequency modulation

A. lower

B. higher

C. same

D. lower or higher

Answer: A

56. AM is used for broad casting because,

    A. it is more noise immune than other modulating systems

    B. it requires less transmitting power compared with other systems

    C. its use avoids receiver complexity

    D. no other modulation system can provide the necessary bandwidth, faithful transmission.

Answer: C

57. Draw backs of Amplitude modulation

A. During transmission extreneous 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. The receiver set is complex

Answer: B

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58. In amplitude modulation

A. only amplitude is changed but frequency remains same

B. both amplitude & frequency changes equally

C. both amplitude & frequency changes unequally

D. only frequency changes but amplitude remains constant.

Answer: A

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59. The limitation of a amplitude modulation is

A. clear reception

B. high efficiency

C. small operating range

D. good audio quality

Answer: C

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60. In frequency modulation

A. Frequency of CW remains constant but amplitude changes in accoradance 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 modulating wave frequency but the amplitude remains constant.

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

Answer: C

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61. In T.V. broadcasting both picture and sound are transmitted simutaneously. 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

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62. Effective power radiated by an antenna is

   A. Proportional to the square at the length of the antenna

B. inversely proportional to the wavelength

C. inversely proportional to the square of the wavelength

D. proportional to the wavelength

Answer: C

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63. 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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64. The difference between phase and frequency modulation

A. practically they are same but theoretically they differ

B. lies in the power 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: A

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65. Basically, the product modulator is

A. An amlifier

B. A mixer

C. A frequency separator

D. A phase semparator

Answer: B

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66. Which of the following is the disadvantage of FM over AM

A. Larger band width requirement

B. Larger noise

C. Higher modulation power

D. Low efficiency

Answer: A

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67. Audio signal cannot 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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68. The examples of broadcast are

(A) radio

(B) television

(C) telephony

(D) internet

A. A & B

B. A, B & D

C. A, B & C

D. B & D

Answer: B

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69. The waves related to telecommuni-cation are-

A. visible light

B. infrared

C. ultraviolet

D. microwave

Answer: D

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70. While tuning in a certain broad cast 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. varying the current of receiver set

Answer: C

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71. Long distance short-wave radio broadcasting uses

A. Ground wave

B. Ionospheric wave

C. Direct wave

D. Sky wave

Answer: C

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72. Which of the following is used to produce radio waves of constant amplitude?

A. filter

B. rectifier

C. FET

D. oscillator

Answer: D

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73. 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

A. a & b

B. b & c

C. a & c

D. a, b & c

Answer: D

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

A. Interference

B. Attenuation

C. Polarization

D. Due to unknown reason

Answer: B

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75. 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

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76. As the $e.\,m$ waves travel in free spaces

A. absorption takes place

B. attennuation takes place

C. refraction take place

D. reflection takes place

Answer: B

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77. The electromagnetic waves of frequency $80MHz$ and $200MHz$

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

78. The better propagation mode to propagate television frequency and radar signal is

    A. satellite communication

    B. ground propagation

    C. polarized communication

    D. skywave communication

Answer: A

79. Micro wave link repeaters are typically $50km$ 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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80. Attenuation of ground waves is due to

(1) Diffraction effect

(2) Radio waves induce currents in the ground because of the

polarisation

A. a & b are true

B. Only a is true

C. Only b is true

D. Both a & b false.

Answer: A

81. 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

82. 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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83. Space wave propagation is used in

(a) microwave communication

(b) satellite communication

(c) TV transmission

A. Only a

B. Both a & b

C. Both b & c

D. a, b & c

Answer: D

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84. 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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85. When a sky wave is reflected onto the ground

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

      wave

   B. there is a phase difference intriduced to the reflected wave

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

      reach the receving antenna along with the direct wave from

      transmitting antenna causing interference.

   D. the waves are not relfected by the ground.

Answer: C

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86. The electromagnetic waves of frequency $2MHz$ and $30MHz$ are

    A. In gorund wave propagation

    B. In sky wave propogation

    C. In microwave propagation

    D. In satellite communication

Answer: B

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87. Among the follwing frequencies one will be suitable for beyond-the horizon communication using sky waves is

    A. $10kHz$

    B. $10MHz$

C. $1GHz$

D. $1000GHz$

Answer: B

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88. Among the follwing , the waves which can penetrate the ionosphere are

A. $10GHz$

B. $10MHz$

C. $20MHz$

D. $25MHz$

Answer: A

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89. A: At great heights from surface of earth and close to earth ionisation of air molecules is low. B: EM waves of frequencies beyond $30MHz$ penetrate ionosphere and escape.

