

UNIT-10 COMMUNICATION SYSTEMS

QUESTIONS

VERY SHORT ANSWER QUESTIONS (1 Mark)

1. What are ground waves?
2. What are the two basic modes of communication?
3. On what factors does the maximum coverage range of ground wave communication depend?
4. What is a base band signal?
5. What is the least size of an antenna required to radiate a signal of wavelength λ ?
6. Why do we use high frequencies for transmission?
7. Why is ionisation low near the earth and high far away from the earth?
8. Define the modulation index.
9. What should be the length of dipole antenna for a carrier wave of frequency 2×10^6 Hz?

10. Why is the transmission of signals using ground wave communication restricted to a frequency of 1500 kHz?
11. What is meant by transducer? Give one example of a transducer.
12. A T.V. transmitting antenna is 81m tall. How much service area can it cover if the receiving antenna is at ground level?
13. What is attenuation?
14. Why are repeaters used in communication?
15. What is the significance of modulation index? What is its range?

Ans : Modulation index determines the strength and quality of the transmitted signal. High modulation index ensures better quality and better strength. Its range is 0 to 1.

SHORT ANSWER QUESTIONS (2 Marks)

1. Write two differences between point to point communication and broadcast mode of communication. Give one example of each.
2. An audio signal of amplitude one fourth of the carrier wave, is used in amplitude modulation. What is the modulation index?
3. What are the essential components of a communication system? Explain with the help of a Block diagram.
4. Explain by a diagram, how space waves are used for Television broadcast.
5. Long distance radio broadcasts use short wave bands. Why?

Ans : The short waves are the waves of wavelength less than 200m or frequency greater than 1.5 MHz. They are absorbed by the earth due to their high frequency. These waves are reflected from ionosphere. These waves after reflection from ionosphere reach the surface of earth only at a large distance from the place of transmission. It means attenuation is less for short waves. It is due to this reason; the short waves are used in long distance broadcasts.

6. What is modulation? Why do we need modulation? Give two reasons.
7. Give two reasons for using satellite for long distance T.V. transmission.

8. Explain the propagation of sky wave in ionospheric layers with the help of a neat, labelled diagram.
9. Derive an expression for maximum range of an antenna of height ' h ' for LOS communication.
10. Plot amplitude v/s frequency for an amplitude modulated signal.
11. Draw block diagram of simple modulator to obtain amplitude modulated signal.

12. It is necessary to use satellites for long distance TV transmission. Why?

Ans : Yes, TV signals being of high frequency are not reflected by the ionosphere. Therefore, to reflect these signals, satellites are needed. That is why; satellites are used for long distance TV transmission.

13. What is the basic difference between an analog communication system and a digital communication system?

Ans : An analog communication system makes use of analog signals, which vary continuously with time. A digital communication system makes use of a digital signal, which has only two values of voltage either high or low.

14. What is ground wave? Why short wave communication over long distance is not possible via ground waves?

Ans : The amplitude modulated radiowaves having frequency 1500 kHz to 40 MHz (or wavelength between 7.5 m to 200 m) which are travelling directly following the surface of earth are known as ground waves. The short wave communication over long distance is not possible via ground because the bending of these waves become severe round the corners of the objects on earth and hence, their intensity falls with distance. Moreover the ground wave transmission becomes weaker as frequency increases.

SHORT ANSWER QUESTIONS (3 MARKS)

1. With the help of Block Diagram show how an amplitude modulated wave can be demodulated.
2. How an amplitude modulated wave can be produced? Give the equation of amplitude modulated wave.

3. What is a amplitude modulation? Derive the equation of an amplitude modulated wave.
4. What are the different ways of propagation of radiowaves? Explain briefly.
5. Draw block diagram for a :
 - (a) Transmitter
 - (b) Receiver
6. Write the band width of the following :
 - (1) Telephonic communication
 - (2) Video signal
 - (3) TV signal
7. Explain the following terms :
 - (1) Ground waves
 - (2) Space waves
 - (3) Sky waves

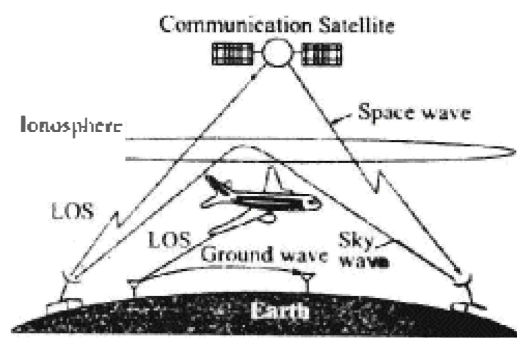
Sol : (i) At low frequencies ($\nu < 2\text{MHz}$), radio-waves radiated by antenna travel directly following the surface of earth and are known as ground waves. [$\nu < 2\text{MHz}$] (About this frequency, it weakens rapidly)]

(ii) Frequencies ranging from 100-200 MHz penetrate ionosphere and hence can only be transmitted by using line-of-sight antenna or satellites, are known as space wave propagation.

(iii) Frequencies between 2-20 MHz are reflected by the ionosphere and known as sky waves (or ionospheric propagation)

8. What does 'LOS communciation' mean? Name the types of waves that are used for this communication. Give typical examples, with the help of suitable figure, of communication systems that use space mode propagation.

Sol : Mode of radiowave propagation by space waves, in which the wave travells in a straight line from transmitting antenna to the receiving antenna, is called *line-of-sight* (LOS) communication. Two types of waves that are used for LOS communication are : Space wave and Ground wave. At frequencies above 40 MHz, LOS communication is essentially limited to line-of-sight paths.



Various propagation modes for EMW