

Communication Systems

Lecture - 5

by:

Dr. Tarun Kumar Dey,
Professor in Physics

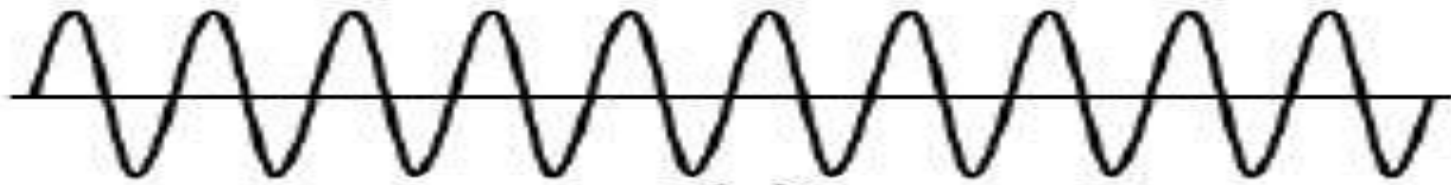
L.S College; BRA Bihar University, Muzaffarpur.

Email: tkdeyphy@gmail.com

Online Platform – meet.findmementor.com

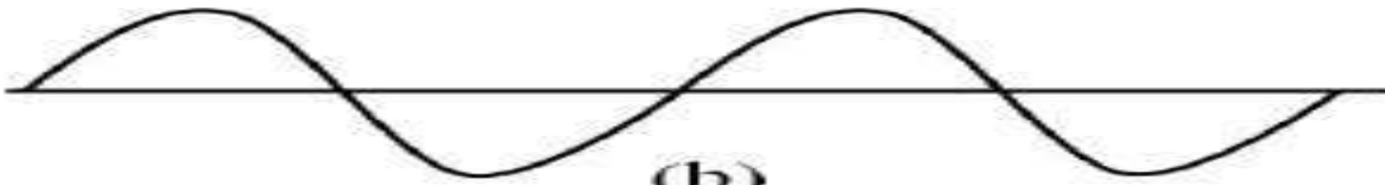
Need of Modulation

- For transmitting a signal ,we need an antenna (also called an aerial) which should have a size of comparable to the wavelength (λ) (or at least $\lambda/4$) of the signal . For example ,in case of a signal (an EM wave travelling with speed $c= 3 \times 10^8$ m/s of frequency 20 kHz ,
$$\lambda = c / \nu = 3 \times 10^8 / 20 \times 10^3 = 15 \text{ km}$$
- Obviously , this is an impossible size for an antenna . hence , the necessity of carrier wave (high frequency wave) to reduce the size of an antenna to transmit the



Carrier

(a)



Signal

(b)



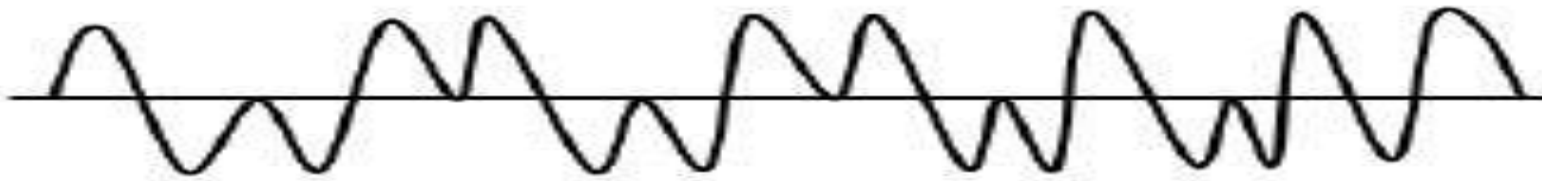
ASK

(c)



FSK

(d)



