PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

COMMUNICATION SYSTEM

Exercise

1. In short wave communication waves of which of the following frequeuncies will be

reflected back by the ionospheric layer having

electron density $10^{11} perm^3$?

A. $2MHz$

B. $10MHz$

C. $12MHz$

D. $18MHz$

Answer: A

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

A. 50 cycles/sec

B. 100 cycles/sec

C. 500 cycles/sec

D. 50,000 cycles/sec

Answer: D

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3. AM is used for broad casting because,

A. It is more noise immune than other modulation 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

4. Range of frequencies allotted for commercial FM radio broadcast is

    A. 88 to 108MHz

    B. 88 to 108kHz

    C. 8 to 88MHz

    D. 88 to 108GHz

Answer: A

5. The velocity factor of a transmission line x.

If dielectric constant of the medium is 2.6,

A. 0.26

B. 0.62

C. 2.6

D. 6.2

Answer: B

6. 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

7. Long distance short-wave radio broadcasting uses

A. Ground wave

B. Ionospheric wave

C. Direct wave

D. Sky wave

Answer: C

8. A sept index fibre has a relavitive refractive index of 0.88%. What is the critical angle at the core-cladding interface?

A. $60°$

B. $75°$

C. $45°$

D. None of these

Answer: D

9. In which frequency range, space waves are normally propagated?

A. HF

B. VHF

C. UHF

D. SHF

Answer: C

10. If μ and μ_2 are the refractive indices of the materials of core and cladding of an optical fibre, then loss of light due to its leakage can be minimised by having

A. $\mu_1 > \mu_2$

B. $\mu_1 < \mu_2$

C. $\mu_1 = \mu_2$

D. None of these

Answer: A

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11. 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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12. A laser beam of pluse power 10^{12} watt is focussed on an object are $10^{-4} cm^2$. The energy flux in wa / cm^2 at the point of focus is

A. 10^{20}

B. 10^{16}

C. 10^8

D. 10^4

Answer: B

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13. The carrier frequency generated by a tank circuit containing $1nF$ capacitor and $10\mu H$ inductor is

A. $1592 Hz$

B. $1592 MHz$

C. $1592 kHz$

D. $159.2 Hz$

Answer: C

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14. Broadcasting antennas are generally

A. Omnidirectional type

B. Vertical type

C. Horizontal type

D. None of these

Answer: B

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15. For television broadcasting, the frequency employed is normally

A. $30 - 300MHz$

B. $30 - 300 GHz$

C. $30 - 300 KHz$

D. $30 - 300 Hz$

Answer: A

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16. The ratio waves of frequency $300 MHz$ to $3000 MHz$ 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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17. An antenna behaves as resonant circuit only when its length is

A. $\dfrac{\lambda}{2}$

B. $\dfrac{\lambda}{4}$

C. λ

D. $\dfrac{\lambda}{2}$ or integral multiple of $\dfrac{\lambda}{2}$

Answer: D

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18. 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

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

A. In ground wave propagation

B. In sky wave propagation

C. In microwave propagation

D. In satellite communication

Answer: B

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20. 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

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21. the attenution in optical fibre is mainly due to

A. Absorption

B. Scattering

C. Neither absorption nor scattering

D. Both (a) and (b)

Answer: D

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

A. hr

B. h

C. hr

D. h

Answer: A

23. A laser beam is used for carrying our surgery because it

A. Is highly monochromatic

B. Is highly coherent

C. s highly directional

D. Can be sharply focussed

Answer: D

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24. Laser beams are used to measure long distances because

    A. They are monochromatic

    B. They are highly polarised

    C. They are coherent

    D. They have high degree of parallelism

Answer: D

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25. An oscillator is producing FM waves of requency $2kHz$ with a variation of $10kHz$. What is modulating index?