A. both A and B are correct

B. both A and B are wrong

C. only A is correct

D. only B is correct

Answer: A

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90. Through which mode of propagation, the radio waves can be sent from one place to another

A. Ground wave propagation

B. Sky wave propagation

C. Space wave propagation

D. All of them

Answer: D

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91. The frequency at which communication will not be reliable is

A. $100KHz$

B. $1MHz$

C. $10GHz$

D. $100GHz$

Answer: A

92. The frequency above which radiation of electrical energy is practical is

A. $0.2kHz$

B. $2kHz$

C. $20kHz$

D. $2Hz$

Answer: C

93. The ratio waves of frequency $300MHz$ to $3000MHz$ belong to

A. High frequency band

B. Very high frequency band

C. Ultra high frequency band

D. Super high frequency band

Answer: C

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94. Coaxial cable is an example of

A. Optical fibre

B. Free space

C. Wire medium

D. Sea medium

Answer: C

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95. Optical fibre communication is generally preferred over general communication system because

    A. it is more efficient

    B. of signal security

    C. both (1) & (2)

    D. it is easily available

Answer: C

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96. the attenution in optical fibre is mainly due to

    A. Absorption

B. Scattering

C. Neither absorption nor scattering

D. both 1 and 2

Answer: D

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97. Consider telecommunication through optical fibres. Which of the following statements is not true?

A. Optical fibres may have homogeneous core with a suitable cladding

B. Optical fibres can be of graded refactive index

C. Optical fibres are subject to electromagnetic interference from outside

D. Optical fibres have extremely low transmission loss

Answer: C

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98. The phenomenon by which light travels in an optical fibres is

A. Reflection

B. Refraction

C. Total internal reflection

D. Transmission

Answer: C

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99. Laser light is considered to be coherent because it consists of

A. Many wavelengths

B. Uncoordinated wave of a particular wavelength

C. Coordinated wave of many wavelengths

D. Coordinated waves of a particular wavelength

Answer: D

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

A. Forest density

B. Pollution

C. Wetland mapping

D. Medical treatment

Answer: D

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101. The question has statement - 1 and statement - 2 Of the four choices given after the statements , choose the one that best describes the two statements

statement - 1 : Sky wave signals are used for long distance radio communication . These signals are in generel , less stable then ground wave signals

statement - 2 : The state of inosphere varies from to hour day and season to season .

A. both A and B are true

B. both A and B are false

C. A is true and B is false

D. A is false and B is true

Answer: A

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102. Choose the correct statement.

A. In the frequency modulation,the amplitude of high frequency carrier wave is mode to vary in proportion to the frequency of audio signal.

B. In amplitude modulation, the amplitude of the high frequency carrier wave is made to vary in proportion to the amplitude of the audio signal.

C. In amplitude modulation, the frequency or the high frequency carrier wave is made to vary in proportion to the amplitude of audio signal.
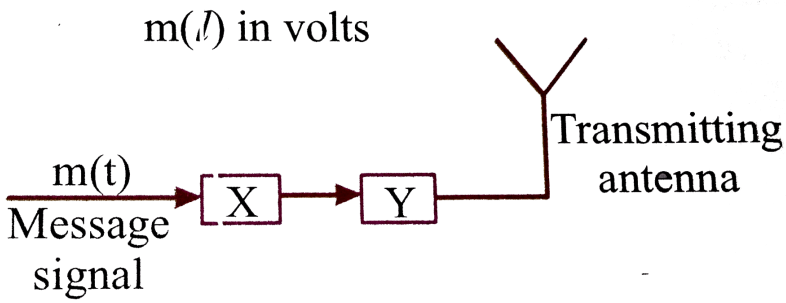
D. In frequency modulation, the amplitude of the high frequency carrier wave is made to vary in proportion to the amplitude of audio signal.

Answer: B

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103. Figure shows a block diagram of a transmitter. Identify the boxes X and Y ?

m(l) in volts

m(t)
Message signal → X → Y → Transmitting antenna

A. Amlitude modulator, detector

B. Dectector, power amlifer

C. Amplitude modulator, power amplifier

D. Capacitor, Detector

Answer: C

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Level I C W

1. An optical commnication system is operating at a wavelenght of $800nm$, it's optical source frequency is

    A. $3.8 \times 10^{14} Hz$

    B. $3.8 \times 10^{12} Hz$

    C. $3.8 \times 10^{10} Hz$

    D. $3.8 \times 10^{9} Hz$

Answer: A

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2. If a carrier wave of 1000 kHz is used to carry the signal, the length of transmitting antenna will be equal to -

    A. $3m$

    B. $30m$

C. $300m$

D. $3000m$

Answer: C

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

A. $22.5km$

B. $27.5km$

C. $50km$

D. $25km$

Answer: C

4. ATV transmitting antenna is $80m$ tall. If the receiving antenna is on the ground the service area is

   A. $12sqkm$

   B. $3215sqkm$

   C. $144sqkm$

   D. $32sqkm$

Answer: B

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

A. $h^{\frac{1}{2}}$

B. h

C. $h^{\frac{3}{2}}$

D. h^2

Answer: A

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6. In short wave communication waves of which of the following frequeuncies will be reflected back by the ionospheric layer having electron density $10^{11} per m^3$?

