PHYSICS

BOOKS - DISHA PUBLICATION PHYSICS (HINGLISH)

COMMUNICATION SYSTEM

Jee Main 5 Year At A Glance

1. The number of AM broadcast stations that can be accomodated in a $300 kHz$ band width

for the highest modulating frequency $15kHz$ will be

A. 20

B. 10

C. 8

D. 15

Answer: B

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2. The carrier frequency of a transmitter is provided by a tank circuit of a coil of inductance 49 μH and a capacitance of 2.5 nF It is modulated by an audio signal of 12 kHz The frequency range occupied by the side bands is :

    A. 18kHz-30kHz

    B. 63kHz-75kHz

    C. 442kHz-466kHz

    D. 13482kHz-13494kHz

Answer: C

3. A telephonic communication service is working at carrier frequency of 10 GHz. Only 10% of it is utilized for transmission. How many telephonic channels can be transmitted simultaneously if each channel requires a bandwidth of 5 kHz ?

A. 2×10^3

B. 2×10^4

C. 2×10^5

D. 2×10^6

Answer: C

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4. A carrier wave of peak voltage 14 V is used for transmitting a message signal. The peak voltage of modulating signal given to achieve a modulation index of 80% will be :

A. 11.2V

B. 7V

C. 22.4V

D. 28 V

Answer: A

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5. A signal is to be transmitted through a wave of wavelength λ, using a linear antenna. The length 1 of the antenna and effective power

radiated P_{eff} will be given respectively as : (K is a constant of proportionality)

A. $\lambda, P_{eff} = K\left(\dfrac{1}{\lambda}\right)^2$

B. $\dfrac{\lambda}{8}, P_{eff} = K\left(\dfrac{1}{\lambda}\right)$

C. $\dfrac{\lambda}{16}, P_{eff} = K\left(\dfrac{1}{\lambda}\right)^3$

D. $\dfrac{\lambda}{5}, P_{eff} = K\left(\dfrac{1}{\lambda}\right)^{\frac{1}{2}}$

Answer: A

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6. In amplitude modulation, sinusoidal carrier frequency used is denoted by w_c and the signal frequency is denoted by w_m. The band width (Δw_m) of the signal is such that $\Delta w_m < < w_c$. Which of the following frequencies is not contained in the modulated wave?

A. $w_m + w_c$

B. $w_c - w_m$

C. w_m

D. ω_c

Answer: C

7. Choose the correct statement :

A. In frequency modulation the amplitude

of the high frequency carrier wave is

made to vary in proportion to the

amplitude of the audio signal.

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

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

D. In amplitude modulation the frequency of the high frequency carrier wave is

made to vary in proportion to the amplitude of the audio signal.

Answer: C

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8. A signal of 5 kHz frequency is amplitude modulated on a carrier wave of frequency 2 MHz. The frequencies of the resultant signal is/ are

A. 2005 kHz, 2000 kHz and 1995 kHz

B. 2000 kHz and 1995 kHz

C. 2 MHz only

D. 2005 kHz and 1995 kHz

Answer: A

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9. Long range radio transmission is possible when the radio waves are reflected from the

ionosphere. For this to happen the frequency

of the radio waves must be in the range:

A. 80-150 MHz

B. 8-25 MHz

C. 1 - 3 MHz

D. 150-1500KHZ

Answer: B

10. Sky Wave Propagation

A. 1 MHz to 2 MHz

B. 5 MHz to 25 MHz

C. 35 MHz to 40 MHz

D. 45 MHz to 50 MHz

Answer: B

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Exercise 1 Concept Builder Topicwise

1. Communication is the process of

    A. keeping in touch

    B. exchange information

    C. broadcasting

    D. entertainment by electronics

Answer: B

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2. Reception of information involves

A. decoding of signal

B. storage of signal

C. interpretation of signal

D. All of the above

Answer: D

3. For good demodulation of AM signal of carrier frequency f, the value of RC should be

A. $\dfrac{1}{f}$

B. $< \dfrac{1}{f}$

C. $\geq \dfrac{1}{f}$

D. $> > \dfrac{1}{f}$

Answer: D

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4. The purpose of ...A... is to convert the message signal produced by the source of information into a form suitable for transmission through the ...B... Here, A and B refer to

