



## PHYSICS

### BOOKS - NCERT FINGERTIPS PHYSICS (HINGLISH)

#### COMMUNICATION SYSTEMS

##### Introduction

1. Who invented world wide web?

- A. J.C.R. Licklider
- B. Tim Berners-Lee
- C. Alexander Graham Bell
- D. Samuel F.B. Morse

**Answer: B**



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2. Who invented world wide web?

A. J.C.R. Licklider

B. Tim Berners-Lee

C. Alexander Graham Bell

D. Samuel F.B. Morse

**Answer: B**



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## Elements Of A Communication System

1. Essential elements of a communication system are

A. transmitter and receiver

B. reciever and communication channel

C. transmitter and communication channel

D. transmitter, comunication channel and receiver

**Answer: D**



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2. Which of the following is an example of point to point communication mode?

A. Radio

B. Television

C. Telephony

D. All of these

**Answer: C**



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3. Essential elements of a communication system are

- A. transmitter and receiver
- B. receiver and communication channel
- C. transmitter and communication channel
- D. transmitter, communication channel and receiver

**Answer: D**



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4. Which of the following is an example of point to point communication mode?

- A. Radio
- B. Television
- C. Telephony

D. All of these

**Answer: C**



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## Basic Terminology In Electronic Communication

1. Which among following is not a basic terminology used in electronic communication systems?

A. Transducer

B. Transmitter

C. Telegraph

D. Attenuation

**Answer: C**



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2. Which of the following is not transducer?

A. Loudspeaker

B. Amplifier

C. Microphone

D. All of these

**Answer: B**



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3. The loss of strength of a signal while propagating through a medium is known as

A. reception

B. absorption

C. transmission

D. attenuation

**Answer: D**



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4. The process of increasing the strength of a signal using an electronic circuit is called.

- A. amplification
- B. modulation
- C. demodulation
- D. transmission

**Answer: A**



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5. Modern is a device which performs

- A. modulation
- B. demodulation
- C. rectification
- D. modulation and demodulation

**Answer: D**

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**6. Modulation is the process of superposing**

- A. low frequency audio signal on high frequency radio waves.
- B. low frequency radio signals on low frequency audio wave.
- C. high frequency radio signal on low frequency audio signal.
- D. high frequency audio signal on low frequency radio waves.

**Answer: A**

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7. The device which is a combination of a receiver and a transmitter is

- A. Amplifier
- B. Repeater
- C. Transducer
- D. Modulator

**Answer: B**



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8. Which among following is not a basic terminology used in electronic communication systems?

- A. Transducer
- B. Transmitter
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9. Which of the following is not transducer?

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C. Microphone

D. All of these

**Answer: B**



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10. The loss of strength of a signal while propagating through a medium is known as

- A. reception
- B. absorption
- C. transmission
- D. attenuation

**Answer: D**



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11. The process of increasing the strength of a signal using an electronic circuit is called.

- A. 1. amplification
- B. 2. modulation
- C. 3. demodulation

D. 4. transmission

**Answer: A**



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12. Modern is a device which performs

A. 1. modulation

B. 2. demodulation

C. 3. rectification

D. 4. modulation and demodulation

**Answer: D**



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13. Modulation is the process of superposing

- A. low frequency audio signal on high frequency radio waves.
- B. low frequency radio signals on low frequency audio wave.
- C. high frequency radio signal on low frequency audio signal.
- D. high frequency audio signal on low frequency radio waves.

**Answer: A**

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**14.** The device which is a combination of a receiver and a transmitter is

- A. 1. Amplifier
- B. 2. Repeater
- C. 3. Transducer
- D. 4. Modulator

**Answer: B**

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## Bandwidth Of Signals

1. Large bandwidth for higher data rate is achieved by using

- A. high frequency carrier wave
- B. high frequency audio wave
- C. low frequency carrier wave
- D. low frequency audio wave

**Answer: A**



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2. In a video signal for transmission of picture. What value of bandwidth is used in communication system?

- A. 2.4 MHz

B. 4.2MHz

C. 24MHz

D. 42MHz

**Answer: B**



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**3. Large bandwidth for higher data rate is achieved by using**

A. high frequency carrier wave

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**Answer: A**



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A. 2.4 MHz

B. 4.2MHz

C. 24MHz

D. 42MHz

**Answer: B**



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## Bandwidth Of Transmission Medium

1. Which one of the following statement is correct?

A. A single geostationary satellite can cover the whole part of the earth for microwave communication.



B. At least three geostationary satellites in the same orbit around earth can cover the whole part of the earth for microwave communication.

C. The first Indian communication satellite is Telstar.

D. The satellite communication is not like the line of sight microwave communication.

**Answer: B**



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2. Which of the following is an example of broadcast mode of communication?

A. Radio

B. Television

C. Mobile

D. Both a and b

**Answer: D**



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3. Which of the following device is full duplex?

A. Mobile phone

B. Walky-talky

C. Loud speaker

D. Radio

**Answer: A**



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4. FM broadcast is preferred over AM broadcast because

- A. it is less noisy.
- B. reproduction is of much better quality.
- C. it is more noisy.
- D. both a and b

**Answer: D**

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5. The frequency band used in the downlink of s atellite communication is

- A. 9.5 to 2.5 GHz
- B. 8 96 to 0901 MHz
- C. 3.7 to 4.2 GHz
- D. 840 to 935 MHz

**Answer: C**

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6. The radio waves of frequency  $300\text{MHz}$  to  $3000\text{MHz}$  belong to

- A. high frequency band
- B. very high frequency band
- C. ultra high frequency band
- D. super high frequency band

**Answer: B**



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

- A. 540-1600 KHz
- B. 200-325MHz
- C. 5.9-6.42GHz

Answer: D



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8. Match the column I with column II.

Column I (Service)		Column II (Frequency bands)	
(A)	Television	(p)	896-935 MHz
(B)	Cellular Mobile Radio	(q)	540-1600 kHz
(C)	Standard AM broadcast	(r)	54-890 MHz
(D)	FM broadcast	(s)	<b>88-108 MHz</b>

A. A-(q),B-(r), C-(s),D-(p)

B. A-(q),B-(s),C-(q),D-(r)

C. A-(r),B-(p),C-(q),D-(s)

D. A-(r),B-(s),C-(p) ,D-(q)

Answer: C



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9. In optical communication system operating at  $1200\text{nm}$ , only 2% of the source frequency is available for TV transmission 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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10. A microwave telephone link operating at the central frequency of  $10\text{GHz}$  has been established if 2% of this is available for microwave communication channel. Then how many telephone channels can be

simultaneously granted if each telephone is allotted a bandwidth of 8 KHz?

