

1. (a) Using examples describe the following concepts as applied in data communications:
- (i) Data Terminal Equipment (DTE);
 - (ii) half duplex connection;
 - (iii) full duplex connection.
- (6 marks)
- (b) With the aid of a sketch describe each of the following transmission media:
- (i) satellite link;
 - (ii) microwave.
- (4 marks)
- (c) Explain each of the following keying techniques:
- (i) amplitude shift keying;
 - (ii) frequency shift keying;
 - (iii) phase shift keying.
- (6 marks)
- (d) Describe the role of Carrier Sense Multiple Access/Collision Detect or [CSMA/CD] in data communication.
- (4 marks)
2. (a) (i) Explain the term 'multiplexing' as used in data transmission.
- (ii) With the aid of a diagram explain Frequency Division Multiplexing.
- (8 marks)
- (b) Describe the following mechanisms of packet switching:
- (i) virtual circuit;
 - (ii) datagrams networks;
 - (iii) message switching.
- (6 marks)
- (c) (i) Outline **three** advantages of Digital Transmission over Analogue;
- (ii) Distinguish between centralised and distributed networks.
- (6 marks)
3. (a) Distinguish between unipolar and bipolar signals.
- (4 marks)
- (b) An analogue signal carries four bits in each signal element.
If 1000 signal elements are sent per second, determine the following:
- (i) band rate;
 - (ii) bit rate.
- (6 marks)

- (c) Describe the following encoding techniques:
- (i) NRZ-L;
 - (ii) NRZ-I.
- (4 marks)
- (d) (i) Define the concept 'propagation delay'.
- (ii) Differentiate between blocking and non-blocking as used in switching giving **one example in each case.**
- (6 marks)
4. (a) Describe **four** communication packages in data communication. (4 marks)
- (b) Outline the operations of an electronic mailing system. (5 marks)
- (c) Explain the operation of checksum generator. (4 marks)
- (d) With the aid of a diagram, describe the operations of a Tree Topology Scheme in computer networks. (7 marks)
5. (a) With the aid of a diagram, explain the working of an X-25 interface. (7 marks)
- (b) Explain the following routing techniques:
- (i) adaptive;
 - (ii) brouter;
 - (iii) flooding.
- (6 marks)
- (c) Using sketches explain the following communication concepts:
- (i) scalability;
 - (ii) transparency;
 - (iii) token passing.
- (7 marks)
6. (a) Omega Club has been in operation in Kenya for the last two years. The club intends to expand its operations to the rest of the East African countries.
- (i) Describe **two** networks they can implement.
 - (ii) List **two** advantages of networking in an enterprise.
- (8 marks)
- (b) Outline **three** services that an Integrated Service Digital Network (ISDN) offers to the user. (3 marks)

- (c) The proprietor of Uzuri Supermarket wants to network his chain of seven outlets to enhance efficiency.
- (i) Identify an appropriate network for Uzuri.
 - (ii) Discuss the operations of the proposed network;
 - (iii) Suggest **two** limitations of the topology identified in (i).
- (9 marks)
7. (a) Ken has been requested to make a presentation in a workshop on the Open System Interconnection (OSI) model of communication.
- (i) Identify the **three** lowest levels in the model.
 - (ii) Explain the function of each level in (i).
 - (iii) Explain **three** advantages of the layered architecture.
- (9 marks)
- (b) Describe the Transport Control Protocol/IP (TCP/IP). (3 marks)
- (c) Discuss the following terms as applied in data communications:-
- (i) piggy backing;
 - (ii) bit stuffing.
- (4 marks)
- (d) Outline **two** benefits to the user for applications of Basic Rate Interface (BRI) service as applied in Integrated Service Digital Network (ISDN). (4 marks)
8. (a) Using a diagram explain the operation of each of the following:
- (i) Longitudinal Redundancy Check Generator (LRC)-G;
 - (ii) Longitudinal Redundancy Check Checker (LRC)-C.
- (10 marks)
- (b) Define the Guided Transmission Media giving **two** suitable examples. (2 marks)
- (c) Explain the causes and methods used to minimize each type of the following noise:
- (i) thermal noise;
 - (ii) impulse noise;
 - (iii) cross talk;
 - (iv) jitter.
- (8 marks)