

PHYSICS

QUESTIONS

Communication Systems

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VERY SHORT ANSWER QUESTION

1. What is Communication System?
2. What is Signal ? What are different types of Signal?
3. What are the two digits used in binary code?
4. What is a Carrier Wave?
5. What do you mean by the term Demodulation?
6. What are different modes for propagation of Radio waves?
7. An electromagnetic wave of frequency 28 MHz passes through the lower atmosphere of earth and gets incidents on the ionosphere. Shall the ionosphere reflect these waves?
8. What should be the frequency of a carrier wave with reference to message signal for the process of modulation?
9. What is the purpose of modulating a signal in transmission?
10. Name type of modulation preferred for digital transmission.
11. What is the cut-off frequency beyond which the ionosphere does not reflect electromagnetic radiations?
12. At a particular place at a distance of 10 km from a transmission station, a person can receive signals but is not able to receive signals at 11 km. Suggest a method how he can received signal at 11 km distance.
13. What is modulation index?
14. What is Pulse Modulation?
15. What is the function of a band filter in an AM modulator?
16. What type of modulation is required of for television broadcast?
17. What type of modulation is required for commercial broadcast of voice signal?
18. Differentiate between analog and digital communication?
19. What do you understand by the terms hypertext and HTML in context of internet?
20. Write the main function of Modem.
21. Name the principal on which an optical fiber work?
22. What are isoclinic and isogonic lines?
23. What is the essential difference between e-mail and chat?
24. Give one difference between FAX and e-mail system of communication.
25. What is the need of Modulation?
26. What is the range of frequencies in which mobile telephones operate?
27. Name the factor which decides the quality of reproduced document sent by fax.
28. How does the effective power radiated by an antenna vary with wavelength?
29. What is the function of cladding in typical optical fiber?
30. Why is short wave band used for long distance radiobroadcast?
31. Can you transmit the TV signals without using the satellite?

SHORT ANSWER QUESTIONS

1. What is an analog signal and a digital signal ? How can an analog signal be converted into a digital signal.
2. What is meant by the term modulation ? Explain with the help of a block diagram , how the process of modulation is carried out in radio broadcasts.
3. Explain the followings with diagram :
 - (i) Amplitude Modulation
 - (ii) Frequency Modulation
 - (iii) Phase Modulation
4. With the help of diagram , differentiate between
 - (i) Pulse amplitude modulation (PAM) and Pulse position modulation (PPM)
 - (ii) Pulse position modulation (PPM) and Pulse duration modulation (PDM)
5. What is Propagation? Explain the following terms
 - (i) Ground Waves Propagation
 - (ii) Sky Waves Propagation
 - (iii) Space Waves Propagation
6. Derive an expression for covering range of TV transmission tower.
7. What does the term LOS communication 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 wave mode propagation.
8. We do not choose to transmit an audio signal by just directly converting it to an e.m. wave of the same frequency. Give three reasons for the same.
9. What mode of communication is employed for the transmission of TV signals? Explain why TV transmission towers are usually made very high.
10. Name 6 types of electro-magnetic waves in ascending order of their wavelength.
11. State three important properties of electromagnetic Waves.
12. What is ionosphere? Explain its importance in communication.
13. It is necessary to use satellites for long distance TV transmission. Why?
14. A radio broadcast is transmitted using amplitude modulation at a carrier frequency of 680 kHz. Explain the meaning of each of the italicized words.
15. What are the two basic modes of communication? Give an example of each case.
16. Distinguish between ‘point to point’ and ‘Broadcast’ communication modes. Give one examples of each.
17. What are sky waves not used in the transmission of television signals?
18. What is a repeater? For what purpose is it used?
19. State two factors by which the range of TV signal can be increased ?
20. Distinguish between ‘point to point’ and ‘broadcast’ communication modes . Give one example of each.
21. Who do not choose to transmit an audio signal by just directly converting it to an e.m. wave of the same frequency. Give two reasons for the same.

LONG ANSWER QUESTIONS

1. What is remote sensing ? Briefly explain how is it carried out? Mention its any true applications.
2. With the help of block diagram explain the working of a modern fibre optic communication link.
3. What is an optical detector ? State its three essential characteristics . Name the factor which decides how good a detector is.
4. Explain the briefly the principle of transmitting signals using a satellite . State two main advantage of using a satellite for transmitting signals.
5. Name the factors which determine the choice of a communication channel .Explain the use of coaxial cables as a communication channel with the help of its simple diagram.

NUMERICAL QUESTIONS

1. A T.V. tower has a height of 400 m at a given place. Calculate its coverage range , if the radius of the earth is 6400 km.
2. A T.V. transmitter has a range of 50 km. What is the height of the TV transmission tower? Radius of earth $R_e = 6.4 \times 10^6$ m.
3. A TV tower has a height of 500 m at a given place. If radius of earth is 6400 km , what is it coverage range?
4. A TV tower has a height of 100 m. How much population is covered by the TV broadcast if the average population density around the tower is 1000 km^{-2} (Radius of earth= 6.4×10^6 m)?
5. A transmitting antenna at the top of a tower has a height of 36 m and the height of the receiving antenna is 49 m . What is the maximum distance between them , for satisfactory communication in LOS mode? (Radius of earth= 6400 km)?
6. A carrier wave of peak voltage 20 V is used to transmit a message signal. What should be the peak voltage of the modulating signal , in order to have a modulation index of 80 % Y.
7. What should be the length of the dipole antenna for a carrier wave of frequency 3×10^8 Hz?
8. A ground receiver station 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. (Given the value of radius of the earth is 6400 km and maximum electron density , $N_{\max} = 10^{12} \text{ m}^{-3}$).
9. Define the term ‘critical frequency ’ in relation to sky wave propagation of electromagnetic waves. On a particular day, the maximum frequency reflected from the ionosphere is 10 MHz. On another day, it was found to decrease to 8 MHz. Calculate the radio of the maximum electron density of ionosphere on the two days.

10. Consider an optical communication system operating at $\lambda \sim 800$ nm. Suppose , only 1 % of the optical source frequency is the available channel band-width for optical communication. How many channels can be accommodated for transmitting.
- (a) Audio-signals requiring a band-width of 8 kHz,
 (b) Video TV signals requiring an approximate band-width of 4.5 MHz?

Support your answer with suitable calculations.

11. A modulating signal has zero dc component and to peak voltage of 11 V. It is used to amplitude modulate a carrier of peak voltage of 10 V . Calculate the modulation index.
12. In an amplitude modulator, the tank circuit consists of a coil of inductance 3.6mH and a capacitor of capacitance 2.5pF. If an audio signal of frequency 15kHz modulates the carrier generated by the tank circuit, find the frequencies of the sidebands.
13. Calculate the length of half wave dipole at:
 (a) 30 MHz (b) 300 MHz and (c) 3000MHz
 What inference do you draw from these results?
14. (a) A TV tower has height of 80 m. Find the radius of the circle within which the transmission can be observed. Radius of earth is 6.4×10^6 m.
 (b) How much population is covered by the TV broadcast, if the average population density around tower is 800km^{-2} ?
15. A radio can tune to any station in the 7.5 MHz to 12 MHz band. What is the corresponding wavelength band?

Note : if any mistake on this, kindly inform on the mail id :

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Your Observation! Our Correction !!