A.  $1.5 \times 10^3$

B.  $3.5 \times 10^2$

C.  $2.5 \times 10^4$

D.  $4.5 \times 10^6$

**Answer: C**



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**11.** A band width of 5 MHz is available for AM transmission. If the maximum audio signal frequency used for modulating the carrier is not to exceed 5 kHz, how many stations can be broad cast within this band simultaneously without interfering with each other?

A. 200

B. 300

C. 400

D. 500

**Answer: D**



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12. A communication between a fixed base station and several mobile units, located on ships or aircraft utilising two way radio communication in the VHF and UHF is of frequency band

A. 3 to 30 MHz

B. 30 to 300 MHz

C. 30 to 470MHz

D. 30 to 600 MHz

**Answer: C**



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13. Which one of the following statement is correct?

- A. A single geostationary satellite can cover the whole part of the earth for microwave communication.
- B. At least three geostationary satellites in the same orbit around earth can cover the whole part of the earth for microwave communication.
- C. The first Indian communication satellite is Telstar.
- D. The satellite communication is not like the line of sight microwave communication.

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14. Which of the following is an example of broadcast mode of communication?

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- B. Television
- C. Mobile
- D. Both a and b

**Answer: D**



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15. Which of the following device is full duplex?

- A. Mobile phone
- B. Walky-talky
- C. Loud speaker
- D. Radio

**Answer: A**



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**16. FM broadcast is preferred over AM broadcast because**

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C. 3.7 to 4.2 GHz

D. 840 to 935 MHz

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**18.** The radio waves of frequency  $300\text{MHz}$  to  $3000\text{MHz}$  belong to

A. high frequency band

B. very high frequency band

C. ultra high frequency band

D. super high frequency band

**Answer: B**



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

A. 540-1600 KHz

B. 200-325MHz

C. 5.9-6.42GHz

D. 840-935 MHz

**Answer: D**



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20. Match the column I with column II.

Column I (Service)		Column II (Frequency bands)	
(A)	Television	(p)	896-935 MHz
(B)	Cellular Mobile Radio	(q)	540-1600 kHz
(C)	Standard AM broadcast	(r)	54-890 MHz
(D)	FM broadcast	(s)	<b>88-108 MHz</b>

A. A-(q),B-(r), C-(s),D-(p)

B. A-(q),B-(s),C-(q),D-(r)

C. A-(r),B-(p),C-(q),D-(s)

D. A-(r),B-(s),C-(p) ,D-(q)

**Answer: C**



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21. In a communication system, operating at 1200 mm, only 2% of the source frequency is available for T.V. transmission , having a bandwidth of

5 MHz. The number of T.V. 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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**22.** A microwave telephone link operating at the central frequency of 10GHz has been established if 2% of this is available for microwave communication channel. Then how many telephone channels can be simultaneously granted if each telephone is allotted a bandwidth of 8 KHz?

- A. a.  $1.5 \times 10^3$
- B. b.  $3.5 \times 10^2$

C. c.  $2.5 \times 10^4$

D. d.  $4.5 \times 10^6$

**Answer: C**



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**23.** A band width of 5 MHz is available for AM transmission. If the maximum audio signal frequency used for modulating the carrier is not to exceed 5 kHz, how many stations can be broad cast within this band simultaneously without interfering with eachother?

A. 200

B. 300

C. 400

D. 500

**Answer: D**



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24. A communication between a fixed base station and several mobile units, located on ships or aircraft utilising two way radio communication in the VHF and UHF is of frequency band

- A. 3 to 30 MHz
- B. 30 to 300 MHz
- C. 30 to 470MHz
- D. 30 to 600 MHz

**Answer: C**

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## Propagation Of Electromagnetic Waves

1. Ground wave have wavelength

- A. less than that of sky waves
- B. greater than that of sky waves
- C. less than that of space waves
- D. equal to that of space waves

**Answer: B**

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2. The mode of propagation used by short wave broadcast services is

- A. space wave
- B. sky wave
- C. ground wave
- D. both and and c

**Answer: B**

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3. The skip zone in radio wave transmission is that range where

- A. there is no reception of either ground wave or sky wave
- B. the reception of ground wave is maximum but that of sky wave is minimum
- C. the reception of ground wave is minimum, but that of sky wave is maximum
- D. the reception of both ground and sky wave is maximum.

**Answer: A**



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4. Which one of the following statements is wrong?

- A. Ground wave propagation can be sustained at frequencies 500 KHz to 1500 KHz.
- B. Satellite communication is useful for the frequencies above 30 MHz.
- C. Sky wave propagation is useful in the range of 30 to 40 MHz.
- D. Space wave propagation takes place through tropospheric space.

**Answer: C**



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5. The waves that are bent down by the ionosphere are

- A. ground waves
- B. surface waves
- C. space waves
- D. sky waves

**Answer: D**



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6. The maximum line-of-sight distance  $d_M$  between two antennas having heights  $h_T$  and  $H_R$  above the earth is

A.  $\sqrt{R(h_T + h_R)}$

B.  $\sqrt{2R/(h_T + h_R)}$

C.  $\sqrt{Rh_T} + \sqrt{2Rh_R}$

D.  $\sqrt{2Rh_T} + \sqrt{2Rh_R}$

Answer: D



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

A. ground waves

B. sky wave

C. surface waves

D. space waves

**Answer: D**



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

A. 2

B. 3

C. 4

D. 6

**Answer: D**



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9. A ground receiver in line-of-sight communication cannot receive direct waves due to

- A. its low frequency
- B. curvature of earth
- C. its high intensity
- D. smaller antenna

**Answer: B**

10. Which of the following modes is used for line of sight

- A. Ground wave
- B. Sky wave propagation is useful in the range of 30 to 40 MHz.

C. Space wave

D. All of these

**Answer: C**



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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 can be sustained at frequencies 500 KHz to 1500 KHz.

