

Communication Systems

Question1

Coaxial cable, a widely used wire medium offers and approximate frequency bandwidth of

TG EAPCET 2025 (Online) 2nd May Evening Shift

Options:

A.

750 GHz

B.

750 Hz

C.

750 MHz

D.

750 kHz

Answer: C

Solution:

The correct answer is:

Option C: 750 MHz

Explanation:

Coaxial cable is a high-frequency transmission medium commonly used for cable television, internet, and long-distance communication.

- It typically offers a bandwidth range from a few kilohertz up to several hundred megahertz.



- The **approximate frequency bandwidth** of a standard coaxial cable used in communications is **up to 750 MHz**.
- Actual usable bandwidth depends on cable type, length, and quality (e.g., RG-6, RG-59, etc.).

Hence, **Option C (750 MHz)** is correct.

Question2

For commercial telephonic communication, the frequency range adequate for speech signals is

TG EAPCET 2025 (Online) 2nd May Morning Shift

Options:

A.

20 Hz – 20kHz

B.

300 Hz – 3100 Hz

C.

200MHz – 600MHz

D.

300kHz – 8000kHz

Answer: B

Solution:

The correct answer is:

Option B: 300 Hz – 3100 Hz

Explanation:

Human speech contains frequency components roughly between **100 Hz and 8 kHz**, but for **commercial telephony**, only the most important frequencies for intelligibility are transmitted.



- The **telephone system** limits the transmitted audio bandwidth to approximately **300 Hz – 3400 Hz**, though sometimes it's cited as **300 Hz – 3100 Hz**, depending on standards and equipment.
- This limited range saves bandwidth while still allowing speech to sound natural and be easily understood.

So, the frequency range adequate for **commercial telephonic communication** is approximately **300 Hz to 3100 Hz (or 3400 Hz)**.

Question3

The maximum distance between the transmitting and receiving antennas is D . If the heights of both transmitting and receiving antennas are doubled, then the maximum distance between the two antennas is

TG EAPCET 2024 (Online) 11th May Morning Shift

Options:

A. $2D$

B. $D\sqrt{2}$

C. $4D$

D. $\frac{D}{\sqrt{2}}$

Answer: B

Solution:

Maximum distance between transmitting and receiving antennas is given by

$$D = \sqrt{2h_t R} + \sqrt{2h_r R}$$

where, h_t = height of transmitting antenna

h_r = height of receiving antenna

R = Radius of earth

Given, $h'_t = 2h_t$

$$h'_r = 2h_r \Rightarrow D' = ?$$

Putting value in Eq. (i), we get

g value in Eq. (1), we get

$$D' = \sqrt{2 \cdot 2h_t \cdot R} + \sqrt{2 \cdot 2h_T \cdot R}$$

$$D' = \sqrt{2} \sqrt{2h_t R} + \sqrt{2} \sqrt{2h_T R}$$

$$D' = \sqrt{2} (\sqrt{2h_t R} + \sqrt{2h_T R})$$

From Eq. (i), we get

$$D' = \sqrt{2} D$$

Question4

For an amplitude modulated wave, the maximum and minimum amplitudes are found to be 10 V and 2 V respectively. Then, the modulation index is

TG EAPCET 2024 (Online) 10th May Evening Shift

Options:

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

B. $\frac{3}{4}$

C. $\frac{1}{5}$

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

Answer: D

Solution:

Given the parameters for an amplitude modulated wave:

Maximum amplitude, $V_{\max} = 10 \text{ V}$

Minimum amplitude, $V_{\min} = 2 \text{ V}$

The formula to calculate the modulation index is as follows:

$$\mu = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$$

Substituting the given values into the formula:

$$\mu = \frac{10-2}{10+2} = \frac{8}{12}$$

Simplifying the fraction:

$$\mu = \frac{2}{3}$$

Therefore, the modulation index is $\frac{2}{3}$.

