8.1 Time and Frequency Domain Representation of Signals :

- A signal x (t) can be represented in two domains namely the **time domain** and the **frequency domain.**
- The time domain representation is a plot of variation in the signal magnitude with respect to time "t" as shown in Fig. 8.1.1(a).
- The time domain representation can provide the information about the shape of the signal, periodicity, time period, amplitude, fundamental frequency, etc.
- But we do not know anything about what frequency components are present and in what proportion are they mixed in order to obtain the particular shape of the signal.
- In order to get all this information, we have to use the **frequency domain** representation of the signal.
- The frequency domain representation is called as **spectrum** of the signal which consists of :
  1. Amplitude spectrum 2. Phase spectrum.
- The **amplitude spectrum** is a graph of amplitude versus frequency whereas the **phase spectrum** is a graph of phase versus frequency.
- The frequency domain representation of the given signal can be obtained by using Fourier series for the periodic signals and Fourier transform for the non-periodic signals.
- The spectrums of periodic signals are **line spectrums** whereas those of non-periodic signals are **continuous ones** as shown in Fig. 8.1.2(b).