   A. channel, transmitter

   B. transmitter, channel

   C. receiver, transmitter

   D. receiver, channel

Answer: B

5. The fundamental radio antenna is a metal rod which has a length equal to

A. $lamdba$ in free space at the frequency of operation

B. $\omega/2$ in free space at the frequency of operation

C. $\lambda/4$ in free space at the frequency of operation

D. $3\lambda/4$ in free space at the frequency of operation

Answer: C

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

D. $\sqrt{n_1 + n_2 + \ldots\ldots}$

Answer: C

7. Pre-emphasis in FM system is done to

A. compress modulating signal

B. expand modulating signal

C. amplify lower frequency component of

the modulating signal

D. amplify higher frequency component of

the modulating signal

Answer: D

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8. If the output of the information source is a

non-electrical signal like a voice signal, a ...A...

converts it to ...B. form before giving it as an input to the ...C.... Here, A, B and C refer to

A. receiver, electrical, channel

B. channel, magnetic, transducer

C. transducer, electrical, channel

D. transducer, electrical, transmitter

Answer: D

9. During the process of transmission & reception the signal gets deteriorated due to

A. noise introduced in the system

B. distortion in the system

C. both (a) & (b)

D. neither (a) nor (b)

Answer: C

10. Optical fibres transmit light along its axis, by the process of

A. total internal reflection

B. refraction

C. interference

D. diffraction

Answer: A

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11. A modem is a

    A. modulator-demodulator

    B. multiplexer-demultiplexer

    C. multivibrator-degenerator

    D. None of these

Answer: A

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12. Which of the following AM-scheme requires the minimum transmitted power & minimum channel bandwidth?

A. VSB

B. DSB-SC

C. AM

D. SSB

Answer: D

13. Buffer amplifier is used at the transmitting end to

A. feed carrier frequency to master oscillator

B. amplify carrier frequency

C. mix modulating signal with carrier frequency

D. isolate master oscillator from other stages of transmitter.

Answer: D

14. 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

15. The purpose of a detector at the receiving end is

   A. to amplify signal

   B. to reduce its frequency level

   C. to modulate signal

   D. to demodulate signal

Answer: D

16. The term channel is used to indicate

    A. the amplitude range allocated to a given

       source

    B. the frequency range allocated to a given

       source

C. the voltage-range allocated to a given

source

D. all of the above

Answer: B

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17. Optical fibre are used for long distance

communication because

A. it amplifies signals to be transmitted

B. it transfer signals faster than electrical

cables

C. it pre-emphasise weak signals

D. it provide little attenuation as compared

to electrical cable for light propagation

Answer: D

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18. For transmission of speeches, talks, music, dramas etc. is used

A. radio broadcast transmitter

B. radio telegraph transmitter

C. navigation transmitter

D. None of these

Answer: A

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19. E.m. wave of audible frequency cannot be directly propagated over a long distance because

    A. they have vary small energy content

    B. the length of antenna required for transmission of these wave is too large

    C. both (a) and (b)

    D. neither (a) nor (b)

Answer: C

20. For transmission of e.m.wave of audible frequency, these waves are superimposed with waves of

A. frequency less than 20 Hz

B. frequency less than 10 KHz.

C. frequency in the audible range.

D. radio-frequency.

Answer: D

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21. Wave obtained on superimposition of audible frequency e.m. wave is known as

    A. carrier wave

    B. high frequency wave

    C. modulating wave

    D. modulated wave

Answer: D

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22. In an ionized medium, the phase velocity v_p group velocity v_g and the speed of light are related as

    A. $v_p > v_g > c$

    B. $v_p = v_g = c$

    C. $v_p < v_g < c$

    D. $v_p > c, v_g < c$

Answer: D

23. Sky wave propagation is not possible for waves of frequency > 30 MHz because

 A. these waves do not have much energy to reach ionosphere

 B. they are not reflected by ionosphere

 C. they get absorbed by troposphere

 D. they get reflected by stratosphere

Answer: B

24. Long range transmission of TV-signal is done by

    A. space-wave

    B. sky waves

    C. ground wave

    D. artificial satellite

Answer: D

25. Communication on ground is through electromagnetic waves of wavelength

    A. larger than 600 m

    B. between 200 and 600 m

    C. between 1 and 5 m

    D. between 10^{-3} and 0.1

Answer: D

26. Earth's atmosphere is transparent for

A. only the visible light

B. only the X-rays

C. only the y-rays

D. visible light and microwaves

Answer: D

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27. Ground wave propagation is suitable for