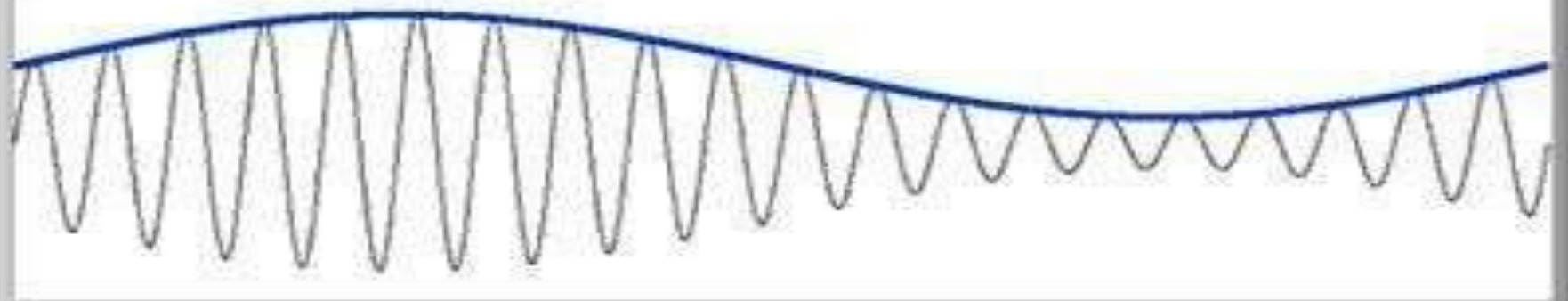
PSK

(e)

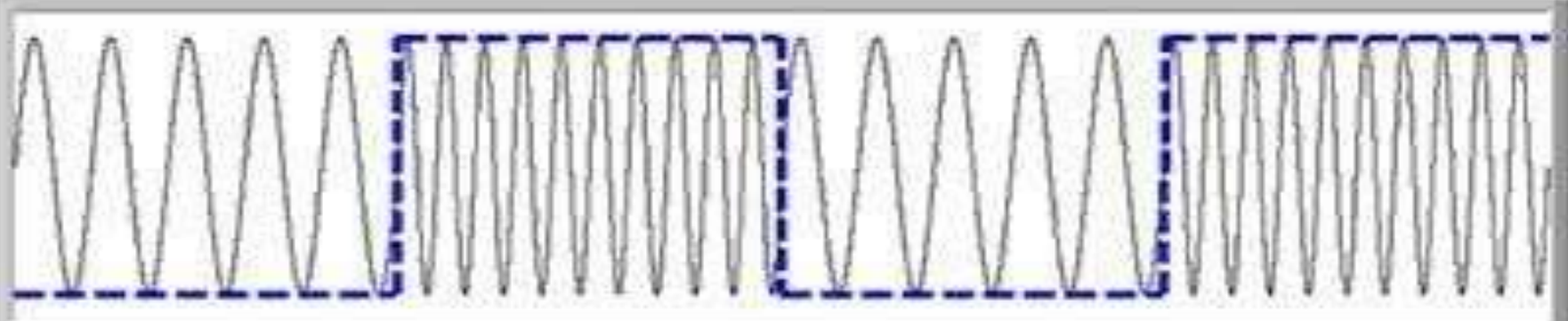
Modulation :

- The process in which low frequency modulating or signal wave is superimposed on a high frequency (carrier wave) as such characteristics (amplitude , frequency phase) of their carrier changes in accordance with signal wave ,i.e , called modulation .
- Types of modulation :
 - Amplitude modulation
 - Frequency modulation
 - Phase modulation

