BEE Experiments Record.

12. STUDY OF MODULATION & DEMODULATION TECHNIQUES.

☆ PRE - LAB QUESTIONS ⟹

① What is meant by modulation and demodulation in communication ?

→ 1) Modulation is the process of influencing data information on the carrier, while demodulation is the recovery of original information at the distant end from the carrier.

2) A modem is an equipment that performs both modulation and demodulation.

② What is modulation and what is the purpose of it?

→ 1) The primary purpose of modulation in a communication system is to generate a modulated signal suited to the characteristics of a transmission channel.

2) In radio communications, modulation is needed in the transmission systems to transfer the message into the available high frequency radio channel.

③ What is the difference between a modem and a router ?

→ The key differences between a modem and a router are as follows :

1) A modem is a device that modulates an analog signal to translate digital information, whereas routers are computer networking devices that manage the data entering and leaving the network as well as data moving inside of

the network.

2) A modem operates on the datalink layer, while router can be operated at the data-link layer, network layer and physical layer.

3) Modem does not help to examine the data packet whereas router examines all data packets before forwarding it.

4) A modem is used for accessing the internet as it connects your computer to the ISP and router is used to access the internet without using a modem.

④ Compare AM and FM.

→

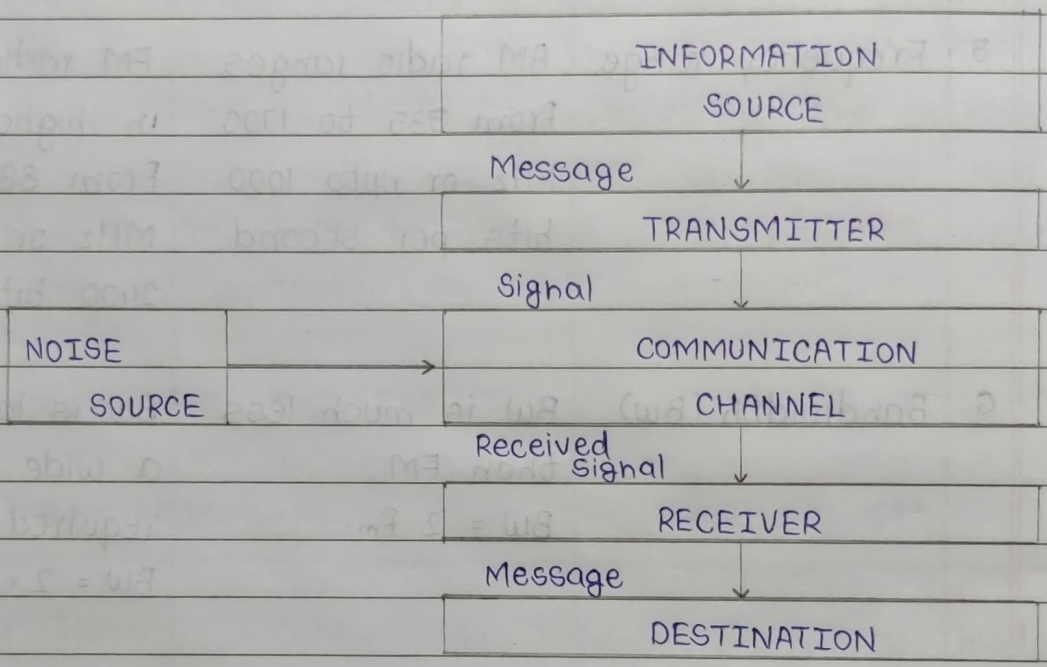
	PARAMETERS	AM	FM
1.	Full form	Amplitude modulation.	Frequency modulation.
2.	Origin	AM method of audio transmission was successfully carried out in the mid - 1870s.	FM radio was developed in the United States in the 1930s by Edwin Armstrong.
3.	Constant Parameters	The frequency and phase remain the same.	The amplitude and phase remain the same.
4.	Modulating differences	In AM, radio wave is known as the	In FM, a radio wave is known as

		"carrier" or "carrier wave" is modulated in amplitude by the signal that is to be transmitted	the "carrier" or "carrier wave" is modulated in frequency by the signal that is to be transmitted.
5.	Frequency range	AM radio ranges from 535 to 1700 kHz or upto 1000 bits per second.	FM radio ranges from in higher spectrum From 88.1 to 108.1 MHz or upto 1200 to 2400 bits per second.
6.	Bandwidth (Bw)	Bw is much less than FM. $Bw = 2 \cdot fm$	Bw is large. Hence a wide channel is required. $Bw = 2 \times (\delta + fm)$
7.	Zero crossings in modulating signal	Equidistant	Not equidistant.
8.	Efficiency	Power is wasted in transmitting the carrier.	All transmitted power is useful so that's why FM is very efficient.
9.	Number of sidebands	The number of sidebands are constant and equal to 2.	The number of sidebands having significant amplitude depends upon the modulation indeæ.

☆ AIM ⟹

To study the different modulation and demodulation techniques.

☆ DIAGRAM ⟹



☆ RESULT ⟹

Thus, different modulation and demodulation techniques are studied.

☆ POST - LAB QUESTIONS ⟹

① What are the different types of modulation?

→ The different types of modulation are as follows:

• ANALOG MODULATION:

1) Amplitude modulation.
2) Frequency modulation.
3) Phase modulation.

→

- DIGITAL MODULATION:

1) Amplitude Shift-keying.
2) Frequency Shift-keying.
3) Phase Shift-keying.

② Which type of modulation is used in television?

→ 1) All analog television systems use vestigial modulation, a form of amplitude modulation in which one side-band is partially removed.
2) This reduces the bandwidth of the transmitted signal, enabling narrower channels to be used.

③ What is PPM modulation?

→ 1) Pulse-position modulation (PPM) is a form of signal modulation in which 'M' message bits are encoded by transmitting a single pulse in one of 2^M possible required time shifts.
2) This is repeated every 'T' seconds, such that the transmitted bit-rate is M/T bits per second.
3) It is primarily useful for optical communications systems, which tend to have little or no multipath interference.

④ What are NTSC and PAL?

→ 1) NTSC and PAL are video standards that are recorded on the cassette. These videos send an electronic signal to the television, then only it can be viewed.
2) In India, PAL video format is supported.
3) NTSC is the video standard commonly used in North America and most of South America.

4) PAL is the video standard which is popular in most of the European and Asian countries.

5) The difference between NTSC and PAL is the transmission of number of frames per second. In NTSC, 30 frames are transmitted per second. Each frame is constituted up of 525 lines.

6) In PAL, 25 frames are transmitted per second. Each frame consists of 625 scan lines.

⑤ What is PWM modulation?

→ 1) Pulse-width modulation (PWM) is a method of reducing the average power delivered by an electrical signal, by effectively chopping it upto into discrete parts.

2) The average value of voltage and current fed to the load is controlled by turning the switch between supply and load, on and off at a fast rate.

3) The longer the switch is on compared to the off periods, the higher the total power supplied to the load.

4) PWM is particularly suited for running inertial loads such as motors, which are not as easily affected by this discrete switching, because their inertia causes them to react slowly.