    A. low radio frequency over a short range

    B. high radio frequency over a short range

    C. high radio frequency over a long range

    D. low radio frequency over a short range

Answer: A

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28. During ground wave propagation the transmitted waves gets attenuated because

    A. earth surface absorbs the waves

    B. frequency of the waves are too low

    C. energy content of these waves are high

    D. earth surface offers resistance

Answer: D

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29. Long range propagation is not possible by space wave propagation because

    A. height of troposhere is quite small

    B. height of troposhere is large

    C. troposphere absorbs transmitted wave

    D. None of these

Answer: A

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30. The wave reaching the receiving antenna will have maximum intensity if the direct wave & wave after reflection from earth's surface

A. are out of phase by 90°

B. are out of phase by 270°

C. are in phase

D. None of these

Answer: A

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31. For a radio wave reaching the ionised medium

    A. will bend away from normal

    B. will bend towards normal

    C. will bend follow a straight-path

    D. None of these

Answer: A

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32. Intensity of electric field obtained at receiver antenna for a space wave propagation is

A. directly proportional to the perpendicular-distance from transmitter to antenna

B. inversely proportional to the perpendicular-distance from transmitter to antenna

C. directly proportional to the square

perpendicular distance from transmitter

to antenna

D. inversely proportional to the square

perpendicular distance from transmitter

to antenna

Answer: D

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33. Ground waves are polarised

    A. parallel to the earth's surface

    B. normal to the earth's surface

    C. at an angle $45°$ from earth's surface

    D. in any direction

Answer: B

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34. Field strength of tropospheric TV signal is proportional to

A. $\dfrac{1}{\lambda}$

B. λ

C. $\dfrac{1}{\lambda^2}$

D. λ^2

Answer: A

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35. The service area of space wave communication increases by

A. increasing the height of transmitting antenna

B. decreasing the height of receiving antenna

C. increasing the height of both transmitting and receiving antenna

D. decreasing the distance between transmitting and receiving antenna

Answer: C

36. Main function of the RF amplifiers in a superheterodyne receiver is to

   A. amplify signal

   B. reject unwanted signal

   C. discriminate against image frequency signal and IF-signal

D. all of the above

Answer: D

37. Array gain of an antenna is

A. directly proportional to power radiated

by isotropic antenna

B. invesely proportional to power radiated

by isotropic antenna

C. directly proportional to power radiated

by practical antenna

D. inversely proportional to square of

power radiated by practical antenna

Answer: A

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38. Critical frequency that gets reflected back

from ionosphere is

A. same for all layers of the ionosphere

B. different for different layers of the ionosphere

C. not dependent on layers of the ionosphere

D. None of these

Answer: B

39. Intensity of electric field obtained at receiver antenna for a space wave propagation is

    A. directly proportional to the perpendicular-distance from transmitter to antenna

    B. inversely proportional to the perpendicular-distance from transmitter to antenna

C. directly proportional to the square

   perpendicular distance from transmitter

   to antenna

D. inversely proportional to the square

   perpendicular distance from transmitter

   to antenna

Answer: D

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40. The function of an amplitude limitter in an

FM-receiver is

A. to reduce the amplitude ofthe signal to

suit IF amplifier

B. to amplify low frequency signal

C. to eliminate any change in amplitude of

receiver FM signal

D. None of these

Answer: C

41. Depth of modulation in terms of E_{max} and E_{min} is

A. $m_a = E_{max} + E_{min} / E_{min}$

B. $ma = E_{max} - E_{min} / E_{max}$

C.

$$m_a = E_{max} - E_{min} / E_{max} + E_{min}$$

D. $ma = E_{max} + E_{min} / E_{max} - E_{min}$

Answer: C

42. A tuned amplifier circuit is used to generate a carrier frequency of 2 MHz for the amplitude modulation. The value of $\sqrt{LC}$ is

A. $\dfrac{1}{3\pi \times 10^6}$

B. $\dfrac{1}{2\pi \times 10^6}$

C. $\dfrac{1}{4\pi \times 10^6}$

D. $\dfrac{1}{2 \times 10^6}$

Answer: C

43. For a single side band transmission a balanced modulator is used to

    A. increase power of carrier wave

    B. increase amplitude of carrier wave

    C. suppress audio signal

    D. suppress carrier component

Answer: D

▶

44. Audio in television signals are

A. frequency modulated

B. amplitude modulated

C. both frequency and amplitude

modulated

D. phase modulated

Answer: A

45. Skip distance does not depend on

    A. the frequency of signal transmitted

    B. electron density of the layer

    C. they get absorbed by troposphere

    D. they get reflected by stratosphere

Answer: D

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46. In PCM if the transmission path is very long

