**ICT 2156: PRINCIPLES OF DATA COMMUNICATION [3 1 0 4]**

**Objectives:**

* To understand basics of data communication
* To understand error detection and correction techniques
* To understand data link layer protocols
* To understand the performance of media access protocols

**Abstract:**

Introduction to Data Communication, Signals, Basic properties of data communication system, Nyquist rate, Shannon Capacity, Signal encoding and Tx and Rx models, Modulation schemes. Properties of Media and digital transmission systems, wired and wireless medium, Error detection and correction, Block codes, CRC, Hamming code, Stop and wait flow control, Sliding window flow control, ARQs, HDLC, Multiplexing, Media Access Sublayer and LAN, Approaches to sharing transmission medium, Random access protocols, Token passing protocols, IEEE LAN standards, Bridges, MAN, FDDI.

**Syllabus:**

**Data Communication fundamentals:** Introduction to Data Communication, Signals, Digital representation of information, Basic properties of data communication system, Time and frequency domain characterization of communication channels, Nyquist signaling rate, Shannon Channel capacity, Line coding-NRZ, bipolar, Manchester, Differential Manchester encoding, Modems and digital modulation- ASK, FSK, PSK, QAM.                                                                  [**14 hours]**

**Properties of Media and Digital Transmission Systems:** Twisted pair, Coaxial cable, Optical fiber, Wireless transmission. **[04 hours]**

**Error detection and correction:** Asynchronous and synchronous transmission, Error detection and correction basics, Parity check, Internet checksum, Polynomial codes, Block codes, Hamming code.                                                    [**08 hours]**

**Peer to Peer Protocols:** Peer to peer protocols and service models, ARQ protocols- Stop and wait, Go back N, selective repeat, Transmission efficiency of ARQ protocols, Other adaptation functions- Sliding window flow control, Timing recovery for synchronous services, Reliable stream service, Data link control- HDLC datalink control, point to point control. Multiplexing-FDM, TDM, STDM.                                                                  [**14 hours]**

**Media Access sublayer and LAN**: Introduction to layered architecture, Protocols, Approaches to sharing transmission Medium, Random Access Protocols, Token Passing protocols, IEEE LAN standards, Bridges, MAN[IEEE802.6], FDDI.       **[08 hours]**

**Course Outcome**

The students will be able to

* Apply the concepts of data communication system to calculate channel capacity.
* Analyse different encoding and modultaion schemes.
* Compute frame check sequence and error correction codes.
* Analyse flow and error control protocols
* Compute the performance of media access protocols

**References:**

1. Stallings W., *Data & Computer Communications* *(9e),* Pearson Education Inc., Noida, 2017.
2. Frozen B.,  *Introduction to data communication & networking* *(4e),* Tata McGraw Hill, New Delhi-2014.
3. Garcia A. L., Widjaja I., *Communication Networks (2e),* Tata McGraw Hill, 2011.