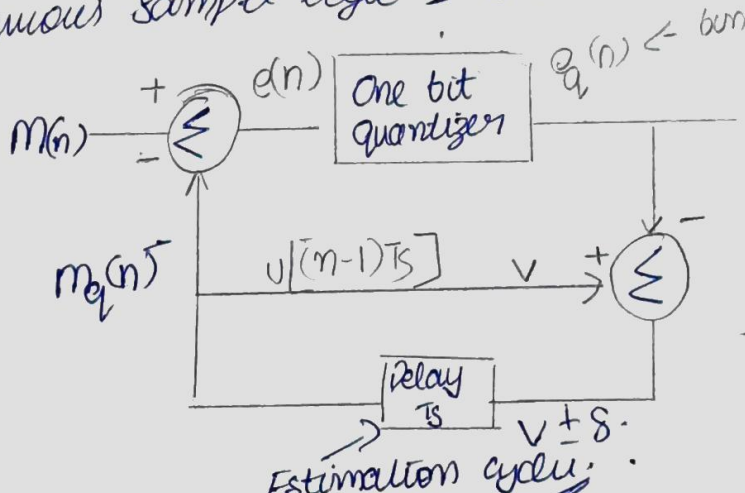
Experiment - 3

Aim:- To study Delta Modulation (DM) and Study Probability of Error using Matlab / Octave.

Software Used:- GNU Octave

Theory:- Delta Modulation uses a single bit PCM code to achieve digital transmission of analog signal. With conventional PCM, each code is a binary representative of both the sign & magnitude of particular sample. The algorithm of delta modulation is simple if the current sample is smaller than the previous sample a '0' is transmitted. If the current sample is larger than the previous sample logic '1' is transmitted.



$e[n] = m[n] - m_q[n]$ ← quantized Estimate

$m_q[n] = m_q[n-1] + e_q[n-1]$

$= m[n-1] - (e[n-1] - e_q[n-1])$

$e_q[n] = Q(e[n]) = \begin{cases} +\delta & : e(n) > 0 \\ -\delta & e(n) < 0 \end{cases} = \pm\delta$

For calculation 'δ' (step size)

$$\frac{\delta}{T_S} > \left|\frac{d(m(t))}{dt}\right|_{max}$$

For compensating for slope overloading & granular noise reduction.

Also for capturing details, equality should hold true.

In case of sinusoid signal:

$$\delta = \frac{2\pi A_m f_m}{f_S}$$