B. Sky wave propagation is useful in the range of 30 to 40 MHz.

C. space wave propagation

D. all of them

**Answer: D**



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

- A. 10KHz
- B. 10MHz
- C. 1GHz
- D. 1000GHz

**Answer: B**



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13. A TV transmitting antenna is 125 m tall. How much service area this transmitting antenna cover, if the receiving antenna is at the ground level? Radius of earth =  $6400\text{km}$ .

- A.  $3258\text{km}^2$

B.  $4180km^2$

C.  $2510km^2$

D.  $1525km^2$

**Answer: A**



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**14.** A transmitting antenna at the top of the tower has a height 18 m and the height of the receiving antenna is 32m. The maximum distance between them for satisfactory communication in line of sight mode is (Radius of earth =  $6.4 \times 10^6m$ )

A. 15.15km

B. 21.25km

C. 30.45km

D. 35.42km.

**Answer: D**



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15. A transmitting antenna of height 20 m and the receiving antenna of height  $h$  are separated by a distance of 40km for satisfactory communication in line of sight mode. Then the value of  $h$  is

A. 40m

B. 45m

C. 30m

D. 25m

**Answer: B**



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16. A TV transmission tower antenna is at a height of 20m. The percentage increase in area covered in case if the receiving antenna is at ground level to that at a height of 25 m is (Radius of earth  $= 6.4 \times 10^6 m$ )

A. 2.48

B. 348.9 %

C. 150 %

D. 360.2 %

**Answer: B**



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17. By what percentage will the transmission range of a T.V. tower be affected when the height of the tower is increased by 21% ?

A. 0.1

B. 0.2

C. 0.3

D. 0.4

**Answer: A**



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**18.** 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. 110km

C. 55km

D. 120km

**Answer: C**



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19. A fax message is to be sent from Delhi to Washington via a geostationary satellite. Calculate the minimum time delay between the dispatch and its getting received. Take height of the geostationary satellite = 36000 km.

A.  $72 \times 10^3 \text{ km}$

B.  $12 \times 10^3 \text{ km}$

C.  $27 \times 10^3 \text{ km}$

D.  $18 \times 10^3 \text{ km}$

**Answer: A**



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20. A 50 MHz sky wave sky wave takes 4.04 ms to reach a receiver via re-transmission from a satellite 600 km above earth's surface. Assuming re-transmission time by satellite negligible, find the distance between source and receiver. If communication between the two was to be done by Line of sight (LOS) method, what should be the size of transmitting antenna ?

A. 606km

B. 170km

C. 340km

D. 280km

**Answer: B**



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21. What should be the length of the dipole antenna for a carrier wave of frequency  $3 \times 10^8$  Hz?

A. 1m

B. 0.5m

C. 2m

D. 2.5 m

**Answer: B**



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**22.** A radio can tune to any station in 7.5 MHz to 12MHz band. The corresponding wavelength band is

A. 25m-40m

B. 10m-30m

C. 20-40m

D. 25m-35m

**Answer: A**



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23. On a particular day, the maximum frequency reflected from the ionosphere is 10 MHz. On another day, it was found to increase to 11 MHz. Calculate the ratio of the maximum electron densities of the ionosphere on the two days. Point out a plausible explanation for this.

- A. 1.21
- B. 0.82
- C. 0.50
- D. 0.25

**Answer: A**

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24. Ground wave have wavelength

- A. less than that of sky waves
- B. greater than that of sky waves
- C. less than that of space waves
- D. equal to that of space waves

**Answer: B**

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**25.** The mode of propagation used by short wave broadcast services is

- A. space wave
- B. sky wave
- C. ground wave
- D. both a and c

**Answer: B**

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26. The skip zone in radio wave transmission is that range where

- A. there is no reception of either ground wave or sky wave
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- C. the reception of ground wave is minimum, but that of sky wave is maximum
- D. the reception of both ground and sky wave is maximum.

**Answer: A**



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27. Which one of the following statements is wrong?

- A. 1. Ground wave propagation can be sustained at frequencies 500 KHz to 1500 KHz.
- B. 2. Satellite communication is useful for the frequencies above 30 MHz.
- C. 3. Sky wave propagation is useful in the range of 30 to 40 MHz.
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**28.** The waves that are bent down by the ionosphere are

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29. The maximum line-of-sight distance  $d_M$  between two antennas having heights  $h_T$  and  $h_R$  above the earth is

A.  $\sqrt{R(h_T + h_R)}$

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30. Frequencies in the *UHF* range normally propagate by means of:

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

A. 2

B. 3

C. 4

D. 6

**Answer: D**



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**32.** A ground receiver in line-of-sight communication cannot receive direct waves due to

- A. 1. its low frequency
- B. 2. curvature of earth
- C. 3. its high intensity
- D. 4. smaller antenna

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**33.** Which of the following modes is used for line of sight

A. Ground wave

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

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**35.** Which of the following frequencies will be suitable for beyond the horizon communication using sky waves?

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- C. 1GHz
- D. 1000GHz

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**36.** A TV transmitting antenna is 81 m tall. How much service area it can cover if the receiving antenna is at the ground level? (Radius of earth=

$$6.4 \times 10^6 m)$$

A.  $3258 km^2$

B.  $4180 km^2$

C.  $2510 km^2$

D.  $1525 km^2$

**Answer: A**



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39. A TV transmission tower of antenna is at a height of 20 m. How much service area can it cover if the receiving antenna is (i) at ground level (ii) at a height of 25 m ? Calculate the percentage increase in area covered in case (ii) relative to case (i).

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40. By what percentage will the transmission range of a T.V. tower be affected when the height of the tower is increased by 21% ?

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**44.** What should be the length of the dipole antenna for a carrier wave of frequency  $3 \times 10^8$  Hz?

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C. 2m

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**Answer: B**

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B. 0.82

C. 0.50

D. 0.25

**Answer: A**



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## Modulation And Its Necessity

1. 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: D**

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2. 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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3. The modulation in which pulse. Duration varies in accordance with the modulating signal is called

- A. PAM
- B. PPM
- C. PWM
- D. PCM

**Answer: C**



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4. Which of the following is digital modulation technique?