A. 0.2

B. 5

C. 0.67

D. 1.5

Answer: B

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

    A. 10 %

    B. 20 %

    C. 25 %

    D. 50 %

Answer: D

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27. 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

28. What is the modulation index of an over modulated wave

A. 1

B. Zero

C. < 1

D. > 1

Answer: D

29. Basically, the product modulator is

    A. An amplifier

    B. A mixer

    C. A frequency separator

    D. A phase separator

Answer: B

30. If f_0 and f_f represent the carrier wave frequencies for amplitude and frequency modulations respectively, then

A. $f_a > f_f$

B. $f_a < f_f$

C. $f_a \approx f_f$

D. $f_a \geq f_f$

Answer: B

31. 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

32. 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. $\sqrt{n_1 - n_2 + n_3......}$

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

D. None of these

Answer: C

33. An AM wave has 1800 watt of total power content, For 100 % modulation the carrier should have power content equal to

A. 1000watt

B. 1200watt

C. 1500watt

D. 1600watt

Answer: B

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

A. Amplitude modulation

B. Frequency modulation

C. Pulse modulation

D. None of these

Answer: A

36. When the modulating frequency is doubled, the modulation index is halved and the modulating voltage constant the modulation system is

A. Amplitude modulation

B. Phase modulation

C. Frequency modulation

D. All of the above

Answer: C

37. An antenna is a device

    A. That converts electromagnetic energy into radio frequency signal

    B. That converts radio frequency signal into electromagnetic energy

    C. That converts guided electromagnetic waves into free space electromagnetic waves and vice-versa

D. None of these

Answer: C

38. While tuning in a certain broad cast station with a receiver, we are actually

    A. Varying the local oscillator frequency

    B. Varying the frequency of the radio signal to be picked up

C. Tuning the antenna

D. None of these

Answer: A

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39. 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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40. 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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41. The waves used in telecommunication are

A. IR

B. UV

C. Microwave

D. Cosmic rays

Answer: C

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42. 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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43. 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 refractive index

C. Optical fibres are subject to electromagnetic interference from outside

D. Optical fibres have extremely low transmission loss

Answer: C

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

    A. Reflection

    B. Refraction

    C. Total internal reflection

    D. Transmission

Answer: C

45. 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 distance 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

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46. Advantage of optical fibre

A. High bandwidth and EM interference

B. Low bandwidth and EM interference

C. High band width, low transmission

capacity and no EM interference

D. High bandwidth, high data transmission

capacity and no EM interference

Answer: D

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47. 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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48. 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

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

A. Forest density

B. Pollution

C. Wetland mapping

D. Medical treatment

Answer: D

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

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

B. $\sim 10^{6} m^{-3}$

C. $\sim 10^{14} m^{-3}$

D. $\sim 10^{22} m^{-3}$

Answer: A

51. What should be the maximum acceptance angle at the aircore interface of an optical fibre if 1 n and 2 n are the refractive indices of the core and the cladding, respectively

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

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

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

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

Answer: B

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52. A sky wave with a frequency 55 MHz is incident on D-region of earth's atmosphere at $45°$. The angle of refraction is (electorn density for D-region is 400electron$/cm_3$)

A. $60°$

B. 45°

C. 30°

D. 15°

Answer: B

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53. In a diode AM- detector, the output circuit consist of $R = 1k\Omega$ 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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54. Consider an optical communication system operating at $\lambda = 800nm$. Suppose, only 1% of the optical source frequency is the available

channel bandwidth for optical communication. How many channels can be accommondated for transmitting audio signals requiring a bandwidth of $8kHz$

A. 4.8×10^8

B. 48

C. 6.2×10^8

D. 4.8×10^5

Answer: A

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55. A photodetectore is made from a semiconductor. In $-(0.53)Ga_{-0.47}As$ with $E_g = 0.73eV$, what is the maximum wavelength which it can detect?

