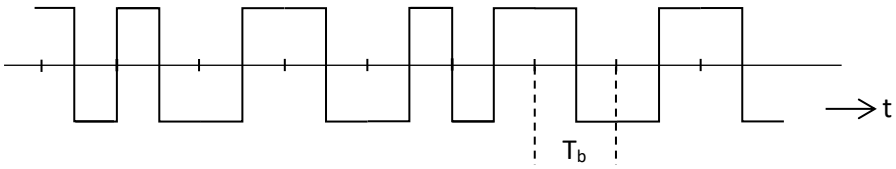
Class Test EBU5302 Online

Please read the following instructions carefully:

- **Type your answers in the supplied answer sheet; hand-written equations or sketches can be incorporated into the answer sheet**
- **Submit the ANSWER SHEET as a PDF file to QMplus.**

1. Write the corresponding binary values for the following Manchester NRZ line code:



[3 marks]

2. A multilevel digital communication system is to operate at a data rate of 3.2 Gb/s. If a 8-bit words are encoded into each level for transmission over the channel. What is the minimum required bandwidth for each channel?

[6 marks]

3. Calculate the autocorrelation function R(k) of bipolar RZ signalling.

[15 marks]

4. A binary waveform of 0.8 Mbits/s is converted into a 16-level waveform that is passing through a channel with a raised cosine roll-off Nyquist filter. The channel has a conditional (equalised) phase response out to 175 KHz. Find out the roll-off factor? [Show all your calculations]

[6 marks]

5. Suppose a signal encoding technique requires that Eb/N0=8.4dB for a bit error rate of 10-4 (one bit error out of every 10,000). If the effective noise temperature is 290oK (room temperature) and the data rate is 2400bps, what received signal level is required to overcome thermal noise?

[6 marks]

6. What will be the free space path loss (in dB) at a distance of 1km when the signal is transmitted on 1GHz?

[6 marks]

7. What are the various ways of combining signals for diversity in cellular system?

[6 marks]

8. What are FDMA, TDMA, CDMA and OFDMA? What are the typical application scenarios of them? You may want to use diagrams to illustrate your answers.

[12 marks]