# ITS323 – Practice 2

Question 1   [6 marks]

You have a twisted pair Ethernet LAN cable connecting two computers directly together. The NICs in each computer support a data rate of 100Mb/s. You have a 1GB file to transfer from one computer to the other using TFTP. TFTP, which uses UDP as a transport protocol, adds a 4B header to each message. Each message carries 512 Bytes of data. Assume packets are sent as fast as possible, ignoring an acknowledgments or other (non-header) overheads.

(a) Draw a protocol stack, labelling each layer, for one of the computers.

(b) How long does it take to transfer the file?

(c) If the NICs supported Gigabit Ethernet, what is the throughput of the file transfer?

Question 2   [2 marks]

A device transmits a signal with power of 20dBm. The signal passes through a 17dB amplifier. The cabling from transmitter to receiver (via the amplifier) has a loss of 3dB. What is the receive power?

Question 3 [4 marks]
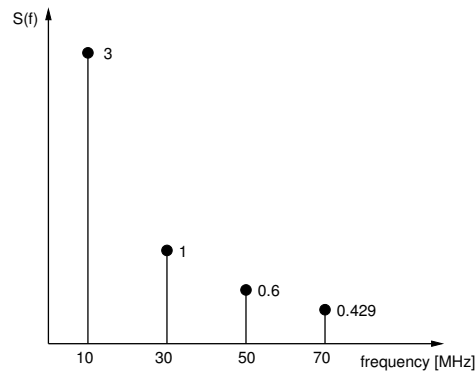
(a) What is the signal bandwidth?

(b) What is the signal period?

(c) Write an equation for the signal in the time domain.

Question 4 [2 marks]

An encoding scheme maps 8 bits of digital data into 1 signal element.

(a) In a noise-free environment with a bandwidth of 10MHz, what is the maximum theoretical data rate possible? [3 marks]

(b) If the level of noise was measured to be -27dBm and the received signal strength of 2.041mw for a communications channel with bandwidth of 10MHz, what is the maximum theoretical data rate possible?

(c) In the noisy channel of part (b) what is the number of bits per signal element needed to achieve the maximum theoretical data rate?