Time Division Multiplexing:

The concept of TDM is illustrated by the block diagram shown in figure -1. Each input message signal is first restricted in bandwidth by a low-pass anti-aliasing filter to remove the frequencies that are nonessential to an adequate signal representation. The low-pass filter outputs are then applied to a *commutator*, which is usually a switching circuit. The function of the commutator is twofold:

(1) to take a narrow sample of each of the N input messages at a rate that is slightly higher than $2W$, where W is the cutoff frequency of the anti-aliasing filter.

(2) to sequentially interleave these N samples inside the sampling interval.

Following the commutation process, the multiplexed signal is applied to a *pulse modulator*, the purpose of which is to transform the multiplexed signal into a form suitable for transmission over the common channel.

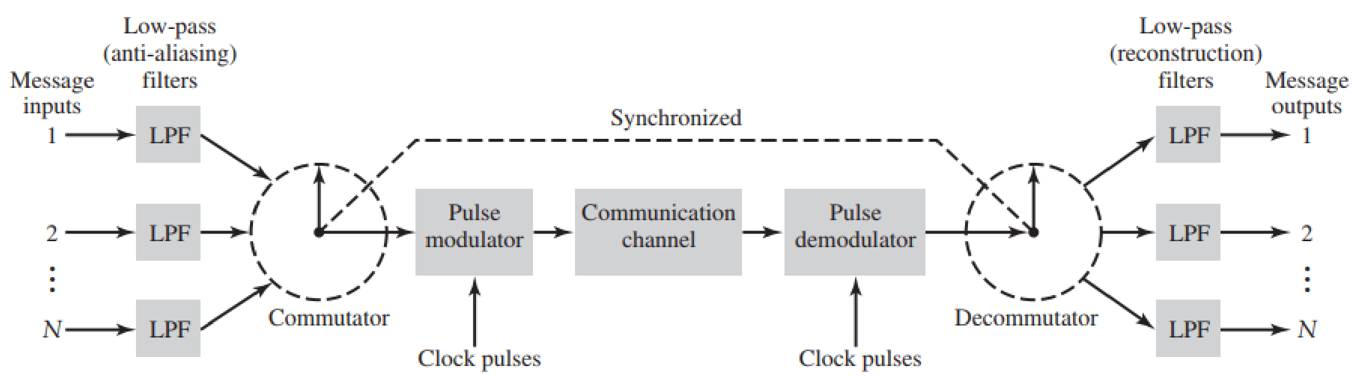

Figure: Block diagram of TDM system

At the receiving end of the system, the received signal is applied to a *pulse demodulator*, which performs the reverse operation of the pulse modulator. The narrow samples produced at the pulse demodulator output are distributed to the appropriate low-pass reconstruction filters by means of a *decommutator*, which operates in *synchronism* with the commutator in the transmitter. This synchronization is essential for a satisfactory operation of the system. The way this synchronization is implemented depends naturally on the method of pulse modulation used to transmit the multiplexed sequence of samples.

The TDM system is highly sensitive to dispersion in the common channel—that is, a non-constant magnitude response of the channel and a nonlinear phase response, both being measured with respect to frequency. Accordingly, *equalization* of both magnitude and phase responses of the channel is necessary so as to ensure a satisfactory operation of the system; in effect, equalization compensates for dispersion in the channel.