2209/302
DATA COMMUNICATION
July 2011
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION TECHNOLOGY

MODULE III

DATA COMMUNICATION

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet.

*Answer any **FIVE** of the following **EIGHT** questions.*

This paper consist of 5 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

Turn over

1. (a) State **two** advantages of using *differential manchester* in data encoding. (2 marks)

(b) Distinguish between *email software* and *network software* as used in computers. (4 marks)

(c) Pongezi T.T.I intends to install a local area network inorder to improve communication in the Institute. Explain **three** factors other than cost they should consider when selecting the transmission media for the LAN. (6 marks)

(d) Figure 1 shows a network of two branches of a company in different countries. Use it to answer the questions that follow.

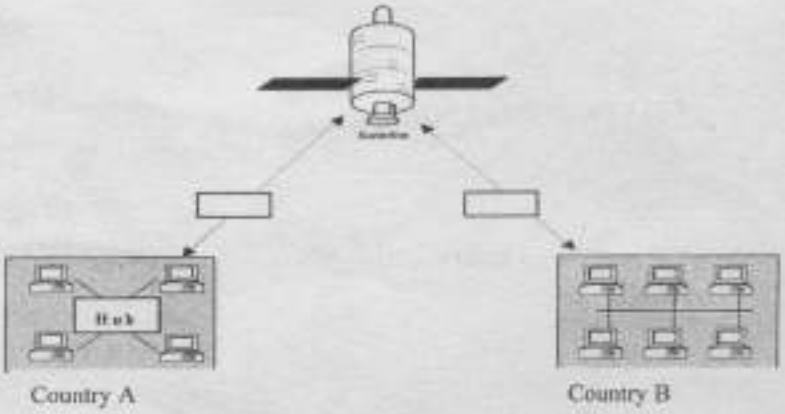


Figure 1

(i) Identify the type of network justifying your answer. (2 marks)

(ii) Describe the process of data communication between a computer in Country A and another in Country B. (6 marks)

2. (a) State **four** *forms of data* as applied in data communication. (2 marks)

(b) State the function of each of the following components as used in data communication:

(i) receiver;

(ii) protocol;

(iii) channel;

(iv) transmitter. (4 marks)

(c) (i) With the aid of a diagram, describe *statistical time division multiplexing* as used in data communication. (6 marks)

(ii) State **two** advantages of the method described in (i). (2 marks)

(d) A cyber cafe often experiences network congestion due to the overwhelming demand for browsing services. Explain **three** strategies that could be used by the network to handle the congestion. (6 marks)

3. (a) State **three** functions of a *network operating system.* (3 marks)

(b) Distinguish between *the stop and wait ARQ* and the *continuous ARQ* error correction methods. (4 marks)

(c) (i) Assuming that 100 pages are to be downloaded from the Internet, calculate the minimum bandwidth for the channel.
Hint: Each page has 30 lines with each line having 120 characters. (2 marks)

(ii) Given that the distortion rate of a signal in a transmission media is -0.6db /km, determine the power of a signal after 7 km whose initial power is 3 mW.

Hint: $dB = 10 \log_{10} \frac{p2}{p1}$ (3 marks)

(d) Figure 2 shows a network design. Use it to answer the questions that follow.

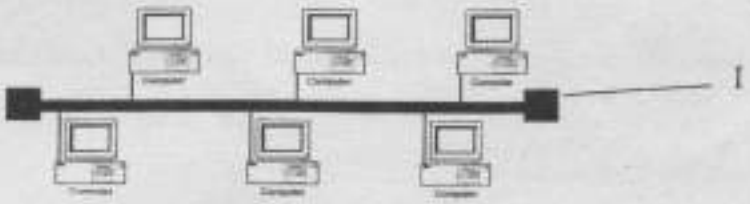


Figure 2

(i) Identify the *type of topology* used in the design. (1 mark)

(ii) Explain the function of the component labeled I. (2 marks)

(iii) Describe the *media access method* used in the topology identified in (i). (2 marks)

(iv) Outline **three** advantages of the topology identified in (i). (3 marks)

4. (a) Outline **four** benefits of installing an *extranet* in an organization. (4 marks)

(b) Distinguish between a *dynamic router* and a *static router.* (4 marks)

(c) With the aid of a diagram in each case, describe **two** types of *switches* as applied in data communication. (6 marks)

(d) The following stream of bits are to be transmitted through a data communication system.

