

## COMMUNICATION SYSTEM

Q.1:- Name the essential components of a communication system.

- Ans:-
1. Transmitter (Transducer, modulator, amplifier, antenna)
  2. Communication channel
  3. Receiver (antenna, demodulator, amplifier, Transducer)

Q.2:- Which of the following frequencies will be suitable for beyond the horizon communication using sky wave

- a) 10 kHz    b) 10 MHz    c) 1 GHz    d) 1000 GHz

Ans:- 10 MHz

Q.3:- Frequencies of UHF range normally propagate by means of (a) ground wave (b) sky wave (c) surface wave (d) space wave

Ans:- Space wave (line of sight communication LOS)  
[Due to their frequency, high frequency, UHF can neither travel along curvature of earth nor can get reflected by ~~ionosphere~~ ionosphere]

Q.4:- Define modulation. (i) Transducer (ii) repeater (iii) attenuation.

Ans:- (i) MODULATION:- The process of superposition of information signal on high frequency ~~radio~~ radio wave (carrier wave) is called modulation.

(ii) TRANSDUCER:- It is a device which converts one form of energy into another.

(iii) REPEATER:- It is a device which receive the signal from transmitter, amplifies it and retransmits.

(iv) ATTENUATION:- The loss of strength of a signal while propagating through a medium is called attenuation.

Q5:- Distinguish between 'point to point communication' and 'broadcast'. Give one example of each.

Ans:- Point to point comm:- A communication which takes place over a link between a signal transmitter and receiver is called point to point communication.  
Telephone

BROADCAST:- In broadcast large number of receivers is linked to a single transmitter.  
Radio

Q6:- We do not choose to transmit an audio signal by just directly converting it to an em wave of same frequency. (Need of modulation)

Ans:- (i) Energy of wave  $E = h\nu \Rightarrow E \propto \nu$

(ii) Size of antenna - For efficient transmission and reception of signal size of antenna must be  $\lambda/4$

(iii) Power radiated by antenna -  $P \propto \frac{1}{\lambda^4}$

(iv) Band gap (band width) - Simultaneous transmission of signals can overlap thus, causing noise at receiver end.

Q7:- A carrier wave of peak ~~voltage~~ voltage 12V is used to transmit a message signal. What should be the peak voltage of modulating signal to have modulation index 75% (0.75)

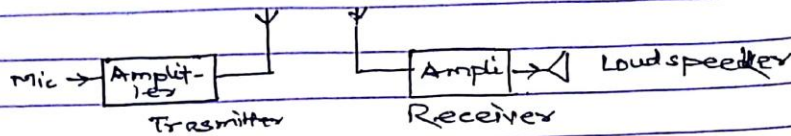
Ans:-  $\mu = \frac{A_m}{A_c} \Rightarrow A_m = \mu A_c = 0.75 \times 12 = 9V$

Q8:- For an amplitude modulated wave the maximum amplitude is found to be 10V while the minimum amplitude is found to be 2V. Calculate modulation index.

Ans:-  $\mu = \frac{A_c - A_m}{A_c + A_m} \Rightarrow \frac{10-2}{10+2} = \frac{8}{12} = \frac{2}{3}$



Q.11.9:- A schematic arrangement for transmitting a message signal (20Hz to 20kHz) is given below.

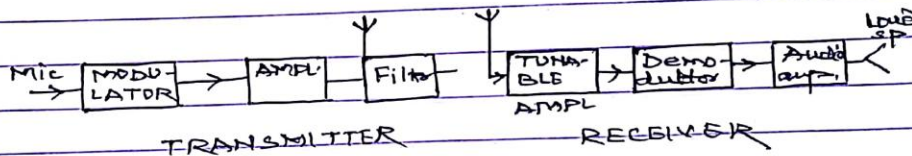


Give two drawbacks from which ~~this~~ this arrangement suffers. Draw block diagram of alternative arrangement efficient transmission & reception of signal.

Ans:- Drawbacks-

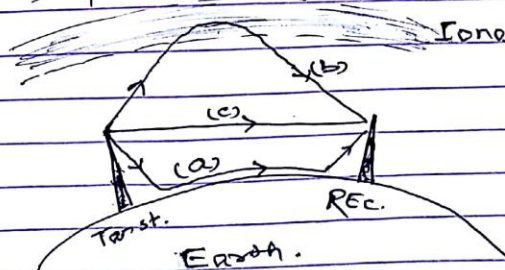
- (i) Modulator & demodulators are missing
- (ii) An receiver tunable & audio amplifier both are needed.

