4.5 Probability of Error

- Bit Error Rate (BER) is defined as the ratio of number of errors occuring over a time interval to the number of pulses transmitted during the interval.

$$BER = \frac{N_e}{B_t}$$

where,

N_e is number of errors occuring during the interval.

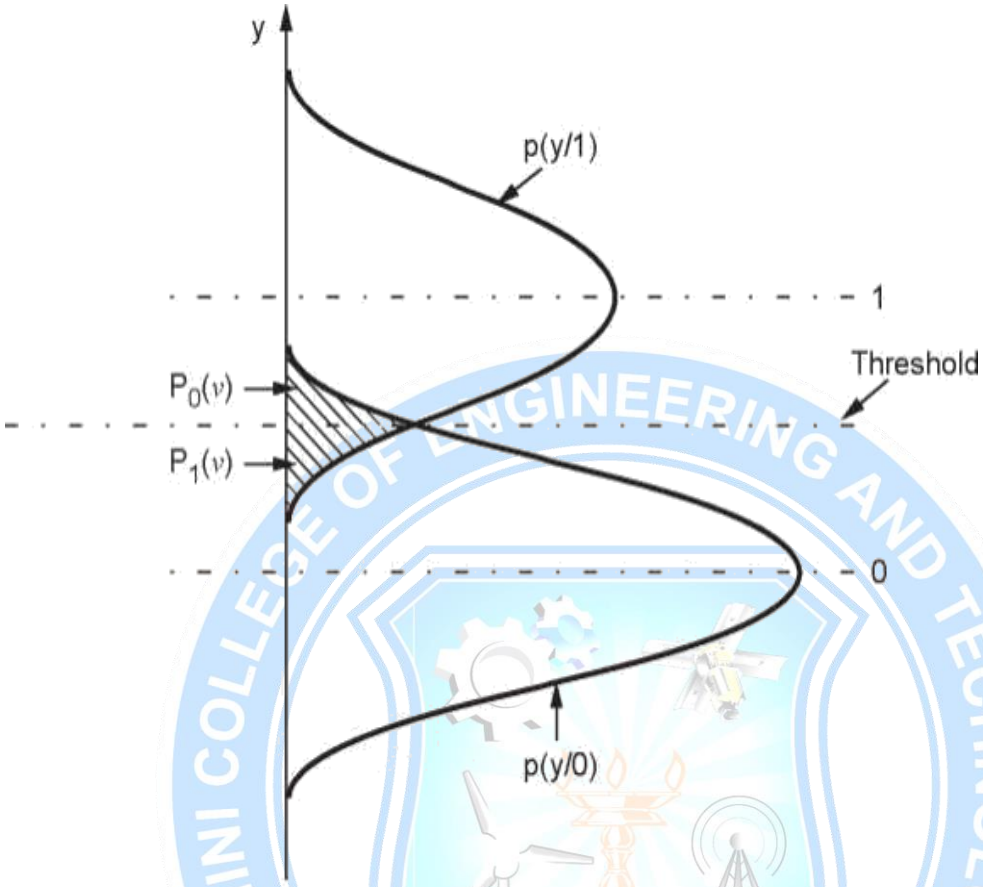
N_t is number of pulses transmitted during the interval.

B_t is bit rate= $\frac{1}{T_b}$ or pulse transmission rate

- BER for optical fiber communication system is ranging between 10^{9} to 10^{12}
- BER of receiver depends on S/N ratio. To compute the BER at receiver probability distribution of output signal is considered.

Conditional PDF

- P(y/x) is the probability that the output voltage is y when x was transmitted. The functions p(y/l) and p(y/0) are conditional PDF as shown in Figure



- The probability distributions are given as -

$$P_1(v) = \int_{-\infty}^{v} p(y/1)\, dy$$

- It is the probability that output voltage is less than threshold when logic '1' is sent.

$$P_0(v) = \int_{v}^{\infty} p(y/0)\, dy$$