

CLASS – 12

WORKSHEET- COMMUNICATION SYSTEMS

(1marks Questions)

1. Name the types of communication systems according to the mode of transmission.

2. Name the type of communication in which the signal is a discrete and binary coded version of the message of information.

3. What is the purpose of modulating a signal in transmission?

4. What type of modulation is required for television broadcast?

5. Which frequency modulation preferred over amplitude modulation for transmission of music?

6. Name type of modulation scheme preferred for digital communication.

7. What type of modulation is required for commercial broadcast of voice signals?

8. Why is shortwave band used for long distance radio broadcast?

9. Why is ground wave transmission of signals restricted to a frequency of 1500 kHz?

10. Name an appropriate communication channel needed to send a signal of bandwidth 100 kHz over a distance of 8 km.

11. What is antenna?

12. What should be the length of dipole antenna for a carrier wave of frequency 6×10^8 Hz?

13. How does power radiated by an antenna vary with wavelength?

14. Give one difference between FAX and e-mail systems of communication.

15. Write the main function of a modem.

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

(1) 10 kHz (2) 10 MHz (3) 1 GHz (4) 1000 GHz

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

(1) Ground Waves (2) Sky Waves
(3) Surface Waves (4) Space Waves

18. Digital signals

(i) Do not provide a continuous set of values
(ii) Represent value as discrete steps
(iii) Can utilize binary system
(iv) Can utilize decimal as well as binary systems
State which statement(s) are true?

(a) (1), (2) and (3) (b) (1) and (2) only

(c) All statements are true (d) (2) and (3) only

(2marks Questions)

19. What should be the frequency carrier wave with reference to message signal for the process of modulation?

20. A transmitting antenna at the top of a tower has height of 36m and the height of the receiving antenna is 49m. What is the maximum distance between them, for satisfactory communicating the LOS mode? (Radius of the earth = 6400km).

21. A TV tower has a height of 400m at a given place. Calculate its coverage range, if the radius of the earth is 6400km.

22. Why sky wave propagation of electromagnetic wave cannot be used for TV transmission?

23. Suggest two methods by which the range of TV transmission can be increased.

24. What should be the length of an antenna in comparison to the wavelength of RF signal applied?

25. Derive an expression for the maximum range up to which TV signals can be received on earth's surface.

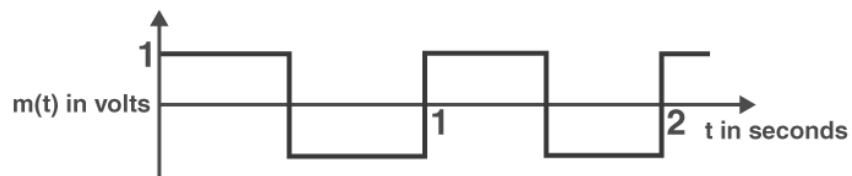
26. Is it necessary for a transmitting antenna to be at the same height as that of the receiving antenna for line-of-sight communication? A TV transmitting antenna is 81m tall. How much service area can it cover if the receiving antenna is at the ground level?

[Ans. 3256 km²]

27. A carrier wave of peak voltage 12 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 75%?

[Ans. 9V]

28. A modulating signal is a square wave, as shown in the figure.



The carrier wave is given by $c(t)=2\sin(8\pi t)$ volts.

- (1) Sketch the amplitude modulated waveform
(2) What is the modulation index?

29. For an amplitude modulated wave, the maximum amplitude is found to be 10V while the minimum amplitude is found to be 2V. Determine the modulation index, μ . What would be the value of μ if the minimum amplitude is zero volts? [Ans. 1]

(3 marks Questions)

30. How do we make the choice of a communication channel? A message signal has a bandwidth of 5MHz. Suggest a possible communication channel for its transmission.

31. Distinguish between analog and digital communication. Write any two modulation techniques employed for the digital data. Describe briefly one of the techniques used.

32. What is digital symbol? Explain the function of modem in data communication. Write two advantages of digital communication.

33. What is modulation? Explain the need of modulating a low frequency information signal.

34. Define the term 'modulation'? Explain with the help of a block diagram, how the process of modulation is carried out in radio broadcasts.

35. Draw the plot variation of amplitude versus ω for an amplitude modulated wave. Define modulation index. State its importance for effective amplitude modulation.

36. What is 'amplitude modulation'? Represent the process graphically. Write its advantages and disadvantages.

37. Distinguish between frequency modulation and amplitude modulation. Why is an FM signal less susceptible to noise than an AM signal?

38. Name the device used for data transmission from one computer to another. Justify the name. Using the device draw the block diagram for data communication and explain it briefly.

39. Consider an optical communication system operating at $\lambda \approx 800\text{nm}$. Suppose only 1% of the optical source frequency is the available channel bandwidth for optical communication. How many channels can be accommodated for transmitting (a) audio signals requiring a bandwidth of 8kHz, (b) video TV signals requiring an approximate bandwidth of 8 MHz? Support your answer with suitable calculations.

40. Give reasons for the following:

(a) Long distance radio broadcasts use short wave bands.

(b) The small ozone layer on top of stratosphere is crucial for human survival.

(c) satellites are used for long distance TV transmission.

41. Explain the following: (i) Ground waves (ii) Space waves (ii) Sky waves.

42. Due to economic reasons, only the upper sideband of an AM wave is transmitted, but at the receiving station, there is a facility for generating the carrier. Show that if a device is available which can multiply two signals, then it is possible to recover the modulating signal at the receiver station

43. Draw a block diagram of a simple amplitude modulation. Explain briefly how amplitude modulation is achieved?

44. Explain the working of amplitude demodulator at receiver end with the help of block diagram.

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