- A. PCM
- B. PAM
- C. PPM

D. PTM

**Answer: A**



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5. If both the length of an antenna and the wavelength of the signal to be transmitted are doubled, the power radiated by the antenna

A. is doubled

B. is halved

C. remains constant

D. is quadrupled

**Answer: C**



**Watch Video Solution**

6. A 300W carrier is modulated to a depth 75%. The total power in the modulated wave is

- A. 200W
- B. 284W
- C. 320W
- D. 384W

**Answer: D**



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7. 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 least 5 km which is not convenient.
- B. the audio signal can not be transmitted through sky waves.

C. effective power transmitted would be very low. If the size of the antenna is less than 5 km.

D. all of these

**Answer: D**



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**8. 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: D**



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9. 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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10. The modulation in which pulse. Duration varies in accordance with the modulating signal is called

A. PAM

B. PPM

C. PWM

D. PCM

**Answer: C**



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

A. PCM

B. PAM

C. PPM



D. PTM

**Answer: A**



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12. If both the length of an antenna and the wavelength of the signal to be transmitted are doubled, the power radiated by the antenna

A. is doubled

B. is halved

C. remains constant

D. is quadrupled

**Answer: C**



[Watch Video Solution](#)

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- A. 200W
- B. 284W
- C. 320W
- D. 384W

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

C. effective power transmitted would be very low. If the size of the antenna is less than 5 km.

D. all of these

**Answer: D**



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## Amplitude Modulation

1. A signal wave of frequency 12 kHz is modulated with a carrier wave of frequency 2.51 MHz. The upper and lower side band frequencies are respectively.

A. 2512 KHz and 2508KHz

B. 2522KHz and 2488KHz

C. 2502KHz and 2498KHz

D. 2522KHz and 2498KHz

**Answer: D**



**Watch Video Solution**

2. A message signal of frequency 10 kHz and peak voltage 10 volt is used to modulate a carrier of frequency 1 MHz and peak voltage 20 volt. Determine (a) modulation index (b) the side bands produced.

A. 1000 KHz, 990KHz

B. 1010KHz,990KHz

C. 990KHz,1000KHz

D. 1010KHz,1000KHz

**Answer: B**



**Watch Video Solution**

3. The maximum amplitude of an AM wave is found to be 15 V while its minimum amplitude is found to be 3 V. What is the modulation index?

A.  $\frac{3}{2}$

B.  $\frac{2}{3}$

C.  $\frac{1}{2}$

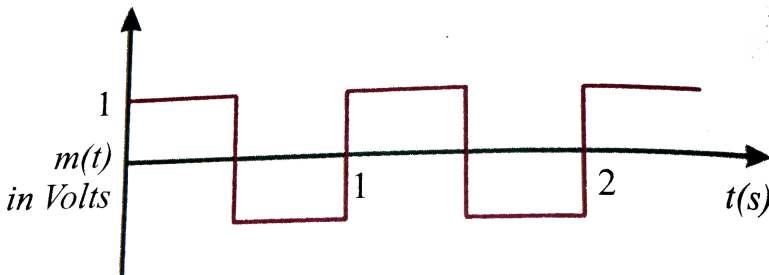
D.  $\frac{1}{3}$

**Answer: B**



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



The carrier wave is given by

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

The modulation index is

A. 0.2

B. 0.3

C. 0.4

D. 0.5

**Answer: D**



[Watch Video Solution](#)

5. A sinusoidal voltage amplitude modulates another sinusoidal voltage of amplitude 2 kV resulting in two side bands of amplitude 200 V. Find the modulation index.

A. 0.2

B. 0.3

C. 0.4

D. 0.5

**Answer: A**



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6. In an amplitude modulation with modulation index 0.5 the ratio of the carrier wave to that of side band in the modulated wave is

A. 4:1

B. 1:4

C. 1:3

D. 2:1

**Answer: A**



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7. 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.  $7V$

C.  $8V$

D.  $9V$

**Answer: D**

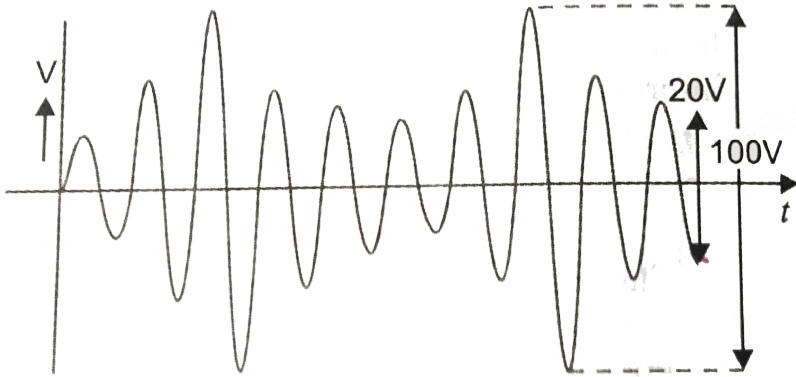


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8. An amplitude modulated wave is as shown in figure. Calculate (i) the percentage modulation, (ii) peak carrier voltage and , (iii) peak value of



information voltage.



A. 30V,20V

B. 10V,15V

C. 15V,30V

D. 20V,35V

**Answer: A**



[Watch Video Solution](#)

9. Compute  $LC$  product of a tuned amplifier circuit required to generate a carrier *wave* of  $1MHz$  for amplitude modulation

A.  $1.5 \times 10^{-14} \text{ s}$

B.  $1.2 \times 10^{-12} \text{ s}$

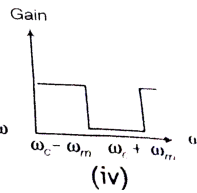
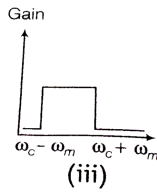
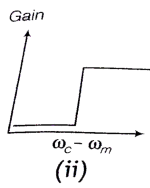
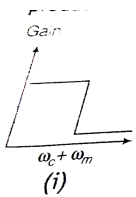
C.  $3.2 \times 10^{-12} \text{ s}$

D.  $2.5 \times 10^{-14} \text{ s}$

**Answer: D**

 **Watch Video Solution**

10. The frequency response curve (figure) for the filter circuit used for production of AM wave should be



A. i followed by ii

B. ii followed by i

C. iii

D. all of these

**Answer: D**



[Watch Video Solution](#)

11. A signal wave of frequency 12 kHz is modulated with a carrier wave of frequency 2.51 MHz. The upper and lower side band frequencies are respectively.

