Problem: Consider the following PCM system.

(a) Determine the # of bits used in the n-bit Binary Encoder.
   \[ L = 4096 \leq 2^n \rightarrow n = 12 \text{ bits/Sample} \]

(b) Determine the maximum message bandwidth for which the system operates satisfactorily.
   \[ f_s = 2B = \text{sample/s} = \frac{(80 \times 10^6 \text{ bits/s})}{(12 \text{ bits/sample})} \rightarrow B = \frac{80 \times 10^6}{12} \times 2 = 3.33 \times 10^6 = 3.33 \text{ MHz} \]

(c) Determine the minimum transmission bandwidth required to transmit the output of this PCM system.
   \[ B_T = n \cdot B = \frac{R}{2} = 12 \times 3.33 \text{ MHz} \times \frac{80 \times 10^6}{2} = 40 \text{ MHz} \]