Alternative arrangement:-



Q.10:- Name three different modes of propagation of electromagnetic wave. Give their frequency range. Give pictorial representation.

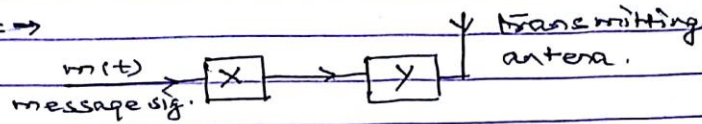
- Ans:-
- (i) Ground wave propagation (500kHz - 1500kHz)
  - (ii) Sky wave propagation (2 MHz - 54 MHz)
  - (iii) Space wave propagation (> 54 MHz).



- Ionosphere
- a) Ground wave.
  - b) Sky wave
  - c) Space wave.

Q11:- The fig. given below shows a block diagram of a transmitter. Identify the boxes X & Y and write their functions.

Ans:- X →



Ans:- X → Amplitude modulator

It superimposes the base band signal over the carrier wave to give modulated wave.

Y → Power Amplifier

It increases the power of modulated signal before transmission.

Q12:- What is a communication channel?

Ans:- The physical path between the transmitter and receiver is called communication channel.

Q13:- What is meant by noise in communication system?

Ans:- The unwanted signals which get mixed up with the information signal during its propagation through communication channel is called noise.

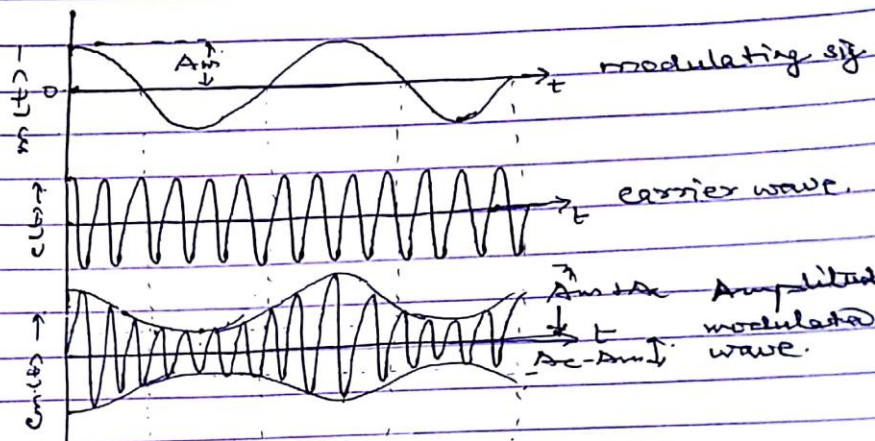
Q14:- What are guided and unguided transmission media? Give examples.

Ans:- Guided media:-



Q.15:- What is amplitude modulation? Draw amplitude modulated wave, carrier wave & modulating signal.

Ans:- Amplitude modulation:- It is process in which, high frequency amplitude of high frequency carrier wave changes in accordance with instantaneous value of modulating signal.



Q.16:- What is antenna?

Ans:- Antenna is a device which converts em wave into electrical signal and vice-versa.

Q.17:- Name a possible communication mode for transmitting TV signal.

Ans:- Line of sight communication (LOS).

Q.18:- A TV tower has a height of 75 m. What is max. distance up to which TV transmission can be received,

Ans

$$d = \sqrt{2Rh}$$

$$= \sqrt{2 \times 6.4 \times 10^6 \times 75} \text{ m} = 31 \text{ km}$$

Q.19:- A carrier wave of frequency 1.5 MHz and amplitude 50V is modulated by a sinusoidal wave of frequency of 10 KHz producing 50% modulation index.

Calculate amplitude of AM wave & frequency of the side bands,

Ans:- 
$$\mu = \frac{A_m}{A_c} \Rightarrow 0.5 = \frac{A_m}{25}$$

$$\therefore A_m = 25V,$$

~~Q.19~~ 
$$\text{USB} = f_c + f_m = 1.5 + 0.01 = 1.51 \text{ MHz}$$

$$\text{LSB} = f_c - f_m = 1.5 - 0.01 = 1.49 \text{ MHz}$$

Q.20 :- Explain ~~power~~ band width,

Ans: The range of frequency of signal in which, message is transmitted from transmitting station.

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