A. 2512 KHz and 2508KHz

B. 2522KHz and 2488KHz

C. 2502KHz and 2498KHz

D. 2522KHz and 2498KHz

**Answer: D**



[Watch Video Solution](#)

12. A message signal of frequency 10 kHz and peak voltage 10 volt is used to modulate a carrier of frequency 1 MHz and peak voltage 20 volt. Determine (a) modulation index (b) the side bands produced.

- A. 1000 KHz, 990KHz
- B. 1010KHz,990KHz
- C. 990KHz,1000KHz
- D. 1010KHz,1000KHz

**Answer: B**



[Watch Video Solution](#)

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- A.  $\frac{3}{2}$
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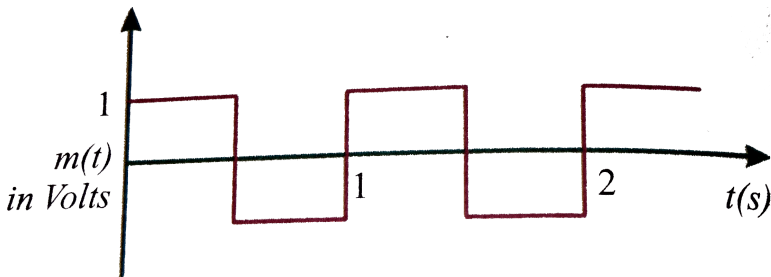
D.  $\frac{1}{3}$

**Answer: B**



**Watch Video Solution**

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



The carrier wave is given by

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

The modulation index is

A. 0.2

B. 0.3

C. 0.4

D. 0.5

**Answer: D**



[Watch Video Solution](#)

15. A sinusoidal voltage amplitude modulates another sinusoidal voltage of amplitude 2 kV resulting in two side bands of amplitude 200 V. Find the modulation index.

A. 0.2

B. 0.3

C. 0.4

D. 0.5

**Answer: A**



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16. In an amplitude modulation with modulation index 0.5 the ratio of the carrier wave to that of side band in the modulated wave is

A. 4:1

B. 1:4

C. 1:3

D. 2:1

**Answer: A**



[Watch Video Solution](#)

17. 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. 7V

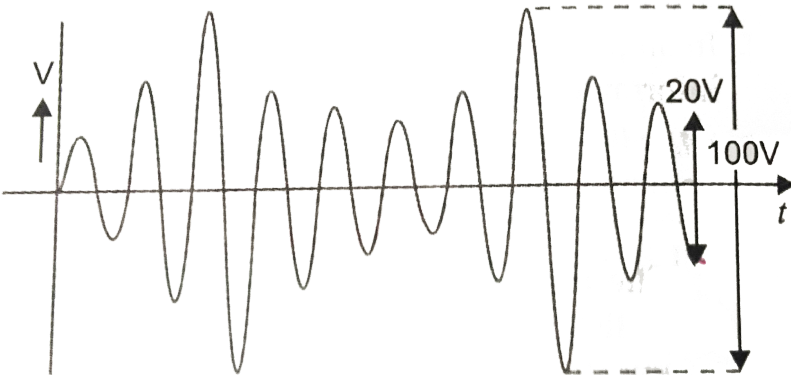
C. 8V

D. 9V

**Answer: D**

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18. An amplitude modulated wave is as shown in figure. Calculate (i) the percentage modulation, (ii) peak carrier voltage and , (iii) peak value of information voltage.



A. 30V,20V

B. 10V,15V



C. 15V,30V

D. 20V,35V

**Answer: A**



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19. The LC product of a tuned amplifier circuit require to generate a carrier wave of 1 MHz for amplitude modulation is

A.  $1.5 \times 10^{-14} s$

B.  $1.2 \times 10^{-12} s$

C.  $3.2 \times 10^{-12} s$

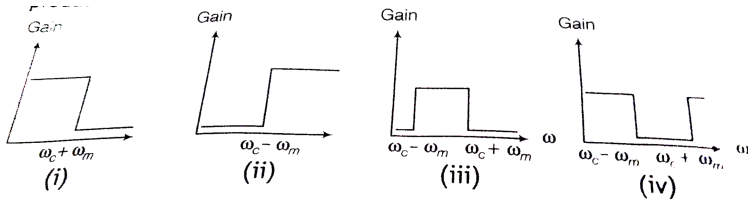
D.  $2.5 \times 10^{-14} s$

**Answer: D**



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20. The frequency response curve (figure) for the filter circuit used for production of AM wave should be



- A. i followed by ii
- B. ii followed by i
- C. iii
- D. all of these

**Answer: D**

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## Detection Of Amplitude Modulation Wave

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

- A. Medical treatment
- B. Pollution
- C. Wetland mapping
- D. Ground water survey

**Answer: A**

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2. Identify the incorrect statement from the following

- A. AM detection is carried out using a rectifier and an envelope detector.
- B. Pulse position denotes the time of rise or fall of the pulse amplitude.
- C. Modulation index  $\mu$  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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3. The essential condition for demodulation is

A.  $v_c < < RC$

B.  $\frac{1}{v_c} < < RC$

C.  $\frac{1}{v_c} > > RC$

D.  $v_c > > RC$

**Answer: B**

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4. In a diode AM detector with the output circuit consists of  $R=1M\Omega$  and  $C = 1pF$  would be more suitable for detecting a carrier signal of

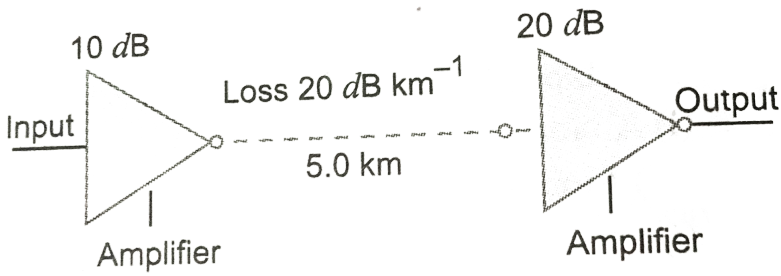
- A. 1MHz
- B. 0.1 MHz
- C. 0.5MHz
- D. 10MHz

**Answer: D**



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5. Figure (EP) shows a communication system. What is the output power when input signals is of 1.01 mW? [ gain in  $dB = 10 \log_{10}(P_0 / P_t)$ ].