Question5

The process of the loss of strength of a signal while propagating through a medium is

TG EAPCET 2024 (Online) 10th May Morning Shift

Options:

- A. damping
- B. attenuation
- C. amplification
- D. modulation

Answer: B

Solution:

The process of the loss of strength of a signal while propagating through a medium is called **attenuation**. It refers to the reduction in signal strength when signal energy is absorbed, reflected, refracted, or otherwise diminished as it travels through a medium. Attenuation can be influenced by factors such as the distance of transmission, the medium through which the signal passes, and the signal frequency.

In contrast:

Damping typically refers to the reduction of oscillations in a system, which might relate to signal but isn't specifically about transmission through a medium.

Amplification is the process of increasing the power or strength of a signal.

Modulation involves varying a carrier signal in order to encode information.

Thus, Option B is correct: attenuation.



Question6

A message signal of peak voltage 12 V is used to amplitude modulate a carrier signal of frequency 1.2 MHz . The amplitude of the side bands is

TG EAPCET 2024 (Online) 9th May Evening Shift

Options:

A. 12 V

B. 3 V

C. 6 V

D. 8 V

Answer: C

Solution:

$$\text{Amplitude of each side band} = \frac{V_m}{2} = \frac{12}{2} = 6 \text{ V}$$

Question7

The heights of the transmitting and receiving antennas are 33.8 m and 64.8 m respectively. The maximum distance between the antennas for satisfactory communication in line of sight mode is (radius of the earth = 6400 km)

TG EAPCET 2024 (Online) 9th May Morning Shift

Options:

A. 20.8 km

B. 49.6 km

C. 28.8 km

D. 57.6 km

Answer: C



Solution:

Given, Height of the transmitting antenna, $H_T = 33.8$ m

$$H_T = 0.0338 \text{ km}$$

Height of the receiving antenna,

$$H_R = 64.8 \text{ m} \Rightarrow H_R = 0.0648 \text{ km}$$

Radius of earth, $R = 6400$ km

$$\text{As we know, } d_{\max} = \sqrt{2 \times R \times H}$$

For both antennas,

$$d_{\max} = \sqrt{2 \times 6400 \times 0.0338} \\ + \sqrt{2 \times 6400 \times 0.0648}$$

$$d_{\max} = \sqrt{12800 \times 0.0338} \\ + \sqrt{12800 \times 0.0648}$$

$$d_{\max} = 49.6 \text{ km}$$

The maximum distance between the antennas for satisfactory communication in line of sight mode is 49.6 km

Question8

The need for modulation is

TS EAMCET 2023 (Online) 12th May Evening Shift

Options:

- A. to increase the intensity of audio signal
- B. to decrease the intensity of audio signal
- C. to transmit audio signal to large distance
- D. to increase the frequency of audio signal

Answer: C

Solution:



Modulation : It is a process in which the message signal is mixed with carrier signal and then sent it. The need for modulation is, Original (Message) signal distorts at very less distance and cannot be sent over large distance.

So to overcome this issue signal is modulated in carrier signal and then sent over large distance.

Question9

A message signal of frequency 10 kHz is used to modulate a carrier wave of frequency 6 MHz , then the side band frequencies are

TS EAMCET 2023 (Online) 12th May Morning Shift

Options:

- A. 6090kHz, 610kHz
- B. 5990kHz, 6010kHz
- C. 6000 Hz, 1000 Hz
- D. 6000kHz, 6100kHz

Answer: B

Solution:

The given problem involves calculating the sideband frequencies produced when a message signal modulates a carrier wave.

Carrier wave frequency: $6 \text{ MHz} = 6000 \text{ kHz}$

Message signal frequency: 10 kHz

Let C denote the carrier wave frequency and M represent the message signal frequency. The sideband frequencies are calculated as follows:

Upper Sideband Frequency:

$$C + M = 6000 \text{ kHz} + 10 \text{ kHz} = 6010 \text{ kHz}$$

Lower Sideband Frequency:

$$C - M = 6000 \text{ kHz} - 10 \text{ kHz} = 5990 \text{ kHz}$$

Thus, the final sideband frequencies are 6010 kHz and 5990 kHz.

