



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations for 2013/2014

DEPARTMENT OF COMPUTING AND APPLIED SCIENCE

End of Term Examination for Diploma in Information Communication Technology

Data Communication and Networked Systems

Date:

Time: 2 Hours

INSTRUCTIONS TO CANDIDATES

Answer any **four** of the following **eight** questions

All questions carry the equal marks

1. (a) (i) Distinguish between synchronous and asynchronous data transmission. (4 Marks)
- (ii) The data 11000101 is to be encoded using NRZ-I (Invert on ones) and pseudoternary encoding schemes. Sketch the resulting signal for each scheme (4 Marks)
- b) A bank is to transmit Data from Kenya to United States of America. Describe **three** transmission impairments likely to affect the data while on transit. (6 Marks)
- c) (i) Identify the multiplexing technique represented by figure 1 below. (2 Marks)

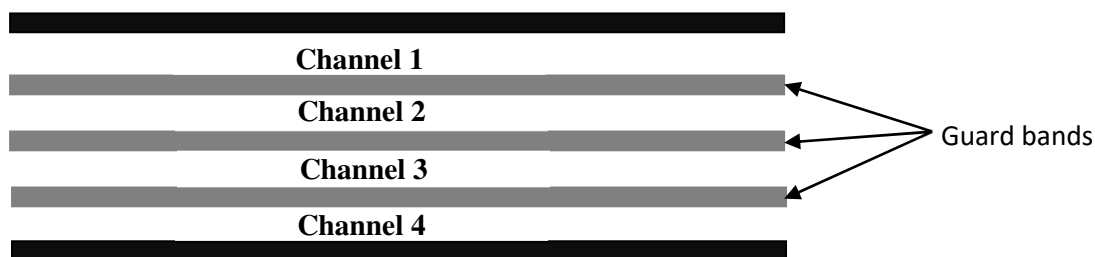


Figure 1

- (ii) Outline **two** challenges of the above multiplexing technique. (2 Marks)
 - (iii) Outline the role played by the guard bands in the above multiplexing technique. (2 Marks)
2. (a) (i) Using the Polynomial generator $X^5 + x^3 + 1$, calculate the CRC needed for the transmission of data stream 1001011.

- (ii) Determine the Block Check Character (BCC) (8 Marks)
- (b) Outline three protocols that would be found in a TCP/IP protocol suite (6 Marks)
- (c) Explain the function of each of the following layers of the OSI reference model:
- Data link
 - Physical.
 - Presentation.
- (6 Marks)
3. (a) (i) Distinguish between circuit switching and packet switching technique (6 marks)
- (ii) State any two advantages of using leased line over PSTN for digital signal transmission (2 Marks)
- (b) (i) Explain **two** characteristics of WAN as used in data communication. (4 Marks)
- (iii) With the aid of a diagram, explain the Integrated Service Digital Network (8 Marks)
4. (a) Outline **two** reasons for encoding signals during data transmission. (2 Marks)
- (b) Outline the advantages of using a mesh Topology over Bus Topology (6 Marks)
- (c) Transmission media can be classified into two, guided and unguided. Outline at least two data transmission media for each class. (4 Marks)
- (d) With the aid of a diagram explain how data is transmitted over a satellite. (8 Marks)
5. (a) A group of module III students in a certain college were carrying-out an assignment on OSI model. Explain **three** benefits that they might have identified. (6 Marks)
- (b) (i) State four components of a data communication system. (2 Marks)
- (ii) Distinguish between a datagram and a frame as used in data communication. (4 Marks)
- (c) With the aid of a simple switching network, explain the following phases:
- Circuit establishment
 - Data transfer
 - Circuit disconnect
- (8 Marks)
6. (a) Plazo International Company has won a tender to install a wide area network for a particular bank across the country. Explain four factors to be considered during network design. (8 Marks)
- (b) Figure 4 below shows OSI model. Explain the function of the layers labeled (i) and (ii). (4 marks)