A. $2MHz$

B. $10MHz$

C. $12MHz$

D. $18MHz$

Answer: A

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7. In an amplitude modulated wave for audio frequency of $500 \text{cycle} / \sec ond,$the appropriate carrier frequency will be

A. $50 \text{cycles} / \sec$

B. $100 \text{cycles} / \sec$

C. $500 \text{cycles} / \sec$

D. $50, 000 \text{cycles} / \sec$

Answer: D

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8. The modulation index of an FM carrier having a carrier swing of $200kHz$ and a modulating signal $10kHz$ is

A. 5

B. 10

C. 20

D. 25

Answer: B

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9. If a number of sine waves with modulation indices $n_1, n_2, n_3...$ modulate a carrier wave, then total modulation index (n) of the wave is

A. $n_1 + n_2.... + 2(n_1 + n_2.....)$

B. $\sqrt{n_1 - n_2 + n_3 \ldots \ldots}$

C. $\sqrt{n_1^2 - n_2^2 + n_3^2 \ldots \ldots \ldots}$

D. $n_1 + n_2 \ldots \ldots$

Answer: C

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10. A sky wave with a frequency 55 MHz is incidnet on D-region of earth's atmosphere at $45°$, The angle of refraction is (electron density for D-region is 400 electron/c.c.

A. $60°$

B. $45°$

C. $30°$

D. $15°$

Answer: B

11. What should be the maximum acceptance angle at the aircore interface of an optical fibre if n_1 and n_2 are the refractive indices of the core and the cladding, respectively

A. $\sin^{-1}(n_2/n_1)$

B. $1\sin^{-1}\sqrt{n_1^2 - n_2^2}$

C. $\left[\tan^{-1}\dfrac{n_2}{n_1}\right]$

D. $\left[\tan^{-1}\dfrac{n_1}{n_2}\right]$

Answer: B

12. The characteristic impedance of a coaxial cable is of the order of

A. 50Ω

B. 200Ω

C. 130Ω

D. None of these

Answer: C

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13. The velocity factor of a transmission line x. If dielectric constant of the medium is 2.6, the value of x is

A. 0.26

B. 0.62

C. 2.6

D. 6.2

Answer: B

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14. For television broadcasting, the frequency employed is normally

A. $30 - 300MHz$

B. $30 - 300GHz$

C. $30 - 300KHz$

D. $30 - 300Hz$

Answer: A

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15. Because of tilting, which waves finally disappear?

A. Microwaves

B. Surface waves

C. Sky waves

D. Space waves.

Answer: B

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

A. $80km$

B. $16km$

C. $40km$

D. $64km$

Answer: A

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

A. $51.2m, 80m$

B. $40m$, $80m$

C. $80m, 125m$

D. $25m , 75m$

Answer: C

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

A. $2D$

B. $\sqrt{2}D$

C. $4D$

D. $D/2$

Answer: B

3. A T.V. tower has a height of $10m$ is in a region of average population density $100\pi/km^2$. The number of people that can receive the transmission is nearly

A. 1, 28, 000

B. 64, 000

C. 2, 56, 000

D. 32, 000

Answer: A

4. A certain distance from a transmitting tower a receiver tower of height $20m$ is used to receive direct signal. Another tower is installed beyond the first along the same line of sight to receive the signals from the same transmitter. Its height is 44% more than the first receiving tower. Then the separation between the two receiving towers is

A. $6.4km$

B. $3.2km$

C. $1.6km$

D. $0.8km$

Answer: B

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5. The TV signals have a band width of $6MHz$.The number of TV channels than can be accommodated in a band width $12GHz$ is

A. 2

B. 20

C. 200

D. 2000

Answer: D

6. 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
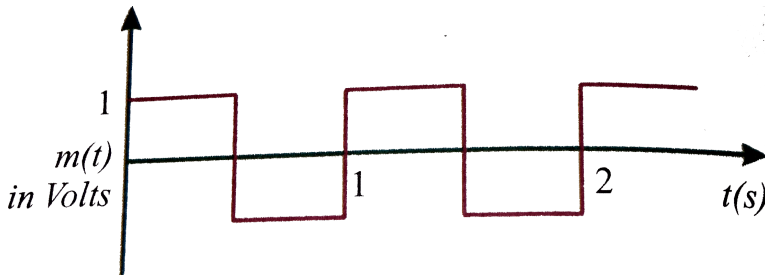
A. $6V$

B. $9V$

C. $4V$

D. $15V$

Answer: B

7. A modulating signal is a square wave as shown in figure.

The carrier wave is given by

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

The modulation index is

A. 2

B. 0.75

C. 0.5

D. 1.5

Answer: C

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8. A audio signal $15 \sin 2\pi(1500t)$ amplitude modulates $60 \sin 2\pi(10^5) t$. The depth of modulation is

A. 25 %

B. 20 %

C. 50 %

D. 40 %

Answer: A

9. An AM wave is given by

$$V = 1500[1 + 0.5\sin 12560t]\sin(5.26 \times 10^5 t).$$

The modulating frequency is

A. $2.0 kHz$

B. $1.0 kHz$

C. $12.5 kHz$

D. $50 kHz$

Answer: A

10. The amplitude modulated current is given by

$i = 125[1 + 0.6 \sin 2900t] \sin(5.50 \times 10^5 t).$

The RMS value of carrier current will be

A. $\dfrac{125}{\sqrt{2}} A$

B. $\dfrac{100}{\sqrt{2}} A$

C. $\dfrac{75}{\sqrt{2}} A$

D. $\dfrac{50}{\sqrt{2}} A$

Answer: A

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11. An audio signal $25 \sin 2\pi(1400t)$ amplitude modulates $80 \sin 2\pi(10^5 t)$. The two side band frequencies are