1 0 0 1 1 0 1 0

Given that the system uses one of the following encoding schemes, draw the line code for each encoding schemes:

(i) Unipolar;

(ii) Bipolar AMI;

(iii) Manchester. (6 marks)

5. (a) (i) State **two** parts of an *IP address*. (2 marks)

(ii) State the class for the following IP address:

175.138.147.240 (1 mark)

(iii) Convert the IP address in (ii) to its binary notation equivalent. (2 marks)

(b) Jane, a network administrator at a particular company, intends to subnet the company's local area network.

(i) Define the term *subnet*. (2 marks)

(ii) Explain **three** reasons for her action. (6 marks)

(c) Figure 3 shows different routes in a network. Given that a packet has to move from Node A to E .

(i) Draw the routing table. (5 marks)

(ii) Assuming the *Dijkstra algorithm*, outline the path from Node A to E. (2 marks)

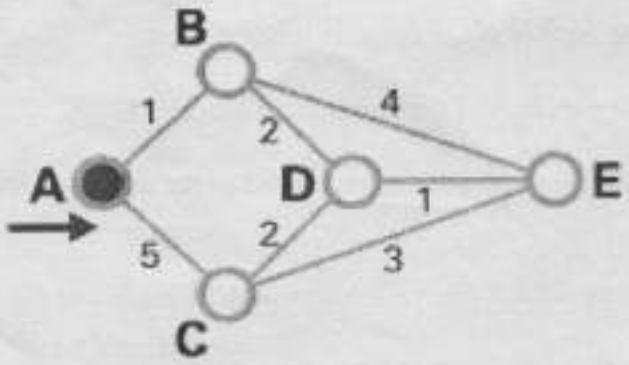


Figure 3

6. (a) (i) With the aid of a diagram, describe the *OSI model* as used in data communication. (9 marks)

(ii) State the network device that operates at each of the following layers of the *OSI model*:

I. Layer 2;

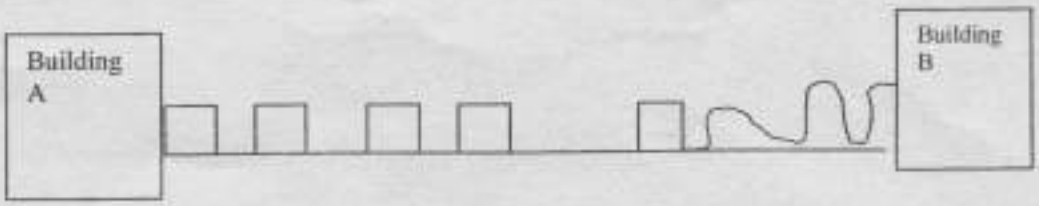
II. Layer 3. (1 mark)

(b) With the aid of a diagram, describe the *star bus topology*. (4 marks)

(c) Describe **three** characteristics of an *analog signal* as used in data communication. (6 marks)

7. (a) Distinguish between *message* and *packet* switching techniques. (4 marks)

(b) Figure 4 shows data moving from Building A to B through a transmission media.



Transmission media

Figure 4

Explain **three** possible causes of the nature of signal at the destination. (6 marks)

(c) Differentiate between *FDDI* and *ATM* networks as used in data communication. (4 marks)

(d) With the aid of a diagram, describe the operation of IEEE *802.4 network standard*. (6 marks)

8. (a) (i) Explain the importance of *contingency measures* as used in networking. (2 marks)

(ii) Explain **three** goals of data security as used in data communication. (6 marks)

(b) Explain the function of each of the components in a network:

(i) air conditioner;

(ii) power back up;

(iii) proxy server. (6 marks)

(c) With the aid of a diagram, describe the *Go-Back-N ARQ* as used in data communication. (6 marks)