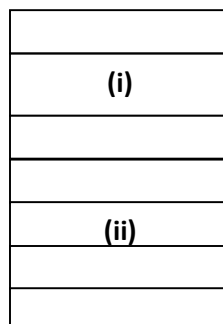
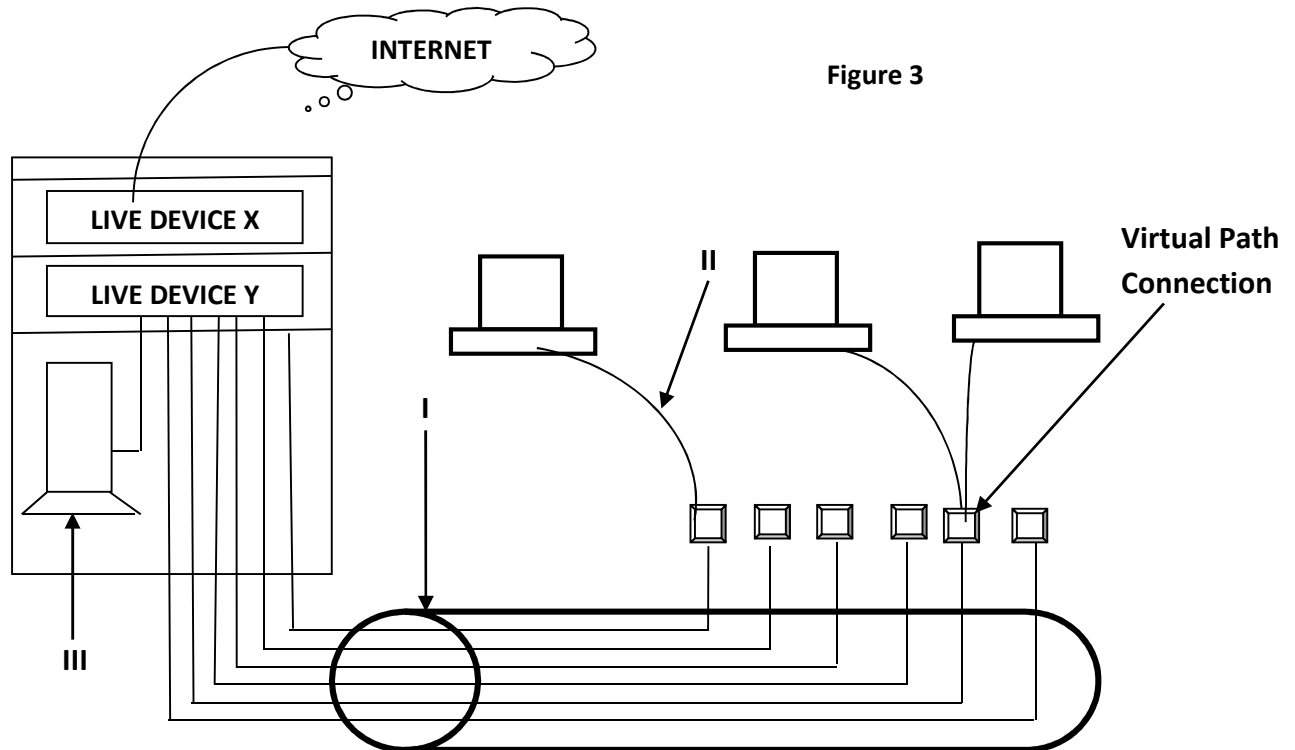


Figure 4

- (c) With the aid of a diagram describe how time division multiplexing works. (6 Marks)
- (d) Outline **two** data transmission impairments as used in data communication (2 Marks)
7. (a) (i) Define the following terms as applied in data communication
- Protocol
 - Parity bit
- (b) Differentiate between a bridge and a router as used in computer networks (4 Marks)
- (c) Outline four advantages of fibre optic cable over coaxial cable. (5 Marks)
- (d) Figure 3 below shows a typical design for a network.

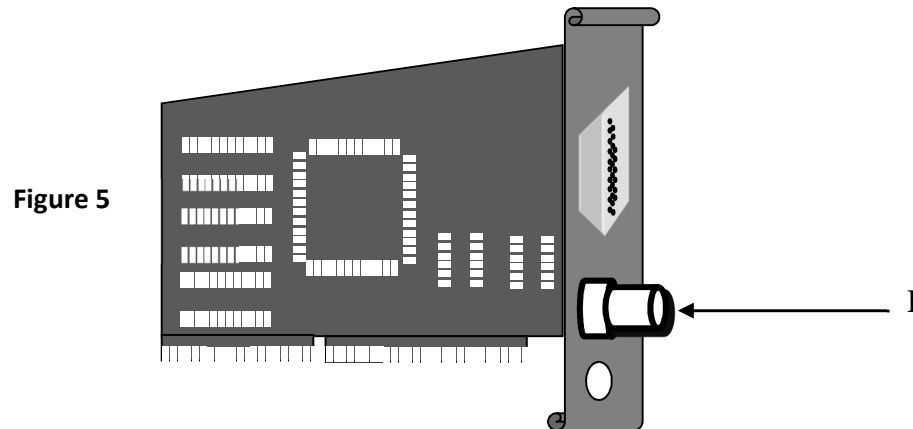


- (I) Name the parts labeled I, II and III (3 Marks)
- (II) Identify the live device X and Y. (2 Marks)
- (III) Identify the transmission media represented in figure 3 above. (2 Marks)
8. (a) (i) Explain **two** advantages of installing air conditioning systems in a computer room (4 Marks)
- (ii) Distinguish between *Data Rate* and *Baud Rate* as applied in data transmission. (2 Marks)
- (b) The following are typical IP addresses for computers in a network.
- 129.151.4.8
 - 192.110.103.22
 - 122.117.100.21
- Identify the class for each IP address (3 Marks)
- (d) Define the following with respect to digital transmission:
- Simplex Connection.

- (ii) Full Duplex Connection
- (iii) Half Duplex Connection

(6 Marks)

(c) Figure 5 shows a typical network interface card



- (i) Identify the type of topology supported by port I
- (ii) Explain three limitations of the topology identified in (i)

(2 Marks)

(3 Marks)