- A. 90mW
- B. 101mW
- C. 1112mW
- D. 120mW

**Answer: B**

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6. (i) The intensity of a light pulse travelling along a communication channel decreases exponentially with distance  $x$  according to the relation  $I = I_0 e^{-\alpha x}$ , where  $I_0$  is the intensity at  $x = 0$  and  $\alpha$  is the attenuation constant.

Show that the intensity reduces by 75 percent after a distance of  $\frac{\ln 4}{\alpha}$

(ii) Attenuation of a signal can be expressed in decibel (dB) according to the relation

$\text{dB} = 10 \log_{10}(I/I_0)$ . What is the attenuation in  $\text{dB}/\text{km}$  for an optical fibre in which the intensity falls by 50 percent over a distance of 50 km?

A. 0.7

B. 0.75

C. 0.8

D. 0.85

**Answer: B**



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

A. Medical treatment

B. Pollution

C. Wetland mapping

D. Ground water survey

**Answer: A**



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8. Identify the incorrect statement from the following

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

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

C. Modulation index  $\mu$  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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9. The essential condition for demodulation is

A.  $v_c \ll RC$

B.  $\frac{1}{v_c} \ll RC$

C.  $\frac{1}{v_c} \gg RC$

D.  $v_c \gg RC$

Answer: B



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10. In a diode AM detector with the output circuit consists of  $R=1M\Omega$  and  $C = 1pF$  would be more suitable for detecting a carrier signal of

A. 1MHz

B. 0.1 MHz

C. 0.5MHz

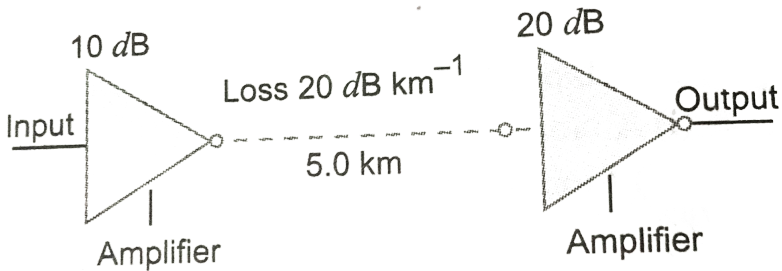
D. 10MHz

**Answer: D**



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11. Figure (EP) shows a communication system. What is the output power when input signals is of 1.01 mW? [ gain in  $dB = 10 \log_{10}(P_o / P_t)$ ].



A. 90mW

B. 101mW

C. 1112mW

D. 120mW

**Answer: B**



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12. The intensity of a light pulse travelling along a communication channel decreases exponentially with distance  $x$  according to the relation  $I = I_0 e^{-\alpha x}$  where  $I_0$  is the intensity at  $x=0$  and  $\alpha$  is the attenuation constant. The percentage decrease in intensity after a distance of  $\left(\frac{\ln 4}{\alpha}\right)$  is

A. 0.7

B. 0.75

C. 0.8

D. 0.85

**Answer: B**



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## Higher Order Thinking Skills

1. An audio signal is modulated by a carrier wave of 20 MHz such that the bandwidth required for modulation is 3 kHz. Could this wave be demodulated by a diode detector which has the values of R and C as (i)  $R = 1k\Omega, C = 0.01\mu F$  (ii)  $R = 10k\Omega, C = 0.01\mu F$  (iii)  $R = 10k\Omega, C = 1\mu F$ .

A.  $R = 1k\Omega, C = 0.01\mu F$

B.  $R = 10k\Omega, C = 0.01\mu F$

C.  $R = 10k\Omega, C = 0.1pF$

D. None of these

**Answer: A**



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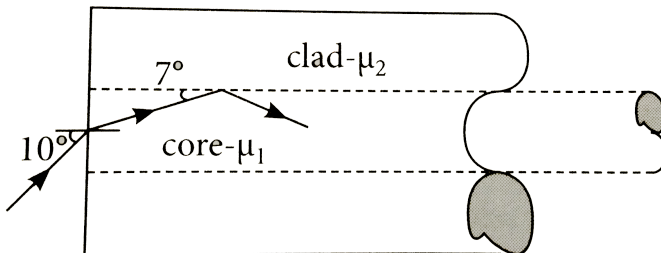
2. A multimode graded index fibre exhibits total pulse broadening of 0.1 us cover a distance of 1.5km. What is the maximum possible band width on the link assuming no inter symbol interference?

- A. 10MHz
- B. 7.5M Hz
- C. 5MHz
- D. 2.5MHz

Answer: C

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3. Refer figure. Core has refractive index  $\mu_1 = 1.424$ . The cladding refractive index  $\mu_2 = 1.39$ . In such a case. Will the light beam propagate?



A. Yes

B. No

C. Data given insufficient to decide

D. the beam propagation is not affected with refractive indices of fibre core and cladding.

**Answer: A**



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4. Three waves A,B and C of frequencies 1500 KHz. 6MHz and 50 MHz respectively are to be transmitted from one place to another. Which of the following is the most appropriate mode of communciation?

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 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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5. If the sum of the heights of transmitting and receiving antennas in line of sight of communication is fixed at  $h$ , show that the range is maximum when the two antennas have a height  $h/2$  each.

A.  $h/2$

B.  $2h$

C.  $h$

D.  $4h$

**Answer: A**



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6. Optical communication system having an operating wavelength  $\lambda$  metre can use only  $x\%$  of its source frequency as its channel band width. The system is to be used for transmitting T.V signals requiring a band width of  $F$  hertz. How many channels can this system transmit simultaneously? Show graphically how this number of channels varies with operating wavelength of the system.