A. $98.6 kHz, 101.4 kHz$

B. $92.5kHz, 105.5kHz$

C. $94kHz, 102.5kHz$

D. $96kHz, 106kHz$

Answer: A

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12. If f_c and f_m are the frequencies of carrier wave and signal, then the band width is

A. f_m

B. $2f_m$

C. f_c

D. $2f_c$

Answer: B

13. The number of AM broadcast stations that can be accomodated in a $300kHz$ band width for the highest modulating frequency $15kHz$ will be

A. 10

B. 5

C. 7

D. 12

Answer: A

14. A $1000kHz$ carrrier is simultaneously modulated with $300Hz$, $800Hz$ and $2kHz$ audio waves. The frequencies present in the output are

A. $999.7kHz$, $1000.3kHz$, $999.2kHz$

B. $1000.8kHz$, $998kHz$, $1002kHz$

C. $1002.8kHz$, $996kHz$, $1106kHz$

D. Both (1) and (2)

Answer: D

15. Depth of modulation in terms of $E_{\max}$ and $E_{\min}$ is

A. $m_a = \dfrac{E_{\max} + E_{\min}}{E_{\min}}$

B. $m_a = \dfrac{E_{\max} - E_{\min}}{E_{\max}}$

C. $m_a = \dfrac{E_{\max} + E_{\min}}{E_{\max} + E_{\min}}$

D. $m_a = \dfrac{E_{\max} + E_{\min}}{E_{\max} - E_{\min}}$

Answer: C

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16. If V_c is amplitude of carrier wave in AM transmitter where modulation factor is m then amplitude of side bands can be

A. $\dfrac{V_c}{2m}$

B. $\dfrac{m}{2} V_c$

C. $m V_c$

D. $\dfrac{V_c}{2}$

Answer: B

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17. If a carrier wave of amplitude $10mV$ is modulated by an audio signal of amplitude $2mV$, then amplitude of LSF or USF is given by

A. $0.2mV$

B. $0.5mV$

C. $1mV$

D. $2mV$

Answer: C

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18. The amplitude modulated current is given by $i = 125[1 + 0.6\sin 2900t]\sin 10^6 t$. The depth of modulation is

A. 60 %

B. 6 %

C. 36 %

D. 66 %

Answer: A

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19. If minimum voltage in an AM wave was found to be $2V$ and maximum voltage $10V$. The % modulation index

A. 80 %

B. 66.67 %

C. 64.25 %

D. 76.25 %

Answer: B

20. Sinusoidal carrier voltage of frequency $1.5MHz$ and amplitude $50V$ is amplitude modulated by sinusoidal voltage of frequency $10kHz$ producing 50% modualtion. The lower and upper side-band frequencies in kHz are

    A. $1490, 1510$

    B. $1510, 1490$

    C. $\dfrac{1}{1490}, \dfrac{1}{1510}$

    D. $\dfrac{1}{1510}, \dfrac{1}{1490}$

Answer: A

21. A transmitter supplies $9kW$ to the aerial when unmodulated. The power radiated when modulated to 40% is

A. $5kW$

B. $9.72kW$

C. $10kW$

D. $12kW$

Answer: B

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22. The total power content of an AM wave is $1500W$. For 100% modulation, the power transmitted by the carrier is

A. $500W$

B. $700W$

C. $750W$

D. $1000W$

Answer: D

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23. The bit rate for a signal, which has a sampling rate of $8kHz$ and whare 16 quantisation levels have been used is

A. $32000bits/\sec$

B. $16000bits/\sec$

C. $64000bits/\sec$

D. $72000bits/\sec$

Answer: A

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24. The antenna current of an AM transmitter is $8A$ when only the carrier is sent but increases to $8.96A$ when the carrier is modulated sinusoidally . The percentage modulation is

    A. 50 %

    B. 60 %

    C. 65 %

    D. 71 %

Answer: D

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25. In a diode AM- dectector, the output circuit consist of $R = 1kW$ and $C = 10pF$. A carrier signal of $100kHz$ is to be

detected. Is it good

A. Yes

B. No

C. Information is not sufficient

D. None of these

Answer: B

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26. In an FM system a $7kHz$ signal modulates $108MHz$ carrier so that frequency deviation is $50kHz$. The frequency modulation index is

A. 7.143

B. 8

C. 0.71

D. 350

Answer: A

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27. Maximum usable frequency (MUF) in F-region layer is x, when the critical frequency is 60 MHz and the angle of incidence is $70°$, then x is

A. $150MHz$

B. $170MHz$

C. $175MHz$

D. $190MHz$

Answer: C

28. Suppose that the modulating signal is $m(t) = 2\cos(2\pi f_m t)$ and the carrier signal is $x_c(t) = A_c \cos(2\pi f_c t)$ which one of the following is a conventional AM signal without over modulation

A. $x(t) = A_c m(t)\cos(2\pi f_c t)$

B. $x(t) = A_c(1 + m(t))\cos(2\pi f_c t)$

C. $x(t) = A_c \cos(2\pi f_c t) + \dfrac{A_c}{4}m(t)\cos(2\pi f_c t)$

D.