A. $1000nm$

B. 1703 nm

C. 500 nm

D. 173 nm

Answer: B

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

A. 5 kW

B. 9.72 kW

C. 10 kW

D. 12 kW

Answer: B

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

A. 500 W

B. 700 W

C. 750 W

D. 1000 W

Answer: D

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59. The total power content of an AM wave is

900 W. For 100% modulation, the power

transmitted by each side band is

A. 50 W

B. 100 W

C. 150 W

D. 200 W

Answer: C

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

A. 5

B. 10

C. 20

D. 25

Answer: B

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61. A 500 Hz modulating voltage fed into an FM generator produces a frequency deviation of $2.25kHz$. If amplitude of the voltage is kept

constant but frequency is raised to $6kHz$ then

the new devition will be

A. $4.5kHz$

B. $54kHz$

C. $27kHz$

D. $15kHz$

Answer: B

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62. The audio signal used to modulate $60 \sin\left(2\pi \times 10^6 t\right)$ is $15 \sin 300\pi t$. The depth of modulation is

   A. 50 %

   B. 40 %

   C. 25 %

   D. 15 %

Answer: C

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

A. 32000 bits/sec

B. 16000 bit/sec

C. 64000 bits/sec

D. 72000 bits/sec

Answer: A

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64. 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?

A. 70 %

B. 65.4 %

C. 94.4 %

D. 25.5 %

Answer: C

65. In AM, the cent percent modulation is achived when

    A. Carrier amplitude = signal amplitude

    B. Carrier amplitude $\neq$ signal amplitude

    C. Carrier frequency = signal frequency

    D. Carrier frequency $\neq$ signal frequency

Answer: A

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66. Statement-I : Diode lasers are used as optical sources in optical communication.

Statement-II : Diode lasers consume less energy.

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

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are
false.

Answer: B

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67. Statement-I : Television signals are received

through sky-wave propagation

Statement-II : The ionosphere reflects

electromagnetic waves of frequencies greater than a certain critical frequency.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

false.

Answer: D

68. Statement-1: in high latitude one sees

colourful curtains of light hanging down from

high altitudes.

Statement-2: The high energy charged

particles from the sun are deflected to polar regions by the magnetic field.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

false.

Answer: A

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69. Statement-1: Short wave band are used for

transmission fo radiowaves to a large

distance.

Statement-2: Short waves are reflected from

ionosphere.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

70. Statemet-1: the electrical conductivity of earth's atmosphere increases with altitude.

Statement -2: The high energy particles (i.e., γ-rays and cosmic rays) coming from outer space while entering our earth's atmosphere cause ionization of the atoms of the gases present in the atmosphere and their energy decreases as they approach to earth.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

71. Assertion: The electromagnetic waves of shorter wavelength can travel longer distances on earth's surface thane those of longer of longer wavelengths.

Reason: Shorter the wavelength, the larger is the velocity of wave propagation. Also, shorter the wavelength, shorter is the velocity of wave propagation.

A. If both assertion and reason are true and the reason is the correct

explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

72. Assertion: The surface wave propagation is used for medium wave band and for television broadcasting.

Reason: The surface waves travel directly from transmitting antenna to receiver antenna through atmosphere.

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

B. If both assertion and reason are true but

reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

false.

Answer: a

73. Assertion: The television broadcasting becomes weaker with increasing distance.

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

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

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

   false.

Answer: c

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74. Assertion: The Microwave propagation is

better than the sky wave propagation.

Reason: Microwaves have frequency 100 to

`3001 GHz, which have very good directional properties.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

false.

Answer: a

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75. Assertion: Satellite is an ideal platform for

remote sensing.

Reasion: Satellite in poplar orbit can provide

global coverage or continuous coverage of the

fixed area in geostationary configuration.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: a

76. Assertion : Fax is a modulating and demodulating device.

Reason : It is necessary for exact reproduction of a document.

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

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: d

▶ **Watch Video Solution**

Ordinary

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

    A. 50Ω

    B. 200Ω

    C. 270Ω

    D. None of these

Answer: C

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1. Assertion: A dish antenna is highly directional.

Reasion: This is because a dipole antenna omnidirectional.

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

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are

false.

