69421 TELECOMMUNICATION FUNDAMENTALS T P C
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AIMS

- To able to understand the basic telephony
- To able to understand the Cellular Mobile Phone system
- To able to understand the Local and Long distance communication systems
- To able to understand the Image communications
- To able to understand the Transmission media and gateway
- To able to understand the Telephone switching systems
- To able to understand the concept of VoIP
- To able to understand the concept of telephone and telegraph system
- To able to understand the telecommunication standardizations
- To able to understand the OSI Model
- To able to understand the concept of BTRC

SHORT DESCRIPTION

- Basic Telephony (1G, 2G, 3G, 4G,LTE And UMTS)
- Wireless and Cellular/Mobile Radio
- Wi-MAX, Wi-Fi, VOIP, PCS
- Local and Long-Distance Communications
- Image Communications
- Transmission Media , Media Gateway Control Protocol
- Telephone switching
- Voice over Internet Protocol (VoIP) and VoIP Gateway
- Telephony and Telegraph system, (NWD, ISD and PSTN)
- Telecommunication standardization organization
- OSI Model
- Bangladesh Telecommunication Regulatory Commission , function , Acts, mission and vision of BTRC

DETAIL DESCRIPTION

1. Introductory of Telephony
   - 1.1 Define telecommunication system.
   - 1.2 Describe the history of telecommunication.
   - 1.3 Describe the Evolution of telecommunication and their frequencies (1G, 2G, 3G, 4G, LTE And UMTS).
   - 1.4 Define telecommunication networks.
   - 1.5 Describe the Simple Telephone Connection
   - 1.6 Define the terminology of telecommunication.
   - 1.7 Describe the mode of communication (Simplex, Half-Duplex-, and Full Duplex)
   - 1.8 Explain: One-Way and Two-Way and hybrid Circuits
   - 1.9 Describe the types of Telecommunication Networks

2. Wireless and Cellular / Mobile Radio
   - 2.1 Define Wireless and Cellular/Mobile Radio
   - 2.2 Describe the Scope and objectives of Wireless and Cellular/Mobile Radio
   - 2.3 Describe the Cellular Radio and frequency reuse system
   - 2.4 Explain the Wi-Fi, and Wi-MAX and two way radio system
   - 2.5 State Personal Communication Systems (PCS)
   - 2.6 Explain Paging Systems
   - 2.7 Describe Microwave communication and its application.

3. Local and Long-Distance Communications
   - 3.1 Define LAN, MAN, WAN
   - 3.2 Define PSTN
   - 3.3 Explain Crosstalk
   - 3.4 Describe the model of PSTN
   - 3.5 Mention the affects of local area networks design.
   - 3.6 Mention the steps of Long-Distance networks design.
   - 3.7 Explain the telephone Numbering plan

4. Image Communications
    4.1 Describe the background and objectives of image communication
    4.2 Define composite signal.
    4.3 Mention the factors of transmitting images
    4.4 Explain the Evolution of Community Antenna Television (CATV)
    4.5 Describe quality of service for voice, data and Image
    4.6 Define Signal to Noise Ratio (SNR)
    4.7 Explain the basic impairments found in all telecommunication transmission systems

5. Transmission Media.
    5.1 Define the term transmission media.
    5.2 Define radio system and radio transmission system.
    5.3 Describe the types of common transmission media
    5.4 Describe the characteristics of transmission media.
    5.5 Explain twisted pair cable, co-axial cable, heliex cable, optical fiber cable.
    5.6 Describe the basic principle of radio system.
    5.7 Describe the basic concept of optical fiber communication system.
    5.8 Describe the factors influencing the choice of transmission media.
    5.9 Explain the basic idea of satellite communication system.
    5.10 Explain Very Small Aperture Terminal (VSAT)
    5.11 State the function of Mouthpiece or Transmitter
    5.12 Describe the function of Telephone Earpiece or Receiver
    5.13 Explain Advanced Broadband Digital Transport (Submarine cable communication, SONET, Synchronous Digital Hierarchy-SDH)