$x_c(t) = A_c \cos(2\pi f_m t) + \cos(2\pi f_c t) + A_c \sin(2\pi f_m t)\sin(2\pi f_c t)$

Answer: C

29. $C(t)$ and $m(t)$ are used to generate an AM signal. The modulation indes of generated AM signal is 0.5. Then the quantity $\dfrac{P_{\text{Total } SB}}{P_{\text{Carrier}}} =$

   A. $1/8$

   B. $1/4$

   C. $2/3$

   D. $9/8$

Answer: A

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30. Which of one of the following modulated signals are recovered up to a scaling factor using envelope detedtor

   A. $20\cos 200\pi t + 30m(t)\cos 200\pi t$

B. $20\cos 200\pi t + 16m(t)\cos 200\pi t$

C. $10m(t)\cos 400\pi t$

D. None

Answer: B

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31. A message signal $m(t) = 4\cos 2000\pi t$ modulates the carrier $C(t) = \cos 2\pi f_c t$ where $f_c = 1MHz$ to produce an AM signal. For demodulation using envelope detector the time constant RC should satisfy

A. $0.5ms < RC < 1ms$

B. $1\mu s < \ < RC < \ < 1ms$

C. $RC > \ > 1\mu s$

D. $RC > \ > 1\mu s$

Answer: B

32. A $1MHz$ carrier signal is modulated by a symmertrical sinusoidal wave for period of $100\mu s$ in a nonlinear (square lae device).Which of the following frequencies will notbe present in the modulated signal

A. $990kHz$

B. $1010kHz$

C. $1020kHz$

D. $1030kHz$

Answer: C

33. A given AM transmitter develops an unmodulated power output of $1KW$ across 50Ω resistance. When a message signal of amplitude $5V$ is applied on it then the side bands carry 40% of power of carrier. Amplitude of the carrier signal used is

    A. $505.952V$

    B. 126.488

    C. 252.976

    D. 316.22

Answer: D

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34. Let $m(t) = \cos\left(4\pi \times 10^3 t\right)$ and $C(t) = 5\cos\left(2\pi \times 10^6 t\right)$ are the message and carrier signals modulation index is 0.5. What is

the efficency achieved?

A. 8.33 %

B. 11.11 %

C. 20 %

D. 25 %

Answer: B

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1. The tuned circuit of an oscillator in a simple AM transimitter employs a 250 micro henry coil and $1nf$ condenser. If the oscillartor output is modulated by audio frequency upto $10KHz$, the frequency range occupied by the side bands in KHz is

A. 210 to 230

B. 258 to 278

C. 308 to 328

D. 118 to 128

Answer: C

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2. A TV tower has a height of $70m.$ 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. 2.816×10^{12}

Answer: A

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

A. 0.6

B. 0.2

C. $\sqrt{0.14}$

D. $\sqrt{0.07}$

Answer: C

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4. The maximum peak-to-peak voltage of an AM wave is $16mV$ and the minimum peak-to-peak voltage is $4mV$. The modulation factor is equal to

A. 0.6

B. 0.3

C. 0.8

D. 0.25

Answer: A

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5. An AM wave is expressed as $e = 10(1 + 0.6\cos 2000\pi t)\cos 2 \times 10^8\pi t$volts, the minimum and maximum values of modulated carrier wave are

A. $10V, 20V$

B. $4V, 8V$

C. $16V, 4V$

D. $8V, 20V$

Answer: C

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6. 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 $3.14 \times 10^6 rad/s$

A. $12KHz, 494KHz$

B. $6KHz, 313KHz$

C. $6KHz, 494KHz$

D. $18KHz, 494KHz$

Answer: A

---

7. A TV transmission tower at a particular station has a height of $160m$. Radius of earth is $6400km$

(i) The range it covers is $45255m$

(ii) The population that it covers is $77.42lakhs$.

When population density is $1200km^{-2}$

(iii) The height of antenna should be increased by $480m$ to double the coverage range

    A. i and ii are true

    B. ii and iii are true

    C. i and iii are true

D. i, ii and iii are true

Answer: D

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8. The tuned circuit of an oscillator in a simple AM transimitter employs a $40\mu H$ coil and 12 nanofarad (nF) capacitor. If the oscillator ouput os modulated by audio frequency of $5kHz$, which of the following frequencies doesn't appear in the output AM?

A. $f_{USB} = 225KHz$

B. $f_{USB} = 235kHz$

C. $f_c = 230kHz$

D. $f_c = 235kHz$

Answer: B

9. A $400wa$ carrier is modulated to a depth of 80%. Calculate the total power in the modulated wave.

    A. $528W$

    B. $128W$

    C. $256W$

    D. $400W$

Answer: A

10. Calculate modulation index if carrier waves is modulated by three signals with modulation indices as $0.6, 0.3$ and 0.4

A. 1.0

B. 0.70

C. 0.78

D. 1.3

Answer: C

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11. A $1000kHz$ carrrier is simultaneously modulated with $f_{m1} = 300Hz$, $f_{m2} = 800Hz$ and $f_{m3} = 1KHz$ audio sine waves.