A.  $\lambda F / Cx$

B.  $2C_x / 100\lambda F$

C.  $cx / 50\lambda F$

D.  $cx / 100\lambda F$

**Answer: D**



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

A.  $2.9 \times 10^7$

B.  $1.5 \times 10^6$

C.  $2.3 \times 10^5$

D.  $1.7 \times 10^4$

**Answer: C**



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8. The carrier frequency of a station is 40 MHz. A resistor of  $10k \Omega$  and capacitor of  $CpF$  are available in the detector circuit. The possible value of C will be

A. 12

B. 8.2

C. 5.6

D. All of these

**Answer: D**



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9. A ground receiving station is receiving a signal at 6MHz transmitted from a ground transmitter at a height of 500m located at a distance of 100km. If radius of earth is  $6.4 \times 10^6$ m, maximum number density of electron in ionosphere is  $10^{12} m^{-3}$ . the signal is coming via:

A. ground wave

B. space wave

C. Sky wave propagation is useful in the range of 30 to 40 MHz.

D. satellite transponder

**Answer: C**



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10. The output current of an 80% modulating amplitude modulated generator is 1.8A. To what value will the current rise if the generator is additionally modulated by another audiowave of modulation index 0.6?

- A. 1.71A
- B. 1.81A
- C. 1.91A
- D. 2.01A

**Answer: C**



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

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

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

C. B and C 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 can become a transmission tower of waves with  $\lambda$

A.  $-400m$

B.  $-25m$

C.  $-150m$

D.  $-2400m$

**Answer: A**



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

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

A.  $900W$

B. 100W

C. 990W

D. 1010W

**Answer: B**



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

A. 1.003 MHz and 0.997 MHz

B. 3001 KHz and 2997 KHz

C. 1003 KHz and 1000 KHz

D. 1MHz and 0.997MHz

**Answer: A**

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5. A message signal of frequency  $\omega_m$  is superposed on a carrier wave of frequency  $\omega_c$  to get an amplitude modulated wave (AM). The frequency of the AM wave will be

A.  $\omega_m$

B.  $\omega_c$

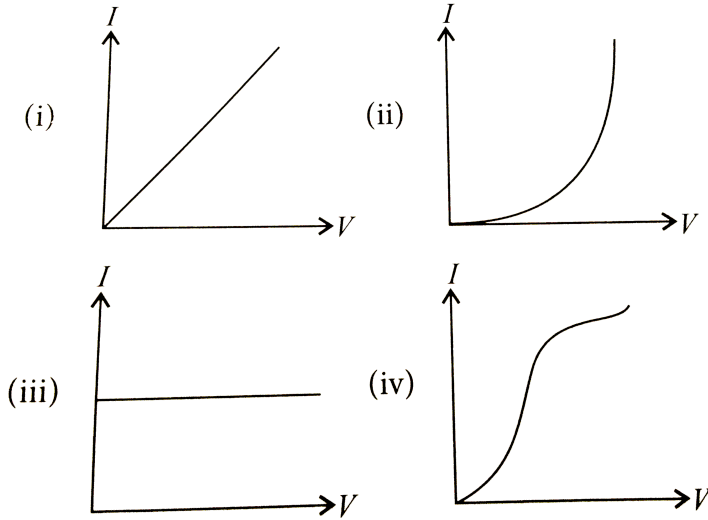
C.  $\frac{\omega_c + \omega_m}{2}$

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

**Answer: B**

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6. I-V characteristics of four devices are shown in figure.



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 amplitudes
- C. poor selection of carrier frequency
- D. loss of energy in transmission

**Answer: B**



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8. A basic communication system consists of (A) transmitter (B) information source (C) user of information (D) channel (E) 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.  $A_c \sin(\omega_c + k_1 v_m(t)t + \phi)$

B.  $A_c \sin(\omega_c t + \phi + k_2 v_m(t))$

C.  $(A_c + k_2 v_m(t)) \sin(\omega_c t + \phi)$

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

**Answer: C**



**Watch Video Solution**

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

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

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**Answer: B**



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

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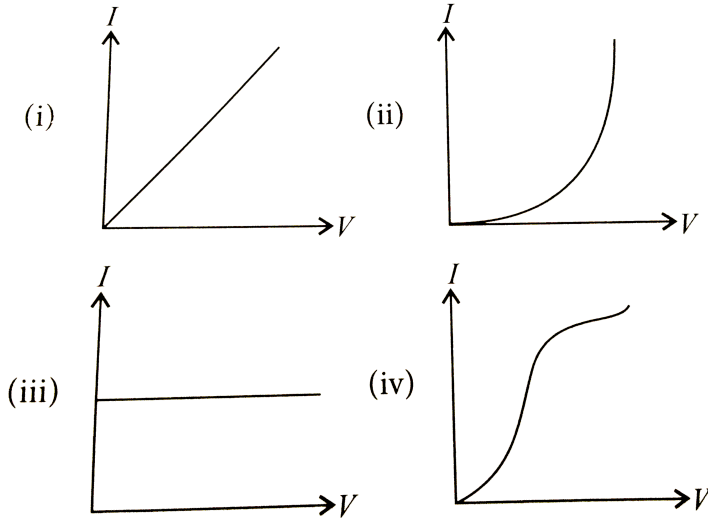
C.  $\frac{\omega_c + \omega_m}{2}$

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

**Answer: B**

[Watch Video Solution](#)

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Identify devices that can be used for modulation

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D. BEADC

**Answer: B**



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**18.** Identify the mathematical expression for amplitude modulated wave:

A.  $A_c \sin(\omega_c + k_1 v_m(t)t + \phi)$

B.  $A_c \sin(\omega_c t + \phi + k_2 v_m(t))$

C.  $(A_c + k_2 v_m(t)) \sin(\omega_c t + \phi)$

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

**Answer: C**



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

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



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2. Assertion: The loss of strength of a signal while propagating through a medium is known as attenuation.

Reason: Transmitter helps to avoid attenuation.



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3. Assertion: Amplification is necessary to compensate for the attenuation of the signal in communication system.

Reason: Amplification is the process of increasing the amplitude and consequently the strength of a signal using an electronic circuit.

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4. Assertion: The process of retrieval of information from the carrier wave at the receiver is termed as modulation.

Reason: Repeater helps to modulate the signals.

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5. Assertion: Digital signals are continuous variations of voltage of current.

Reason: Digital signals are essentially single valued functions of time.

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**6. Assertion:** Microwave communication is preferred over optical communication.