    A. pulse spacing is reduced

    B. pulse amplitude is increased

    C. pulse width is increased

    D. repeater stations are used

Answer: D

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47. 100% modulation in FM means

A. actual frequency deviation $>$ maximum

allowed frequency deviation

B. actual frequency deviation $=$ maximum

allowed frequency deviation

C. actual frequency deviation $\geq$ maximum

allowed frequency deviation

D. actual frequency deviation $<$ maximum

allowed frequency deviation

Answer: B

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48. Encoding of signal is required for

A. modulation at transmitting end

B. modulation at receiving end

C. demodulation at receiving end

D. demodulation at transmitting end

Answer: A

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49. Picture signal of TV-signal is

    A. amplitude modulated

    B. frequency modulated

    C. phase modulated

    D. pulse modulated

Answer: A

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50. 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 fixed location in space and simply spins about its own axis

Answer: C

51. Which one of the following statement is wrong

A. Radio waves in the frequency range 30 MHz to 60 MHz are called sky waves.

B. Radio horizon of the tramitting antenna for space wave is $d_T = \sqrt{(2Rh_T)}$, R= Radius of earth , h_T= height of transmitting antenna).

C. Within the skip distance neigthe the ground waves nor the sky waves are received.

D. The principle of fibre optical communication is total internal reflection.

Answer: A

52. Identify the incorrect statement from the following.

A. AM detection is carried out using a rectifier and an envelop detector

B. Pulse position denotes the time of rise or fall of the pulse amplitude

C. Modulation index μ is kept $\geq$ 1, to avoid distortion

D. Facsimile (FAX) scans the contents of the document to create electronic signals

Answer: C

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53. If the heights of transmitting and the receiving antennas are each equal to h, the maximum line-of-sight distance between them is (R is the radius of earth)

A. $\sqrt{2Rh}$

B. $\sqrt{4Rh}$

C. $\sqrt{6Rh}$

D. $\sqrt{8Rh}$

Answer: D

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

A. Long-wave

B. Short-wav

C. Medium-wave

D. Amplitude-modulated

Answer: B

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55. The rms value of a carrier voltage is 100 volts. Compute its rms value when it has been

amplitude modulated by a sinusoidal audio

voltage to a depth of 30%.

A. 94V

B. 104.5V

C. 114.4V

D. 124V

Answer: B

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

    A. ~$1.2 \times 10^{12} m^{-3}$

    B. ~$10^{6} m^{-3}$

    C. ~$10^{14} m^{-3}$

    D. ~$10^{22} m^{-3}$

Answer: A

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57. The gap between the frequency of the side bands in an amplitude modulated wave is

    A. twice that of the carrier signal

    B. twice that of the message signal

    C. the same as that of the message signal

    D. the same as that of the carrier signal

Answer: B

58. Which of the following four alternatives is not correct, We need modulation :-

A. to reduce the time lag between transmission and reception of the information signal

B. to reduce the size of antenna

C. to reduce the fractional band width, that is the ratio of the signal band width to the centre frequency

D. to increase the selectivity

Answer: A

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59. An audio signal represented as $25 \sin 2\pi(2000t)$ amplitude modulated by a carrier wave : $60 \sin 2\pi(100,000)t$. The modulation index of the modulated signal is

A. 25%

B. 41.6%

C. 50%

D. 75 %

Answer: B

60. If a carrier wave $c(t) = A\sin\omega_c t$ is amplitude modulated by a modulator signal $m(t) = A\sin\omega_m t$ then the equation of modulated signal $[C_m(t)]$ and its modulation index are respectively

A. $C_m(t) = A(1 + \sin\omega_m t)\sin\omega_c t$ and 2

B. $C_m(t) = A(1 + \sin\omega_m t)\sin\omega m t$ and 1

C. $C_m(t) = A(1 + \sin\omega_m t)\sin\omega_c t$ and 1

D. $C_m(t) = A(1 + \sin\omega_c t)\sin\omega_m t$ and 2

Answer: C

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Exercise 2 Concept Applicator