What will be the frequencies present in the output?

(a)
$f_{LSB1} = 999.7KHz$
$f_{USB1} = 1000.3KHz$

(b)
$f_{LSB2} = 999.2KHz$
$f_{USB2} = 1000.8KHz$

(c)
$f_{LSB3} = 999KHz$
$f_{USB3} = 1001KHz$

(d)
$f_{LSB3} = 990KHz$
$f_{USB3} = 1010KHz$

A. a only

B. b, c and d

C. a, b and c

D. a, c only

Answer: C

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Ncert Based

1. Three waves A, B and C of frequencies $1600kHz$, $5MHz$ and $60MHz$, respectively are to be transmitted from one place to another. Which of the following is the most appropriate mode of communications:

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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2. A $100m$ long antenna is mounted on a $500m$ tall building. The complex ca become a transmission tower of waves with λ

A. ~$400m$

B. ~$25m$

C. ~$150m$

D. ~$2400m$

Answer: A

3. A $1KW$ signal is transmitted using a communication channel which provides attenuatiom at the rate of $-2dBperkm$. If the communication channel has a total length of $5km$, the power of the signal received is

[gain in $dB = 10\log\left(\dfrac{P_0}{P_i}\right)$]

A. $900W$

B. $100W$

C. $990W$

D. $1010W$

Answer: B

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4. A speech signal of $3kHz$ is used to modulate a carrier signal of frequency $1MHz$, using amplitude modulation. The frequencies of the side bands will be

A. $1.003MHz$ and $0.997MHz$

B. $3001kHz$ and $2997kHz$

C. $1003kHz$ and $1000kHz$

D. $1MHz$ and $0.997MHz$

Answer: A

5. A message signal frequency ω_m is superpiosed on a carrier wave of frequency ω_c to gent an amplitude modulated wave (AM).The frequency of the AM wave will be

    A. ω_m

    B. ω_c

    C. $\dfrac{\omega_c + \omega_m}{2}$

    D. $\dfrac{\omega_c - \omega_m}{2}$

Answer: B

6. $I - V$ characterstic of four devices are shown in Fig. 15.1

Identify devices that can be used for modulation:

A. i and iii

B. only iii

C. ii and some regions of iv

D. All the devices can be used

Answer: C

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7. A male voice after modulation-transmission sounds like that of a female to the receiver. The problem is due to

A. poor selection of modulation index (selected $0 < m < 1$)

B. poor bandwidth selection of amplifiers.

C. poor selection of carrier frequency

D. loss of energy in transmission

Answer: B

8. A basic communication system consist of

(a) transmitter

(b) information source

(c) channel

(d) receiver

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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9. Identify the mathematical expression for amplitude modulated wave:

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

B. $A_c \sin[\{\omega_c t + \phi + KV_m(t)\}t]$

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

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

Answer: C

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10. Compute LC product of a tuned amplifer circuit required to generate a carrier wve of $1MHz$ for amplitude modulation

    A. 52×10^{-15}

    B. 25×10^{-15}

    C. 2.5×10^{-16}

    D. 2.0×10^{-15}

Answer: B

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11. An audio signal of 15 kHz frequency cannot be transmitted over long distance without modulation because.

A. the size of the required antenna would be at least $5km$ which

    is not convenient

B. the audio signal can not be transmitted through sky waves.

C. the size of the requried antenna would be at least $20km$,

    which is not convenient

D. effective power transmitted would be very low, if the szie of

    the antenna is less than $5km$.

Answer: A::B::D

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12. Audio sine waves of 3 kHz frequency are used to amplitude

modulate a carrier signal of 1.5 MHz. Which of the following

statements are true?

A. The side band frequencies are $1506kHz$ and $1494kHz$.

B. The bandwidth required for amplitude modulation is $6kHz$.

C. The bandwidth required for amplitude modulation is $3MHz$.

D. The side band frequencies are $1503kHz$ and $1497kHz$.

Answer: B::D

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13. A TV transmission tower has a height of 240 m. Signals broadcast from this tower will be received by LOS communication at a distance of (assume the radius of earth to be $6.4 \times 10^6 m$)

A. $100km$

B. $24km$

C. $55km$

D. $50km$

Answer: B::C::D

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14. The frequency response curve (Fig. 15.2) for the filter circuit used for production of AM waves should be

A. (i) followed by (ii)

B. (ii) followed by (i)

C. (iii)

D. (iv)

Answer: A::B::C

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15. In amplitude modulation, the modulation index mu, is kept less than or equal to 1 because.

