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| **Course-24 Title: Data Communication and Engineering** |  |
| **Course No.: CCE 211- Credit : 3 Contact Hours: 3** | **Total Marks: 100** |

**11.1 Rationale:**

A computer communication engineer needs to know the communication model, different network layer, transmission medium and technique to fulfill his CSE degree.

**11.2 Objectives:**

1. Build an understanding of the fundamental concepts of Data communication.
2. Learn how computer network hardware and software operate
3. Investigate the fundamental issues driving network design
4. Learn about dominant network technologies

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| **11.3**  **Learning Outcomes** | **11.4**  **Course Content** | **11.5**  **Teaching learning Strategy** | **11.6 Assessment Strategy** |
| **Discuss** Communication model, task, network  standards and organizations  Draw Protocol architecture  Discuss different protocol layer | **Introduction:** Communication model, data communication tasks, data communication network standards and organizations. Protocol architecture, communications between layers, peer to peer communication between remote layers, service access points, service primitives and communication between adjacent layers, encapsulation of PDUs, addition of headers on transmission; removal on reception, segmentation & reassembly by protocol layers. | Lecture | Essay  Short Question |
| **Define Physical layer**  **Illustrate Analog and digital data transmission technique, channel capacity** | **Physical Layer:**  Analog and digital data transmission, spectrum and bandwidth, transmission impairments, data rate and channel capacity. | Lecture  Exercise | Essay  Short Question |
| Discuss and characterize different transmission medium Different | **Transmission Medium:** Characteristics and applications of various types of guided medium. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question  Assignment |
| Explain Different wireless transmission technique,  Compute path loss  Distinguish slow and fast fading  Define inter symbol interference and VSAT | **Wireless Transmission:** Characteristics and applications of wireless transmission-terrestrial and satellite microwave, radio waves, propagation mechanism, free space propagation, land propagation, path loss, slow fading, fast fading, delay spread, inter symbol interference, VSAT. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question |
| Discuss various Digital transmission technique | **Digital transmission:** Line coding techniques NRZ, RZ, Manchester, and differential Manchester encoding, AMI, Block coding, analog to digital conversion based on PCM, delta modulation, etc. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question |
|  | **Analog transmission:** ASK, FSK, PSK, QPSK, QAM encodings, AM, PM,FM, etc. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question  Assignment |
|  | **Data Transmission:** Synchronous and asynchronous data transmission techniques. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question |
|  | **Multiplexing:** FDM, international FDM carrier standards, synchronous TDM, international TDM carrier standards, statistical time division multiplexing | Lecture  Exercise  Assignment | Essay  Quiz  Short Question  Assignment |
|  | **Spread Spectrum:** Frequency hopping spread spectrum, direct sequence spread spectrum, code division multiple access. | Lecture | Short Question  Essay |
|  | **Data Link Layer:** Error Detection and Correction; parity check, CRC, forward error correction technique, linear block code, hamming code, etc. | Lecture  Exercise | Short Question  Essay |
|  | **Data Link Control:** Line configurations, flow control and error control techniques- sliding window, stop and wait ARQ, selective reject ARQ and HDLC protocols. | Lecture  Exercise  Assignment | Essay  Quiz  Short Question  Assignment |

**RECOMMENDED BOOKS AND PERIODICALS**

**Text Books**:

1. William Stallings : Data and Computer Communication
2. Hajkins : Data Communication
3. Taub : Data Communication

4. Behrouz A. Forouzan : Data Communications and networking.