1. Given the electric field of a complete amplitude modulated wave as

$$\overrightarrow{E} = \hat{i}E_C\left(1 + \frac{E_m}{E_C}\cos \omega_m t\right)\cos \omega_c t.$$

Where the subscript c stands for the carrier wave and m for the modulating signal . The frequencies present in the modulated wave are

A. ω_c and $\sqrt{\omega_c^2 + \omega_m^2}$

B. ω_c, $\omega_c + \omega_m$ and $\omega_c - \omega_m$

C. ω_c and ω_m

D. ω_c and $\sqrt{\omega_c \omega_m}$

Answer: B

2. Sinusoidal carrier voltage of frequency 1.5 MHz and amplitude 50 V is amplitude modulated by sinusoidal voltage of frequency 10 kHz producing 50% modulation. The lower and upper side-band frequency 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

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

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

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

4. When radio waves passes through ionosphere, phase difference between space current and capacitive displacement current is

A. 0 rad

B. $(3\pi/2)$ rad

C. $(\pi/2)$ rad

D. πrad

Answer: A

5. The electron density of a layer of ionosphere at a height 150 km from the earth's surface is 9 × 109 per m3. For the sky transmission from this layer up to a range of 250 km,

The critical frequency of the layer is

    A. 2 Hz

    B. 2.7 Hz

    C. 2.78 kHz

    D. 2.7 MHz

Answer: D

6. In optical communication system operating at 1200nm, only 2% of the source frequency is available for TV t ransmission having a bandwidth of 5 MHz. the number of TV channels that can be transmitted is

   A. 2 million

   B. 10 million

   C. 0.1 million

D. 1 million

Answer: D

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7. A radiostation has two channels. One is AM

at 1020 kHz and the other FM at 89.5MHz. For

good results you will use

    A. longer antenna for the AM channel and

        shorter for the FM

B. shorter antenna for the AM channel and

longer for the FM

C. same length antenna will work for both

D. information given is not enough to say

which one to use for which

Answer: B

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8. Antennas are used to receive and transmit

A. electric component of the electromagnetic wave produced by antenna

B. magnetic component of the electromagnetic wave produced by antenna

C. both electric and magnetic components of the electromagnetic wave produced by by antenna

D. 50% of both components of the

electromagnetic wave produced by

antenna

Answer: A

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9. An AM wave is expressed as

$e = 10(1 + 0.6\cos 2000\pi t)\cos 2 \times 10^8\pi t\text{volts,}$

the minimum and maximum values of

modulated carrier wave are

A. 10V and 20 V

B. 4V and 8V

C. 16 V and 4V

D. 8 V and 20 V

Answer: C

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10. Calculate the power developed by an amplitude modulated wave in a load resistance of 100Ω, if the peak voltage of

carrier wave is 100 V and modulation index is

0.4.

A. 50 watt

B. 54 watt

C. 104 watt

D. 4 watt

Answer: B

11. 12 signals each band limited to 5 kHz are to be transmitted by frequency-division multiplexer. If AM-SSB modulation guard band of 1 kHz is used then the bandwidth of multiplexed signal is

   A. 101 kHz

   B. 99 kHz

   C. 84kHz

   D. 71 kHz

Answer: D

12. In a radar system, peak transmitted power is increased a factor of 81 and the antenna diameter is increased by a factor of 3, then the maximum-range will increase by a factor of

A. 81

B. 27

C. 9

D. 3

Answer: C

13. A carrier frequency of 10kV at 1 MHz is amplitude modulated by a 1 kHz signal of 6 kV peak voltage. When the modulation pattern is observed on a calibrated CRO, the voltage indicated by the CRO will be

A. 16

B. 32

C. 864

D. 84

Answer: B

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

A. 999.7 kHz, 100.3 kHz, 999.2 kHz

B. 1000.8 kHz, 998 kHz, 1002 kHz

C. 1002.8 kHz, 996 kHz, 1106 kHz

D. both (a) and (b)

Answer: D

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15. A 10 kW carrier is sinusoidally modulated by two carriers corresponding to a modulation

index of 30% and 40% respectively then total power radiated by the modulator is

A. 10.25 kW

B. 11.25 kW

C. 12.75 kW

D. 17kW

Answer: B

16. An FM signal has a resting frequency of 105MHz and highest frequency of 105.03MHz when modulated by a signal of frequency 5kHz. The carrier swing is

