

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)



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Scheme of Examination

Second Semester –M.Tech. (Digital Communication)

| S.No. | Subject Code | Subject Name | Periods per week | | | Credits | Maximum marks (Theory Slot) | | | Maximum Marks (Practical Slot) | | Total Marks |
|-------|--------------|---|------------------|---|----|---------|-----------------------------|-------------|------------------|--------------------------------|---|-------------|
| | | | L | T | P | | End Sem. Exam | Tests (Two) | Assignments/Quiz | End Sem. Practical / Viva | Practical Record/assignment/Quiz/Presentation | |
| 1. | MEDC-201 | Advanced Optical Communication | 3 | 1 | - | 4 | 70 | 20 | 10 | - | - | 100 |
| 2. | MEDC-202 | Wireless Communications and Networks | 3 | 1 | - | 4 | 70 | 20 | 10 | - | - | 100 |
| 3. | MEDC-203 | Advanced Data Communications | 3 | 1 | - | 4 | 70 | 20 | 10 | - | - | 100 |
| 4. | MEDC-204 | Telecommunication Switching & Networks | 3 | 1 | - | 4 | 70 | 20 | 10 | - | - | 100 |
| 5. | MEDC-205 | Cellular And Mobile Communications | 3 | 1 | - | 4 | 70 | 20 | 10 | - | - | 100 |
| 6. | MEDC-206 | Lab -1 : Modeling & Simulation Lab | - | - | 6 | 6 | - | - | - | 90 | 60 | 150 |
| 7. | MEDC-207 | Lab -2 : Simulation in MATLAB Environment | - | - | 6 | 6 | - | - | - | 90 | 60 | 150 |
| | | Total | 15 | 5 | 12 | 32 | 350 | 100 | 50 | 180 | 120 | 800 |

L: Lecture- T: Tutorial- P: Practical

w.e.f. July- 2014

MEDC-201 Advanced Optical Communication

Unit 1 : Introduction To Optical Communication And Fiber Characteristics

Evolution of Light wave systems, System components, Optical fibers - Step Index & Graded index - Mode theory, Fiber modes – Dispersion in fibers, Limitations due to dispersion - Dispersion shifted and dispersion flattened fibers - Fiber Losses - Non-linear effects

Unit 2 : Optical Transmitters

Basic concepts - LED's structures - Spectral Distribution - Semiconductor lasers - Structures – Threshold conditions - SLM and STM operation - Transmitter design.

Unit 3 : Optical Detectors And Amplifiers

Basic Concepts - PIN and APD diodes structures, Photo detector Noise, Receiver design. Amplifiers: Basic concepts - Semiconductor optical amplifiers; Raman - and Brillouin amplifiers - Erbium-doped fiber amplifiers, pumping requirements, cascaded in-line amplifiers.

Unit 4 : Coherent Lightwave Systems

Homodyne and heterodyne detectors - Modulation formats - Demodulation schemes - BER in synchronous receivers - Sensitivity degradation – Post - and pre compensation techniques - Optical solitons - Soliton based communication system.

Unit 5 : Multichannel Systems

WDM systems, Multiple access networks - WDM Components - Hetero wavelength linear crosstalk and homo wavelength Linear Crosstalk – TDM, Channel multiplexing and demultiplexing - Code-division multiplexing.

Reference Books

1. G.P.Agrawal, "Fiber Optic Communication Systems", 3rd Edition, John Wiley & Sons, New York, 2002.
2. G. Keiser, "Optical Fiber Communication Systems", McGraw Hill, New York 2000.
3. Franz & Jain, "Optical Communication, System and Components", Narosa Publications, New Delhi 2000.
4. Djafar K. Mynbaev Lowell and Scheiner, "Fiber Optic Communication Technology", Pearson Education Asia, 2001.

MEDC-202 Wireless Communications and Networks

Unit No I ; Wireless Communications Systems & fundamentals:

Introduction to Wireless Communications Systems, examples, comparisons & trends, Cellular concepts -frequency reuse, strategies, Interference & System capacity, Trucking & grade of service, Improving coverage & capacity in Cellular Systems.

Unit No II : Multiple access techniques for Wireless Communication:

FDMA, TDMA, SSMA, (FHMA/CDMA / Hybrid techniques), SDMA technique (as applicable to Wireless Communications), Packet radio access-protocols, CSMA protocols, Reservation protocols, Capture effect in packet radio, Capacity of Cellular Systems.

Unit No III :Wireless Networking:

Introduction, differences in wireless & fixed telephone networks, Traffic routing in Wireless Networks, Circuit switching, Packet switching, X.25 protocol, Wireless & Mobile data services: Cellular Digital Packet Data (CDPD), Data oriented CDPD Network advanced radio data information systems, RAM Mobile Data (RMD), Common Channel Signaling (CCS), Signaling System no.7 (SS7)-protocols, ISDN, Broad band ISDN and ATM Network services part, user part, Signaling traffic, services & performance. GPRS and higher data rates, Short Messaging Service in GSM, Mobile application protocol.

Unit No IV : Mobile IP and Wireless Application Protocol:

Mobile IP operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, Wireless transaction, Wireless datagram protocol.