**Reason:** Information carrying capacity is directly proportional to bandwidth.



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**7. Assertion:** The ionosphere layer acts as a reflector for all range of frequencies.

**Reason:** Ionosphere does not allow electromagnetic wave to penetrate and escape.



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**8. Assertion:** It is possible to transmit signals from one place on the earth to practically other place on earth.

**Reason:** A geostationary satellite orbiting the earth is used for transmission.



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**9.** Statement-1: Short wave band are used for transmission fo radiowaves to a large distance.

Statement-2: Short waves are reflected from ionosphere.



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**10.** Assertion : The information contained in our original low frequency baseband signal is to be translated into high or radio frequencies before transmission.

Reason: For transmitting a signal, the antenna should have a size comparable to the wav elength of the signal.



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**11.** Assertion: Lond distance communication between two points on the earth is achieved using sky waves.

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

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**12.** Assertion: The television signals are propagated through sky waves.  
Itbr. Reason: Television signals have frequency in the range of 1000MHz to 2000MHz range.

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**13.** Assertion: Space waves are used for line-of-sight communication.  
Reason: Space wave travels in a straight line from transmitting antenna to the receiving antenna.

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**14. Assertion:** When the height of a TV transmission tower is increased by three times. The range covered is doubled.

**Reason:** The range covered is proportional to the height of the TV transmission tower.



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**15. Assertion:** AM detection is the process of recovering the modulating signal from amplitude modulated waveform which is carried out using a rectifier and an envelope detector.

**Reason:** Amplitude modulated waves can be produced by application of the message signal and the carrier wave to a non-linear device followed by band pass filter.



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

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 [Watch Video Solution](#)

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 [Watch Video Solution](#)

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[Watch Video Solution](#)

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[Watch Video Solution](#)

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[Watch Video Solution](#)

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[Watch Video Solution](#)

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**Reason:** For transmitting a signal, the antenna should have a size comparable to the wave length of the signal.

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

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

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**27.** Assertion: The television signals are propagated through sky waves.

Itbr. Reason: Television signals have frequency in the range of 1000MHz to 2000MHz range.



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**30.** Assertion: AM detection is the process of recovering the modulating signal from amplitude modulated waveform which is carried out using a rectifier and an envelope detector.

Reason: Amplitude modulated waves can be produced by application of the message signal and the carrier wave to a non-linear device followed by band pass filter.

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Hots

1. An audio signal is modulated by a carrier wave of 20 MHz such that the bandwidth required for modulation is 3 kHz. Could this wave be demodulated by a diode detector which has the values of R and C as (i)  $R = 1k\Omega, C = 0.01\mu F$  (ii)  $R = 10k\Omega, C = 0.01\mu F$  (iii)  $R = 10k\Omega, C = 1\mu F$ .

A.  $R = 1k\Omega, C = 0.01\mu F$

B.  $R = 10k\Omega, C = 0.01\mu F$

C.  $R = 10k\Omega, C = 0.1pF$

D. None of these

**Answer: A**



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2. A multimode graded index fibre exhibits total pulse broadening of 0.1 us cover a distance of 1.5km. What is the maximum possible band width on the link assuming no inter symbol interference?

A. 10MHz

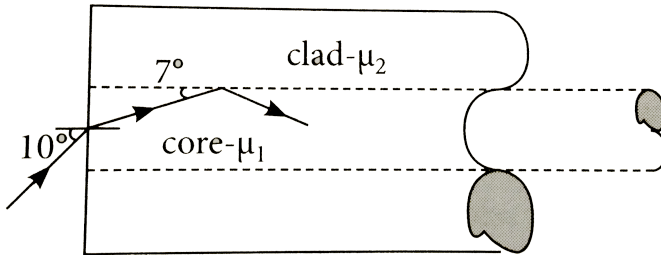
B. 7.5M Hz

C. 5MHz

D. 2.5MHz

**Answer: C**

3. Refer figure. Core has refractive index  $\mu_1 = 1.424$ . The cladding refractive index  $\mu_2 = 1.39$ . In such a case. Will the light beam propagate?



A. Yes

B. No

C. Data given insufficient to decide

D. the beam propagation is not affected with refractive indices of fibre core and cladding.

**Answer: A**

4. Three waves A, B and C of frequencies 1500 KHz, 6MHz and 50 MHz respectively are to be transmitted from one place to another. Which of the following is the most appropriate mode of communication?

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

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

C. B and C 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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5. The sum of the heights of transmitting and receiving antennas in line of sight of communication is fixed at  $h$ , find the height of two antennas when range is maximum.

A.  $h/2$

B.  $2h$

C.  $h$

D.  $4h$

**Answer: A**



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6. Optical communication system having an operating wavelength  $\lambda$  metre can use only  $x\%$  of its source frequency as its channel band width. The system is to be used for transmitting T.V signals requiring a band width of  $F$  hertz. How many channels can this system transmit

simultaneously? Show graphically how this number of channels varies with operating wavelength of the system.

A.  $\lambda F / Cx$

B.  $2C_x / 100\lambda F$

C.  $cx / 50\lambda F$

D.  $cx / 100\lambda F$

**Answer: D**



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

A.  $2.9 \times 10^7$

B.  $1.5 \times 10^6$

C.  $2.3 \times 10^5$

D.  $1.7 \times 10^4$

**Answer: C**



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8. The carrier frequency of a station is 40 MHz. A resistor of  $10\text{k } \Omega$  and capacitor of 12 pF are available in the detector circuit. The possible value of C will be

A. 12

B. 8.2

C. 5.6

D. All of these

**Answer: D**



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9. A ground receiving station is receiving a signal at 6MHz transmitted from a ground transmitter at a height of 500m located at a distance of 100km. If radius of earth is  $6.4 \times 10^6$ m, maximum number density of electron in ionosphere is  $10^{12} m^{-3}$ . the signal is coming via:

- A. ground wave
- B. space wave
- C. Sky wave propagation is useful in the range of 30 to 40 MHz.
- D. satellite transponder

**Answer: C**

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10. The output current of an 80% modulating amplitude modulated generator is 1.8A. To what value will the current rise if the generator is additionally modulated by another audiowave of modulation index 0.6?

- A. 1.71A

B. 1.81A

C. 1.91A

D. 2.01A

**Answer: C**



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