    A. 25 kHz

    B. 54 kHz

    C. 60 kHz

    D. 75 kHz

Answer: C

17. A super heterodyne receiver is designed to receive transmitted signals between 5 and 10 MHz. The tuning range of the local oscillate for IF frequency 600 kHz for high-side tuning would be

    A. 4.6 to 9.6 MHz

    B. 5.6 to 10.6 MHZ

    C. 4.6 to 10.6 MHz

    D. 5.6 to 9.6 MHz

Answer: B

18. Consider the following amplitude modulated (AM) signal, where $f_m < B$

$$x_{AM}(t) = 10(1 + 0.5\sin 2\pi f_m t)\cos 2\pi f_c t$$

The average side-band power for the AM signal given above is

A. 25

B. 12.5

C. 6.25

D. 3.125

Answer: C

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19. An AM - signal is given as

$$x_{AM}(t) = 100[p(t) + 0.5g(t)]\cos \omega_c t \qquad \text{in}$$

interval $0 \le t < 1$. One set of possible values

of the modulating signal and modulation

index would be

A. $t, 0.5$

B. $t, 1.0$

C. $t, 1.5$

D. $t^2, 2.0$

Answer: A

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20. A device with input x (t) and output y (t) is

characterized by :

$$y(t) = x^2(t) \, .$$

An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device . The bandwidth of the output signal is

A. 370kHz

B. 190kHz

C. 380kHz

D. 95kHz

Answer: C

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21. A sinusoidal carrier voltage of frequency 10 MHz and amplitude 200 volts is amplitude modulated by a sinusoidal voltage of frequency 10 kHz producing 40% modulation. Calculate the frequency of upper and lower sidebands.

    A. 10010 kHz, 9990 kHz

    B. 1010kHz, 990 kHz

    C. 10100 Hz,9990 Hz

    D. 1010 MHz, 990 MHz

Answer: A

22. An audio signal consists of two distinct sound. One a human speech signal in the frequency band of $200Hz$ to $2700Hz$, while the other is a high frequency music signal in the frequency band of $10200Hz$ to $15200Hz$. The ratio of the AM signal together to the AM signal band width required to send just the human speech is:

A. 2

B. 5

C. 6

D. 3

Answer: C

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23. A carrier frequency of 1 MHz and peak value
of 10 V is amplitude modulated with a signal
frequency of 10 KHz with peak value of 0.5 V.

What are the values of the modulation index and the side band frequencies ?

A. 0.05 and 1 ± 0.010 MHz

B. 0.5 and 1 ± 0.010 MHz

C. 0.5 and 1 ± 0.005 MHz

D. 0.05 and 1 ± 0.005 MHz

Answer: A

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24. For an A.M. wave, the maximum and minimum amplitude is found to be 20V and 4v. Find the modulation index(m).

A. $3/5$

B. $5/3$

C. $2/3$

D. $3/2$

Answer: C

25. A transmitting antenna at the top of a tower has height 32 m and height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in line of sight (LOS) mode?

    A. 55.4 km

    B. 45.5 km

    C. 54.5km

    D. 455 km

Answer: B

26. The maximum range for the tropospheric transmission of radio wave of wavelength 3m using the transmitting antenna and receiving antenna of heights 100 m and 60 m respectively is

A. 8m

B. 800m

C. 8km

D. 80km

Answer: C

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27. The height of a television tower is 100 m . If radius of earth is 6.4×10^6 and average-population density surrounding the tower is 1000 per km^2 , then the population covered by the television transmission is

A. 2.06×10^6

B. 4.02×10^6

C. 5.18×10^9

D. 6.04×10^9

Answer: B

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28. The area of the region covered by the TV broadcast by a TV tower of 100 m height is (Radius of the earth = 6.4×10^6 m)

A. $12.8\pi \times 10^8\, km^2$

B. $1.28\pi \times 10^3\, km^2$

C. $0.64\pi \times 10^3\, km^2$

D. $1.28 \times 10^3\, km^2$

Answer: B

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29. A broadcast radio transmitter radiates 12 kW when percentage of modulation is 50% , then the unmodulated carrier power is

A. 5.67 kW

B. 7.15 kW

C. 9.7 kW

D. 12 kW

Answer: C

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30. A transmitter radiates 11.8 kW of power

with the carrier unmodulated and 10 kW with

the   carrier   sinusoidally   modulated.   The

modulation factor is

A. 56 %

B. 60 %

C. 72 %

D. 84 %

Answer: B

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