TELECOMMUNICATION AND SWITCHING NETWORKS

Course Objectives

- To introduce the basic concepts of telecommunication systems and networks.
- To understand telephone networks, switching techniques, and signaling systems.
- To learn the fundamentals of telecommunication traffic engineering.
- To familiarize students with emerging communication technologies and next-generation networks.

Module I (6 Hours)

Introduction to Telecommunication: Evolution of Telecommunication, Elements of Telecommunication Systems, Telecommunication Standards, Types of Telephone Switching Systems, PSTN, Modern Telecommunication Networks, Telephone Network Organization, Telephone Numbering Plan, Next Generation Networks (NGN), VoIP and IP Telephony.

Module II (6 Hours)

Telephone Systems and Transmission: Telephone Set, Central Battery System, Transmission Impairments, Two-Wire and Four-Wire Transmission, Subscriber Loop Design, Introduction to Optical Fiber Communication, Fiber-to-the-Home (FTTH) and Broadband Access Networks.

Module III (6 Hours)

Telecommunication Traffic and Switching: Telecommunication Traffic, Erlang Concept, Grade of Service (GoS), Traffic Measurement, Circuit Switching, Message Switching, Packet Switching, Multiplexing Techniques (FDM and TDM), Packet-Based Communication and Internet Telephony.

Module IV (6 Hours)

Switching Networks and Telephone Exchanges: Electronic Switching Systems, Stored Program Control (SPC), Space Switching, Time Switching, Hybrid Switching, Digital Telephone Exchanges, Introduction to C-DOT Exchange, Software Defined Networking (SDN) and Network Function Virtualization (NFV) Concepts.

Module V (6 Hours)

Signaling and Modern Communication Networks: Signaling Concepts, Channel Associated Signaling (CAS), Common Channel Signaling (CCS), SS7 Overview, Network Topologies, LAN Concepts, Evolution towards ISDN, Basics of LTE/4G, 5G Networks, Internet of Things (IoT), and Smart Communication Systems.

Course Outcomes

After successful completion of the course, students will be able to:

CO1: Explain the fundamentals of telecommunication systems and network organization.
CO2: Describe transmission systems and subscriber access technologies.
CO3: Analyze telecommunication traffic and switching techniques.
CO4: Explain the operation of switching systems, digital exchanges, and signaling methods.
CO5: Understand modern telecommunication technologies including VoIP, SDN, NFV, IoT, and 5G networks.

Text Books

1. J. E. Flood, Telecommunication and Switching, Traffic & Networks, Pearson Education
2. Thiagarajan Viswanathan, Telecommunication Switching Systems & Networks, PHI

Supplementary Reading

1. John G. van Bose and Fabrizio u devetak, 1. Signaling in Telecommunication Networks, Wiley interscience
2. Roger L. Freeman, elecommunication System Engineering, John Wiley & Sons