NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2005

SUBJECT: DATA COMMUNICATIONS AND COMPUTER NETWORKS
CODE: SCS6103

INSTRUCTIONS TO CANDIDATES

This question paper consists of six [7] questions
Answer any four questions

3 hours

QUESTION ONE

a) Outline the differences between Conducted media and Radiated media. Explain two examples of each.   [8]

b) Draw a sketch showing the components of a communication system. Give a detailed explanation of every component feature.   [10]

c) There are number of transmission methods that are used with LANs. State and describe the three transmission methods used with LANs.   [7]

QUESTION TWO

a). What is the existing relationship between information, bandwidth, and noise? Assuming that a PSTN has a bandwidth of 5000Hz and a typical signal-to-noise power ratio of 10dB. What would be the Maximum theoretical information rate that can be achieved   [9]

b). A series of 8-bit message blocks (frames) is to be transmitted across a data link using a CRC for error detection. A generator polynomial of 11001 is to be used. Use an example to illustrate:

i)   The FCS generation process   [4]
ii)   The FCS checking process   [4]

c). What are the characteristics of a data packet under the following transmission modes:

amplification of 20dB and the third an attenuation of 10dB. Assuming a mean transmitted power level of 400mW, determine the mean output power level of the channel? [5]

c) Explain the meaning of the following terms relating to a data link control protocol:

    i)   Connectionless   [5]
    ii)   Connection-oriented   [5]

QUESTION SIX

a) Explain the aim of the OSI reference model for open systems interconnection and outline the function of each layer. [15]

b). Outline the basic operation of a Bus topology LAN that uses the CSMA/CD Access Control method. [10]

END OF QUESTION PAPER

i)	Asynchronous transmission	[4]
ii)	Synchronous Transmission	[4]

QUESTION THREE

a). Explain the following multiplexing techniques, hence give advantages and disadvantages of each:

i)	Frequency-division-Multiplexing (FDM)	[4]
ii)	Time –division-Multiplexing (TDM)	[4]
iii)	Statistical-time-division Multiplexing (STDM)	[5]

b) Why is it important to ensure error free data transmission? Explain the two techniques that are used to achieve error correction.   [12]

QUESTION FOUR

a) You are a network consultant and a client who is the manager of a corporate organisation request for your advice on the best Network (LAN) design to install in his organisation. The client is concerned with performance, bandwidth and cost issues. Write a report giving your advice attending to issues of equipment, software, topologies and bandwidth in relation to performance and costs. Make your own recommendations to the client. [10]

b) Explain the fault detection method that is used with token ring LANs. Explain also how the reliability of LANs can be enhanced by the introduction of a redundant ring.   [6]

c) Using examples illustrate how the following transmission modes are achieved.

i)	Simplex	[3]
ii)	Half duplex	[3]
iii)	Full duplex	[3]

QUESTION FIVE

a) With the Aid of Sketches compare and contrast circuit switching and packet switching. Exemplify the operational environment for each of the switching techniques.   [10]

b) A transmission channel between two communications DTEs is made up of three sections. The first introduces an attenuation of 16dB, the second an