Unit No V : Wireless LAN:

Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 Physical layer. Adhoc Wireless Networks- Cellular and Adhoc Wireless Networks, Applications, MAC protocols, Routing, Multicasting, Transport layer protocols, Quality of service browsing, Adhoc Wireless Internet

Reference Books

1. Wireless Communication and Networking - Williams Stallings, 2003 PHI.
2. Wireless Communication, Principles- Theodore, S Rappaport 2nd Edn, 2002, PHI
3. Principles of Wireless Networks – KavehPah Laven and P.KrishnaMurthy, 2002, PE Reference books:
 1. Wireless Digital Communications - Kamilo Fecher, 1990, PHI.
 2. Telecommunication System Engineering – Roger I.Freeman, 4/ed, Wiley-Interscience, Jhon Wiley & Sons, 2004

MEDC-203 Advanced Data Communications

Unit-I: Digital Modulation:

Introduction, Information Capacity Bits, Bit Rate, Baud, and M-ARY Coding, ASK, FSK, PSK, QAM, BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

Unit -II: Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication- Components, Networks, Distributed Processing, Network Criteria- Applications, Protocols and Standards, Standards Organizations- Regulatory Agencies, Line Configuration- Point-to-point- Multipoint, Topology- Mesh- Star- Tree- Bus- Ring- Hybrid Topologies, Transmission Modes- Simplex- Half duplex- Full Duplex, Categories of Networks- LAN, MAN, WAN and Internetworking, Digital Data Transmission- Parallel and Serial, DTE- DCE Interface- Data Terminal Equipment, Data Circuit-Terminating Equipment, Standards EIA 232 Interface, Other Interface Standards, Modems- Transmission Rates.

Unit-III: Error Detection and Correction:

Types of Errors- Single- Bit Error, CRC (Cyclic Redundancy Check)- Performance, Checksum, Error Correction- Single-Bit Error Correction, Hamming Code. Data link Control: Stop and Wait, Sliding Window Protocols. Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocol- Binary Synchronous Communication (BSC) - BSC Frames- Data Transparency, Bit Oriented Protocols – HDLC, Link Access Protocols.

Unit-IV: Switching:

Circuit Switching- Space Division Switches- Time Division Switches- TDM Bus- Space and Time Division Switching Combinations- Public Switched Telephone Network, Packet Switching- Datagram Approach- Virtual Circuit Approach- Circuit Switched Connection Versus Virtual Circuit Connection, Message Switching. Multiplexing: Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing, Digital Hierarchy, Statistical Time Division Multiplexing.

Unit-V: Multiple Access:

Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Detection (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization- Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), - Code - Division Multiple Access (CDMA).

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 3rd ed., 2008, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5 ed., 2008, PEI.
3. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
4. Data and Computer Communications - William Stallings, 8th ed., 2007, PHI.
5. Data Communication and Tele Processing Systems - T. Housely, 2nd Edition, 2008, BSP.
6. Data Communications and Computer Networks- Brijendra Singh, 2nd ed., 2005, PHI.
5. Telecommunication System Engineering – Roger L. Freeman, 4/ed., Wiley-Interscience, John Wiley & Sons, 2004.

MEDC-204 Telecommunication Switching & Networks

Unit-I Resource sharing and need for switching;

Circuit switching, Store and forward switching, Packet switching, electronic space division switching, Need for networks, Two stage networks, Three stage networks and n-stage networks.

Unit-II Time division switching:

Time switching, space switching, Three stage combination switching, n-stage combination switching; Traffic engineering: Hybrid switching, Two/Four wire transmission, Erlang formula and signaling.

Unit-III High speed digital access:

DSL technology, Cable Modem, SONET.

Unit-IV Local area networks:

Traditional ETHERNET, fast ETHERNET, Gigabit ETHERNET, Wireless LAN, Bluetooth, Connecting LAN's, Backbone networks.

Unit-V Integrated Services Digital Network:

Network & protocol architecture, user network interfaces, signaling, inter networking, ISDN standards, expert systems in ISDN, Broadband ISDN.

Reference Books

1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, Prentice Hall, New Delhi, 2001.
2. Data Communications and Networking- B.A. Forouzan, Tata McGrawhill, Third Edn., 2004.

MEDC-205 Cellular and Mobile Communication

Unit -1 : Wireless Communications :

Introduction to wireless communications , examples of wireless communication system , the Cellular concept and system design fundamentals , Frequency reuse, Channel assignment strategies , Handoff strategies , Interference and system capacity , Trunk and grade services , Methods for improving coverage and capacity in cellular system .

Unit-2: Multiple Access Techniques :

Multiple access techniques for wireless communications FDMA , TDMA , Spread spectrum techniques , SDMA , Packet Radio , CSMA , Capacity of cellular CDMA with multiple cells and capacity of SDMA.

Unit-3: Wireless Systems And Standards:

AMPS , IS-94, GSM traffic, Examples of GSM cell , Frame structure of GSM cell, details of forward and reverse CDMA channels.

Unit-4: Personal Access Communication Systems:

Personal Mobile satellite communications, Integrating GEO, LEO, MEO Satellite and terrestrial mobile systems , Rake receiver and Advanced Rake receiver,

Unit-5: Mobile Radio propagation :

Large scale path loss , Reflection , Diffraction , Scattering , Outdoor and Indoor propagation models , Small signal fading and multi path , measurement of small scale path loss , parameters of multi path channels , fading due to multi path , fading effect due to Doppler spread , small scale fading models , equalization , Diversity .

Reference Books

- 1.Wireless Communications Principles and Practice , Second Edition , THEODORE S.REPPAPORT .
- 2.Wireless Digital Communications , DR. KAMILO FEHER .
- 3.Electronic Communication system , WAYNE TOMASI.
- 4.Wireless Communications , SANJY SHARMA.