SEMESTER	***DEPARTMENT***	***COURSE TITLE***
Seventh	*Telecommunications Engineering*	*Data Communications*
COURSE CODE	***HOURS*** 3	***COURSE SPECIFICATIONS***
ET707	***UNITS*** 3	*Theoretical Content*

1. ***The Enterprise Network Environment:***
   - Enterprise Networks.
   - Types of Network Topology.
   - Network Access: An Overview.
   - Initial Network Design Considerations.
   - Connection-Oriented and Connectionless Service
   - Data Protocols: Key to Network Operation.

2. ***The OSI Model and the Data-Link Layer:***
   - Introduction.
   - Layering.
   - Type and Instance.
   - Possible Sub layers.
   - Data Units.
   - Specific Layers of the OSI Reference Model.
   - Layer Descriptions.
   - Specific Comments on OSI.
   - Discussion of OSI Layers.
   - Procedural Versus Electrical.

3. ***High-Level Data-Link Control (HDLC) Typical Data-Link Layer Protocol:***
   - Introduction.
   - Stations and Configurations.
   - Modes of Operation Used with HDLC.
   - HDLC Frame Structure.
   - Commands and Responses.
   - Frame Operation.

- Error Recovery.
- Other Station Modes.
- SDLC Variations with HDLC.

4. *Data Network Operations:*

- General Requirements for the Interchange of Data.
- Discussion of Issues and Requirements.
- Error Detection Schemes.
- Error Correction Schemes.
- Data Switching.

5. *Data Transmission I:*

- Electrical Communication of Information.
- The Bit and Binary Transmission of Information.
- Binary Codes for Data Communication.
- Electrical Bit Decisions.
- Electrical Representation of Binary Data.
- Binary Conventions.
- Bit-Parallel and Bit-Serial.
- Baseband.
- Data Rate.

6. *Data Transmission II:*

- Interpreting a Serial Stream of Bits.
- Timing Distortion in a Serial Bit Stream.
- The Transmission of Digital Data.
- Interface at the Physical Layer.
- The Question of Bandwidth.

7. *The Telecommunications Network as a Vehicle for Data Transport:*

- The Public Switched Telecommunication Network.
- Introduction to Digital Networks.
- Brief Overview of Digital Switching.

- Digital Network Structure.
- Digital Network Impairments and Performance Requirements.
- Data Transmission on the Digital Network.
- Interconnects and Bypass.
- Bypass in Economically Evolving Nations.

8. ***The Transmission of Data over the Analog Voice Channel:***

- Background.
- Two-Wire versus Four-Wire Operation.
- Echo and Singing: Telecommunication Network Impairments.
- Amplitude Distortion and Phase Distortion.
- Data Modems.

9. ***Data Communications in the Office Environment, Part 1:***

- Introduction.
- Distinguishing Characteristics of LANs.
- How LAN Protocols Relate to OSI.
- Logical Link Control (LLC).
- Medium Access Control (MAC).
- CSM/CD Current Status and Advanced Operation.
- 100-Mbps CSM/CD Baseband Networks.
- 1000-Mbps CSM/CD Networks.

10. ***Data Communications in the Office Environment, Part 2:***

- Medium Access Control Token-Passing Schemes.
- Repeaters, Bridges, Routers, and Hubs.
- LAN Bridges - Overview.
- Hubs and Switching Hubs.
- Routers.
- Virtual Local Area Networks (VLANs).
- Servers and Intranets.

11. ***Wide Area Networks (WANs):***

- Background and Scope.
- Basic Approaches.
- Packet Networks for Data Communication.
- Transmission Control Protocol / Internet Protocol (TCP/IP).
- User Datagram Protocol (UDP).
- The CLNP Protocol Based on ISO 8473.
- Networking via VSATs.
- Hypothetical Reference Connections for Public Synchronous Data Networks.

12. ***Frame Relay:***

- How Can Networks Be Speeded Up?
- Introduction to Frame Relay.
- DL-CORE Parameters.
- Traffic and Billing on Frame Relay.
- PVCs and SVCs.
- Two Types of Interfaces: UNI and NNI.
- Congestion Control: A Discussion.
- Flow Control and Possible Applications of FECN and BECN Bits.
- Policing a Frame Relay Network.
- Quality of Service Parameters.
- Network Responsibilities.
- Frame Relay Signaling Functions.
- Compatibility Issues.

13. ***Integrated Services Digital Networks (ISDNs):***

- Introduction.
- ISDN Structures.
- User Access and Interface.
- ISDN Protocols and Protocol Issues.
- ISDN Networks.
- ISDN Protocol Structures.

- Overview of Layer 2 Interface: Link Access Procedure for the D Channel (LAPD).
- Overview of Layer 3.
- ISDN Packet Mode Review.

References:

1. ***Practical Data Communications,*** Second Edition, Roger L. Freeman, 2001.