Digital Communication I

Information is to be conveyed from A to B using automatic repeat request (ARQ), forward error correction (FEC), and lossless compression.

(a) Explain the terms ARQ, FEC and lossless compression. [5 marks]

(b) If we consider each of these functions to be operating at different protocol layers, what would be the most sensible ordering of the layers, and why? [5 marks]

(c) Suppose:

- The underlying bit channel has a capacity of $B$, a delay $\tau$ and error rate $\epsilon_0$.
- The compression ratio is $C < 1$.
- The FEC has rate $R < 1$ and given an error rate $\epsilon_0$ provides an error rate $\epsilon_1$ (which is detected).
- The ARQ protocol has a window size of $W$.

At what rate can the information be conveyed? [Hint: Consider when retransmissions are made.] State any assumptions you make about the operation of the ARQ protocol. [10 marks]