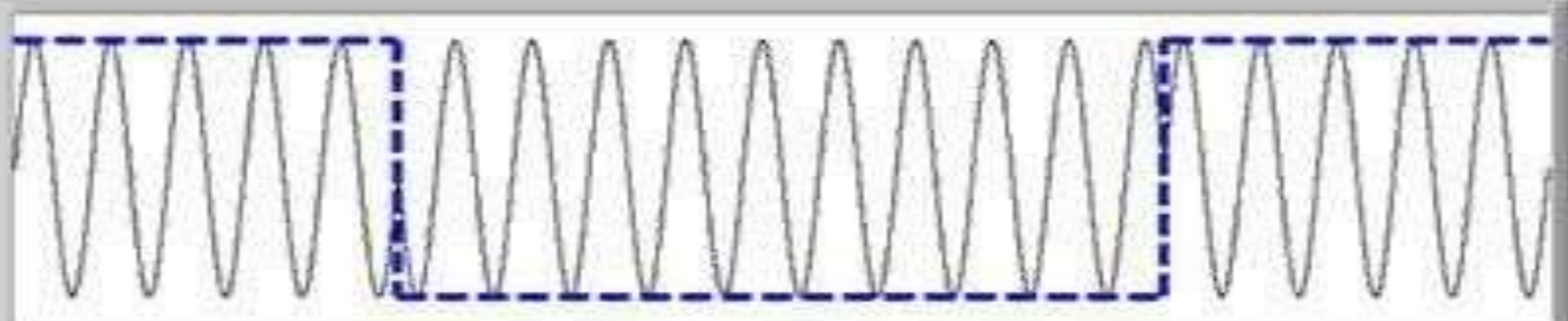
Amplitude Modulation

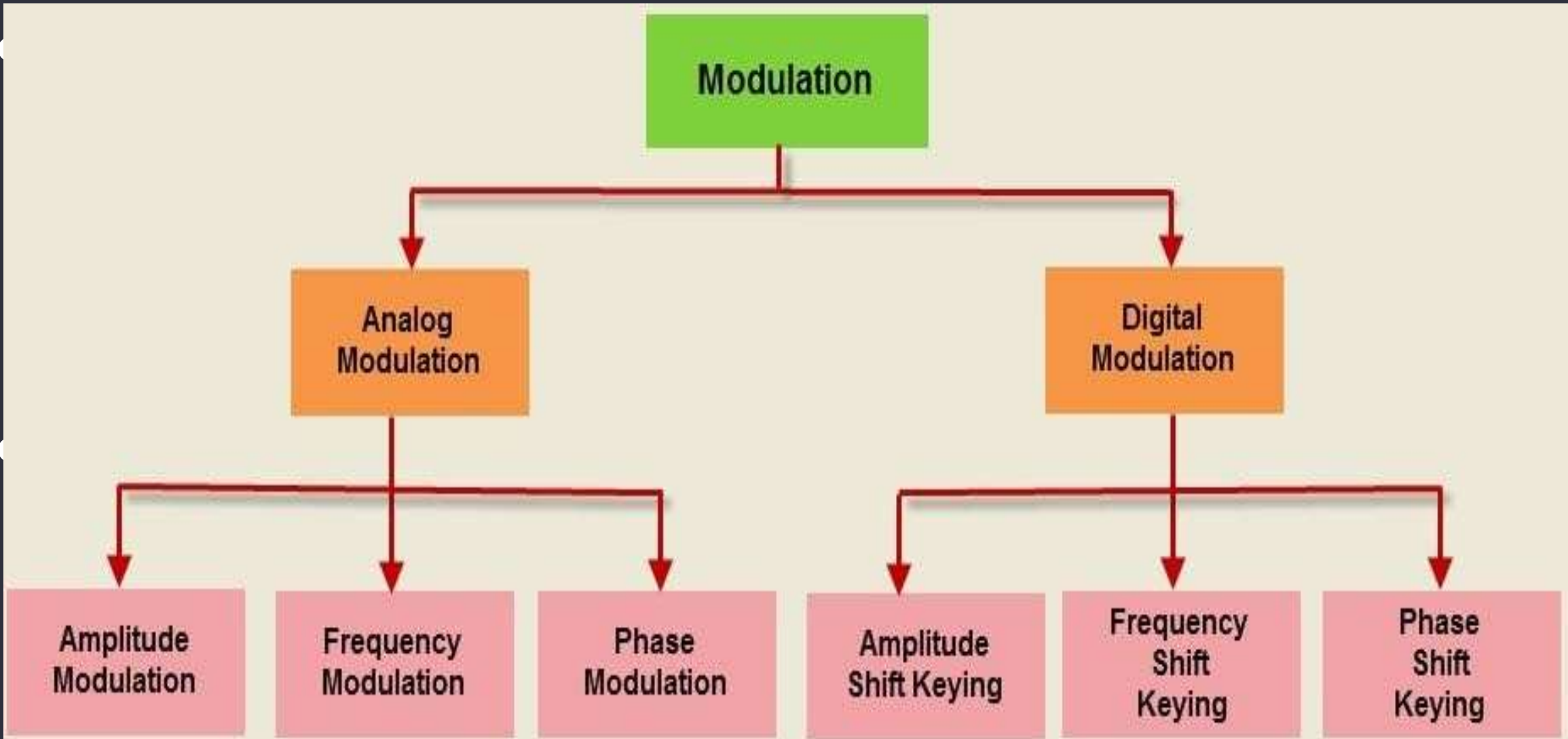


Frequency Modulation



Phase Modulation





■ Phase Modulation (PM)