CO - DATA COMMUNICATION & COMPUTER NETWORKS

Teaching Schedule Per Week			Progressive Assesment		Examination Schedule (Marks)		
Lectures	Practical	Tutorials	Test	TW	Theory	Practical Exam	Total
3	2	-	25	25	75	-----	125

UNIT I: Fundamentals of Data Communication **(15 Marks)**

1.1 Introduction
1.2 Communication systems
1.3 Signal and data
1.4 Channel characteristics-channel noise
1.5 Channel bandwidth
1.6 Channel data transmission rate (bit rate), channel capacity, transmission time, propagation time, throughput, channel utilization.
1.7 Communication modes - Simplex, half duplex and full duplex.
1.8 Data Transmission- Parallel transmission & Serial transmission
1.9 Data Transmission modes - Synchronous & Asynchronous transmission.
1.10 **Transmission media**:
  1.10.1 Guided media (Twisted pair, Co-axial cable, Optical fiber),
  1.10.2 Unguided media(Radio,VHF, microwave-satellite),Infrared transmission,Cell-phones.
  1.10.3 Fibre optics communication: Components (Source, Channel Detector).

UNIT 2: Data Modems **(15 Marks)**

2.1 Concept of Modulation
2.2 Analog data, Analog Signal
  2.2.1 Amplitude Modulation, Frequency Modulation, Phase Modulation
2.3 Analog data, Digital signal
  2.3.1 Pulse Code Modulation (PCM)
2.4 Digital data, Analog Signal / Modem Modulation Techniques
  2.4.1 Amplitude Shift Keying, Frequency Shift & Phase Shift Keying
2.5 Digital data, Digital Signal / Encoding Techniques and CODEC.
  2.5.1 Unipolar, Polar, Bipolar
2.6 Classification of Modems
2.7 Standards and Protocols
2.8 Protocols used by modem to transfer files
2.9 Establishing a connection.

UNIT 3: Networking Fundamentals **(15 Marks)**

3.1 An overview of networking
3.2 Switching techniques:
  3.2.1 Circuit Switching & Packet switching
3.3 Datagram, Virtual circuit & Permanent Virtual Circuit
3.4 Connectionless & connection oriented communication
3.5 Message switching
3.6 Cell switching (ATM)
3.7 Network Topologies:
  3.7.1 Bus topology: Examples bus: Ethernet, Local Talk
  3.7.2 Ring topologies, Examples: IBM Token Ring, FDDI(Fiber Distributed Data Interface)
  3.7.3 Star topologies, Example of Star: ATM (Asynchronous Transmission Mode)

UNIT 4: OSI Model, TCP/IP Suite & Data link protocols (15 Marks)

4.1 Network architectures
- 4.1.1 Layering the communication process
- 4.1.2 The need for layered solutions
- 4.1.3 Open system Interconnection (OSI) model
- 4.1.4 TCP/IP Protocol
  - 4.1.4.1 Data transmission by TCP and Ethernet
  - 4.1.4.2 Data Encapsulation
  - 4.1.4.3 Data routing.
- 4.1.5 Internet Architecture and Protocol overview.

4.2 **Data Link Protocol**
- 4.2.1 Protocol
- 4.2.2 Transmission Control Procedure
  - 4.2.2.1 Synchronous protocols
  - 4.2.2.2 Asynchronous Data Link Control (DLC) Protocols
- 4.2.3 Character Oriented Protocols (COP)
  - 4.2.3.1 Binary synchronous Protocol (Bisync or BSC)
- 4.2.4 Bit Oriented Protocols (BOP)
  - 4.2.4.1 X25 CCITT Standard for packet data transmission
- 4.2.5 Synchronous Data Link Control Protocol (SDLC)
- 4.2.6 High level Data Control Protocol (HDLC)

UNIT 5:

5. Local Area Network (LAN) & Wide Area Network (WAN) (15 Marks)

5.1 Base band versus Broadband

5.2 Media access control - Aloha & Slotted Aloha, CSMA, CSMA/CA, CSMA/CD

5.3 LAN hardware, LAN operating systems

5.4 Transmission Media,
- 5.4.1 Implementing LAN
  - 5.4.1.1 Implementing of LAN using twisted pair, Fiber optic, Wireless technology
- 5.4.2 Fast LAN
- 5.4.3 Non-standard LANs.
- 5.4.4 Extending LAN
  - 5.4.4.1 Fiber optic extension
  - 5.4.4.2 Repeaters, Bridges, Routers, Gateways Switching hubs, Virtual LANs

5.5 Network using WAN and network services
- 5.5.1 Host to Terminal connection
- 5.5.2 LAN to LAN Connections
- 5.5.3 Remote LAN Connection
- 5.5.4 LAN to LAN Connection

5.6 Router Concepts:
- 5.6.1 Forwarding Function & Filtering Function

5.7 Routing method (Static and dynamic routing)
- 5.7.1 Local routing: ARP (Address Resolution Protocol) Table
- 5.7.2 Distributed routing
- 5.7.3 Hierarchical Routing Distance-Vector Protocol, Link-State Protocol
- 5.7.4 Communication Protocols over WAN.

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Text Books:

1. **Rajneesh Agrawal and Bharat Tiwari - "Data comm and Computer Networks".**