    A. $m > 1$, will result in interference between carrier frequency and message frequency, resulting into distortion.

    B. $m > 1$ will result in overlapping of both side bands resulting into loss of information.

    C. $m > 1$ will result in change in phase between carrier signal and message signal.

    D. $m > 1$ indicates amplitude of message signal greater than amplitude of carrier signal resulting into distortion.

Answer: B::D

16. Choose correct statements in the following

A. A vibrating tuning fork produce analog signal

B. A muscial sound due to vibrating sitar string prodduce

analog signal

C. Light pulse produce digital signal

D. Out put of $NAND$ Gate produce digital signal

Answer: A::B::C::D

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Level I H W

1. An optical commnication system is operating at a wavelength of

$600nm$, it's optical source frequency is

A. $3.8 \times 10^{14} Hz$

B. $3.8 \times 10^{12} Hz$

C. $3.8 \times 10^{10} Hz$

D. $5 \times 10^{14} Hz$

Answer: D

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2. A carrier wave of $2000 kHz$ is used to carry the signal, the length of the transmitting antenna will be equal to

A. $3m$

B. $30m$

C. $150m$

D. $3000m$

Answer: C

3. A transmitting antenna is at a height of $25m$ and the receiving antenna is at a height of $64m$.The maximum distance between them for satisfactory communication is nearly

A. $22.5km$

B. $46.5km$

C. $50km$

D. $25km$

Answer: B

4. A TV transmitting antenna is $100m$ tall. If the receiving antenna is on the ground the service area is

    A. $12 sqkm$

    B. $4000 sqkm$

    C. $144 sqkm$

    D. $32 sqkm$

Answer: B

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

    A. $(Rh)^{\frac{1}{2}}$

    B. h

C. $h^{\frac{3}{2}}$

D. h^2

Answer: A

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6. In short wave communication waves of which of the following frequencies will be reflected back by the ionospheric layer, having electron density $10^{12} per m^3$

A. $2MHz$

B. $9MHz$

C. $12MHz$

D. $18MHz$

Answer: B

7. In an amplitude modulated wave for audio frequency of $1000 cycle/sec ond$,the appropriate carrier frequency will be

A. $50 cycles/sec$

B. $100 cycles/sec$

C. $500 cycles/sec$

D. $40,000 cycles/sec$

Answer: D

8. The modulation index of an FM carrier having a carrier swing of $300kHz$ and a modulating signal $10kHz$ is

A. 15

B. 10

C. 20

D. 25

Answer: A

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9. A sky wave with a frequency $64.4MHz$ is incident on D-region of earth's atmosphere at $45°$. The angle of refraction is (electron density for D-region is $400\text{electron}/cm^3$)

A. $60°$

B. $90°$

C. $45°$

D. $15°$

Answer: C

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10. The velocity factor of a transmission line x. If dielectric constant

of the medium is 1.8, the value of x is

A. 0.26

B. 0.62

C. 0.74

D. 6.2

Answer: C

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

A. $80km$

B. $16km$

C. $40km$

D. $92km$

Answer: D

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Level Ii H W

1. The maximum distance between the transmitting and receving TV towers is $64km$. If the ratio of the heights of the TV transmitting tower to receiving tower is $4:9$, the heights of the transmitting and receiving tower are

    A. $51.2m, 80m$

    B. $1280m, 2880m$

    C. $80m, 125m$

    D. $25m, 75m$

Answer: B

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2. The maximum distance between the transmitting and receiving TV towers is D. If the heights of both transmitting and receiving

towers are doubled then the maximum distance between them

becomes

A. $2D$

B. $D/\sqrt{2}$

C. $4D$

D. $D/2$

Answer: B

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3. A T.V. tower has a height of $5m$ is in a region of average

population density $100\pi/km^2$. The number of people that can

receive the transmission is nearly

A. $1, 28.000$

B. 64000

C. 2, 56, 000

D. 32, 000

Answer: B

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4. At certain distance from a transmitting tower a receiver tower of height $180m$ is used to receive direct signal. Another tower is installed beyond the first along the same line of sight to receive the signals from the same transmitter. Its height is 21% more than the first receiving tower. Then the separation between the two receiving towers is

A. $6.4km$

B. $3.2km$

C. $1.6km$

D. $4.8km$

Answer: D

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5. The TV signals have a band width of $4MHz$.The number of TV channels that can be accommodated in a band width $16GHz$ is

A. 2

B. 20

C. 200

D. 4000

Answer: D

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6. A carrier wave of peak voltage $10V$ is used to transmit a message signal. The peak voltage of the modulating signal in order to have a modulation index of 80% is
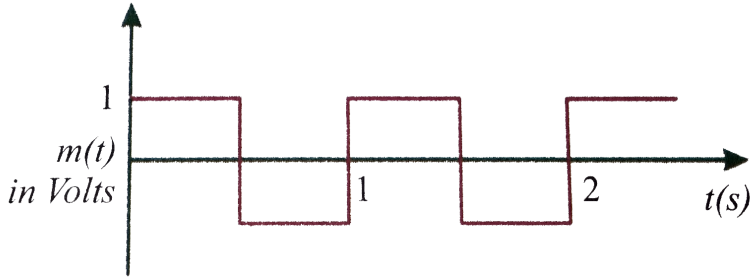
A. $6V$

B. $9V$

C. $8V$

D. $15V$

Answer: C

7. A modulating signal is a square wave as shown in the figure

The carrier wave is given by.