6. Telephone switching
    6.1 Define the telephone switching
    6.2 Define analog and digital switching
    6.3 Describe the essential functions of a Switch
    6.4 Describe different types of Telephone Switching System
        a) PABX b) Crossbar switch
        c) ACDs d) Call Centers
    6.5 Explain the principle of Circuit Switching System
    6.6 Explain the principle of Packet Switching System
    6.7 Define Degeneration, Availability, and Grading

7. Voice over Internet Protocol
    7.1 Describe the Voice over Internet Protocol (VoIP)
    7.2 Describe the Analog voice and VoIP
    7.3 Describe the Data Transmission versus Conventional Telephony
    7.4 Describe the Drawbacks and Challenges for Transmitting Voice on Data Packets
    7.5 Define VoIP Gateway
    7.6 Define Media Gateway Control Protocol (MGCP)
    7.7 Explain the Fax over IP network
    7.8 Explain the evolving toward ATM

8. Telephony and Telegraph system
    8.1 Describe the basic operating principle of Telephone
    8.2 Explain the simple telephone connection block diagram
    8.3 Describe several types of telephone apparatus
    8.3 Explain NWD and ISD system of dialing
    8.4 Describe pulse and dial tone multi frequency dialing system.
    8.5 Mention the elements of PSTN.
    8.6 Explain the principle of telegraph system
    8.7 Define the terms baud and WPH
    8.8 Explain the Telex network

9. Telecommunication standardization organization
    9.1 Describe the functions of standardization organization
    9.2 Mention the different types of telecommunication standard

9.3 Describe the standardization organization and function of the ITU
9.4 Explain the function of ANSI and IEC
9.5 Describe the IEEE-802 project group
9.6 Mention the role of ISO, ETA and Bell Laboratories.

10. Understand the Concept of OSI (Open System Interconnection) model & TCP/IP.
    10.1 Define the OSI (Open System Interconnection) model.
    10.2 Describe the OSI layer architecture.
    10.3 Describe the importance of OSI model.
    10.4 Mention the Difference between TCP/IP and OSI model.
    10.5 Explain Network Devices to each layer of the OSI model.

11. Bangladesh Telecommunication Regulatory Commission
    11.1 Describe the historical background of BTRC
    11.2 Explain the function of BTRC
    11.3 Describe the mission and vision of BTRC
    11.4 Describe the Telecommunication Act 2001
    11.5 Describe the Amendment (2010 or latest amendment) of Telecommunication Act 2001
    11.6 Describe the ICT policy of BTRC
    11.7 Explain the Telecommunication frequency distribution of BTRC

PRACTICAL

1. Observe and demonstrate the construction and operation of cordless telephone set.
2. Observe and demonstrate the construction and operation of PSTN.
3. Practice on audio and video conferencing.
4. Observe and demonstrate the operation of FM Transmitter.
5. Practice on File sharing both PC to PC and PC to Smart Phone.
6. Practice on LAN operations by file sharing both PC.
7. Practice on Upload and download the document and also observe both speed by using speed tracker.
8. Practice on the various types of tone generation circuits used in automatic telephone set.
9. Observe and demonstrate the construction and operation of telephone relays and different selector switches.
10. Observe and demonstrate the construction of different types of communication media.
11. Observe and demonstrate the construction and operation of different types of microphone, loudspeaker and public address system.

Reference Books:

1. Fundamentals of Telecommunications -Roger L. Freeman
2. Telecommunication System Engineering -Fourth Edition, Roger L. Freeman
3. Fundamentals of Telecommunications -Khaled M. Fuad Elsayed
4. Introduction of Telecommunication -1st ed., Prentice Hall, Rosengrant M.
5. Introduction to Telecommunications Converging Technologies- 1st ed., McGraw-Hill, Massey, Kimberley, Baran, Stanley J.
6. Communication system-3rd edd, Oxford University Press , B.P Lathi.
7. Communication Engineering Fundamental-3rded , Samad M. A.
8. www.btrc.gov.bd