Answer: b

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SET

1. A ground reciever is receiving a signal at (a) 5 MHz, and (b) 100 MHz, transmitted from a ground transmitter at a height of 300 m located at a distance of 100 km, Identify whether it is coming via space wave or sky wave propagation or satellite transponder. [Radius of earth $\approx 6.4 \times 10^6 m$, N_{max} of ionosphere $= 10^{12} m^3$]
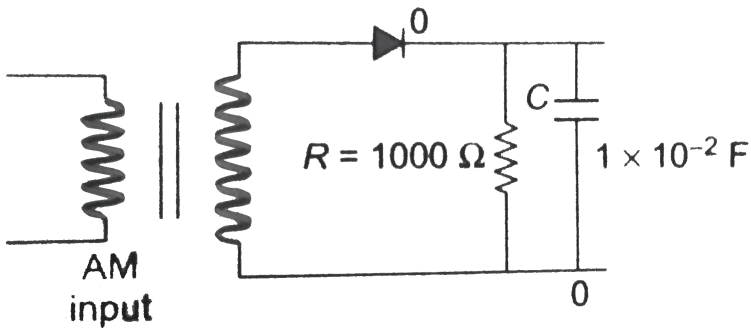
    A. Space wave

    B. Sky wave propagation

    C. Satellite transponder

D. All of these

Answer: b

2. In the given detector circuit, the suitable value of carrier frequency is

A. $< \, < 10^9 Hz$

B. $< \, < 10^5 Hz$

C. $> \, > 10^9 Hz$

D. None of these

Answer: a

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3. The impedance of coaxial cable, when its inductance is $0.40\mu H$ and cappacitance is $1 \times 10^{-11} F$, can be

A. $2 \times 10^2 \Omega$

B. 100Ω

C. $3 \times 10^3 \Omega$

D. $3 \times 10^{-2}\Omega$

Answer: a

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4. A wave is represented as

$$e = (10^8 t + 6\sin 1250t)\sin(W_c)t$$

then the modulating index is

A. 10

B. 1250

C. 10^8

D. 6

Answer: d

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5. An optical fibre communication system works on a wavelength of $1.3 \times 10^{-6} m$. The

number of subscribers it can feed if a channel

required $20 kHz$ are

A. 2.3×10^{10}

B. 1.15×10^{10}

C. 1×10^{5}

D. None of these

Answer: b

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6. 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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7. In a radio receiver, the short wave and medium wave station are tuned by using the same capacitoer butcoils of different inductance L_s and L_m respectively then

A. $L_s > L_m$

B. $L_s < L_m$

C. $L_s = L_m$

D. None of these

Answer: N/A

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8. The electron dencity of E, F_1, F_2 layers of ionosphere is $2 \times 10^{11}, 5 \times 10^{11}$ and $8 \times 10^{11} m^{-3}$ respectively. Wht is the ratio of critical frequency for reflection of radiowaves?

A. $2:4:3$

B. $4:3:2$

C. $2:3:4$

D. $3:2:4$

Answer: N/A

9. A carrier is simultaneously modulated by two sine waves with modulation indices of 0.4 and 0.3. The resultant modulated index will be

A. 1

B. 0.7

C. 0.5

D. 0.35

Answer: c

10. Mean optical power launched into an $8km$ fibre is $120\mu W$ and mean output power is $4\mu W$, then the overall attenuation is (Given $\log 30 = 1.477$)

   A. $14.77dB$

   B. $16.77dB$

   C. $3.01dB$

D. None of these

Answer: a

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

A. $10.35A$

B. $9.25A$

C. $10A$

D. $5.5A$

Answer: a

▶ **Watch Video Solution**

12. Because of tilting, which waves finally disappear?

A. Microwaves

B. Surface waves

C. Sky waves

D. Space waves

Answer: b

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13. A transmitter transmits a power of $10kW$ when modulation is 50%. Power of carrier wave is

A. $5kW$

B. $8.89kW$

C. $14kW$

D. $5.7kW$

Answer: b

14. A telephone link operating at a center frequency of $10GHz$ is etablished. If 1% of this is a available then how many telephone channel can be simultaneously given when

each telephone covering a band width of

$5kHz$?

A. 2×10^4

B. 2×10^6

C. 5×10^4

D. 5×10^6

Answer: a