$$c(t) = 1.33 \sin(8\pi t) \text{volts}$$

The modulation index is

A. 2

B. 0.75

C. 0.5

D. 1.5

Answer: B

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8. A audio signal $20 \sin 2\pi (1500t)$ amplitude modulates $40 \sin 2\pi (10^5) t$. The depth of modulation is

A. 25 %

B. 20 %

C. 50 %

D. 40 %

Answer: C

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9. An AM wave is given by

$V = 1500[1 + 0.5 \sin 62800t] \sin (5.26 \times 10^5 t).$

The modulating frequency is

A. $20 kHz$

B. $10kHz$

C. $12.5kHz$

D. $50kHz$

Answer: B

10. The amplitude modulated current is given by

$$i = 75[1 + 0.3\sin 2003t]\sin(7 \times 10^5t).$$

The RMS value of carrier current will be

A. $\dfrac{125}{\sqrt{2}}A$

B. $\dfrac{100}{\sqrt{2}}A$

C. $\dfrac{75}{\sqrt{2}}A$

D. $\dfrac{50}{\sqrt{2}}A$

Answer: C

---

11. An audio signal $5\sin 2\pi(1600t)$ amplitude modulates $20\sin 2\pi(10^5 t)$. The two side band frequencies are

A. $98.4kHz$, $101.6kHz$

B. $92.5kHz$, $105.5kHz$

C. $32.1kHz$, $31.59kHz$

D. $96kHz$, $106kHz$

Answer: A

12. If $2f_c$ and $3f_m$ are the frequencies of carrier wave and signal, then the band width is

A. f_m

B. $6f_m$

C. f_c

D. $2f_c$

Answer: B

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13. The number of AM broadcast stations that can be accomodated in a $140kHz$ band width for the highest modulating frequency $10kHz$ will be

A. 10

B. 5

C. 7

D. 12

Answer: C

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14. A $2000kHz$ carrier is simultaneously modulated with $600Hz$, $800Hz$ and $4kHz$ audio waves. The frequencies present in the output are

A. $2000.6kHz, 2000.8kHz, 1996kHz$

B. $1999.4kHz, 2004kHz, 1999.2kHz$

C. $1002.8kHz, 996kHz, 1106kHz$

D. Both (1) and (2)

Answer: D

---

15. If a carrier wave of amplitude $20mV$ is modulated by an audio signal of amplitude $4mV$, then amplitude of LSF or USF is given by

A. $0.2mV$

B. $0.5mV$

C. $1mV$

D. $2mV$

Answer: D

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16. The amplitude modulated current is given by $i = 70[1 + 0.06 \sin 2900t] \sin 10^6 t$. The depth of modulation is

A. 60 %

B. 6 %

C. 36 %

D. 66 %

Answer: B

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17. If minimum voltage in an AM wave was found to be $1.1V$ and maximum voltage $10V$. The $\%$ modulation index

A. 80.2 %

B. 66.67 %

C. 64.25 %

D. 76.25 %

Answer: A

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18. Sinusoidal carrier voltage of frequency $3MHz$ and amplitude $50V$ is amplitude modulated by sinusoidal voltage of frequency $10kHz$ producing 50% modualtion. The lower and upper side-band frequencies in kHz are

A. 1490, 1510

B. 3010, 2990

C. $\dfrac{1}{1490}, \dfrac{1}{1510}$

D. $\dfrac{1}{1510}, \dfrac{1}{1490}$

Answer: B

---

19. A transmitter supplies $6kW$ to the aerial when unmodulated. The power radiated when modulated to $60\ \%$ is

A. $5kW$

B. $9.72kW$

C. $7.08kW$

D. $12kW$

Answer: C

20. The total power content of an AM wave is $6000W$. For 100% modulation, the power transmitted by the carrier is

    A. $500W$

    B. $700W$

    C. $750W$

    D. $4000W$

Answer: D

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21. The bit rate for a signal, which has a sampling rate of $8kHz$ and where 32 quantization levels have been used is

    A. $32000bits\,/\sec$

    B. $40000bits\,/\sec$

C. $64000 bits/\sec$

D. $72000 bits/\sec$

Answer: B

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22. The antenna current of an AM transmitter is $10A$ when only carrier is sent but increase to $10.1A$ when the carrier is modulated sinusoidally. The percentage modulation is

A. 50%

B. 60%

C. 2%

D. 71%

Answer: C

23. In a diode AM- dectector, the output circuit consist of $R = 1k\Omega$ and $C = 10pF$. A carrier signal of $1000MHz$ is to be detected. Is it good

A. Yes

B. No

C. Information is not sufficient

D. None of these

Answer: A

24. In an FM system a $9kHz$ signal modulates $108MHz$ carrier so that frequency deviation is $60kHz$. The frequency modulation index is

   A. 7.143

   B. 8

   C. 6.67

   D. 350

Answer: C

25. Maximum usable frequency (MUF) in F-region layer is x, when the critical frequency is $60MHz$ and the angle of incidence is $60°$. Then x is

A. $150 MHz$

B. $170 MHz$

C. $120 MHz$

D. $190 MHz$

Answer: C

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