ECC-601

OPTICAL COMMUNICATION

Unit-I

Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems. Optical fibers: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.

Unit-II

Optical sources: Light emitting diodes (LED): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. Power launching and coupling: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.

Unit-III

Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise. Signal degradation in optical fibers: Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.

Unit-IV

Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. Digital links: point to point links, link power budget, rise time budget, power penalties. Analog links: overview of analog links, carrier to noise ratio, multi channel transmission techniques.

Unit-V

Optical technologies Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators. Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification

mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. Performance Measurement and monitoring: measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring.

References: 1. Keiser: Optical Fiber Communications, TMH.

2. Senior: Optical Fiber Communication- Principles and Practices, Pearson Education.

3. Agarwal: Fiber Optic Communication Systems, Wiley India.

4. Palais: Fiber Optics Communications, Pearson Education.

5. Satish Kumar: Fundamentals of optical Communications, PHI Learning.

6. Khare: Fiber Optics and Optoelectronics, Oxford University Press.

7. Ghatak and Thyagrajan: Fiber Optics and Lasers, Macmillan India Ltd.

8. Gupta: Optoelectronic Devices and Systems, PHI Learning.

9. Sterling: Introduction to Fiber Optics, Cengage Learning.

List of Experiments: 1. Launching of light into the optical fiber and calculate the numerical aperture and V-number.

2. Observing Holograms and their study.

3. Measurement of attenuation loss in an optical fiber.

4. Diffraction using gratings.

5. Construction of Michelson interferometer.

6. Setting up a fiber optic analog link and study of PAM.

7. Setting up a fiber optic digital link and study of TDM and Manchester coding.

8. Measurement of various misalignment losses in an optical fiber.

ECC-602

Microwave Engineering

Unit-I

Microwave Transmission System General representation of EM field in terms of TEM, TE and TM components, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical consideration etc.

Unit-II

Microwave Networks and Component Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, Non reciprocal, loss less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multihole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of non reciprocal devices, properties of ferrites, Isolators and phase shifters.

Unit-III

Microwave Solid State Devices and Application PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation MASER, LASER , Amplifiers, Frequency converters and harmonic generators using varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.

Unit-IV

Microwave Vacuum Tube Devices Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, modefrequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, Π-mode operation Mode separation techniques, Rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.

Unit-V

Microwave Measurements Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometers, bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type). Network Analyzer and its use in measurements.

References:

1. Liao: Microwave Devices and Circuits, Pearson Education.

2. Das: Microwave Engineering, TMH.

3. Rao: Microwave Engineering, PHI Learning.

4. Collins: Foundations of Microwave Engineering, Wiley India.

5. Srivastava and Gupta: Microwave Devices and Circuits, PHI Learning.

6. Reich: Microwave Principles, East West Press.

7. Pozar: Microwave Engineering, Wiley India.

8. Roy and Mitra: Microwave Semiconductor Devices, PHI learning.

List of Experiments:

Following illustrative practical should be simulated with the help of any RF simulation software:- 1. Study the characteristics of Klystron Tube and to determine its electronic tuning range.

2. To determine the frequency and wavelength in a rectangular wave-guide working on TE10 mode.

3. To determine the Standing Wave-Ratio and reflection coefficient.

4. To measure an unknown impedance with Smith Chart.

5. To study the V-I characteristics of Gunn Diode.

6. To study the following characteristics of Gunn Diode. (a) Output power and frequency as a function of voltage. (b) Square wave modulation through PIN diode.

7. Study the function of Magic Tee by measuring the following parameters. (a) Measurement of VSWR at different ports and (b) Measurement of isolation and coupling coefficient.

8. Study the function of Isolator / Circulator by measuring the following parameters. (a) Input VSWR measurement of Isolator / Circulator. (b) Measurement of insertion loss and isolation.

9. Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters. (a) Input VSWR measurement. (b) Measurement of insertion loss and attenuation.

10. Study the function of Multi Hole Directional Coupler by measuring the following parameters. (a) To measure main line and auxiliary line VSWR. (b) To measure the coupling factor and directivity. 1

1. Study of a network analyzer and measurements using it.

ECC-603

Digital Image Processing

Unit-I

Digital Image Processing (DIP) Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. Digital Image Fundamentals: elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

Unit-II

Image Transforms Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.

Unit-III

Image Enhancement Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.

Unit-IV

Image Restoration Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.

Unit-V

Image Compression Fundamentals of data compression: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding. Digital image watermarking, representation and description- minimum perimeter polygons algorithm (MPP).

References: 1. Gonzalez and Woods: Digital Image Processing, Pearson Education.

2. Anil Jain: Fundamentals of Digital Image Processing, PHI Learning.

3. Annadurai: Fundamentals of Digital Image Processing, Pearson Education.

4. Sonka, Hlavac and Boyle: Digital Image Processing and Computer Vision, Cengage Learning.
5. Chanda and Majumder: Digital Image Processing and Analysis, PHI Learning.

6. Jayaraman, Esakkirajan and Veerakumar: Digital Image Processing, TMH.

Elective –III

ECC-604(A) DIGITAL SYSTEM DESIGN

UNIT -1

Principles of combinational logic: Review of Boolean Algebra. Definition of combinational, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3, 4 and 5 variables. Incompletely specified functions (Don't care terms). Simplifying max – term equations.Quine -McClusky minimization technique, Quine – McClusky using don't care terms, Reduced Prime Implicant tables, Map entered variable.

UNIT-2

Analysis and design of Combinational Logic: General approach, Decoders-BCD decoders, Encoders. Digital multiplexers-using multiplexers as Boolean function generators. Adders and Subtractors-Cascading full adders, Look ahead carry, Binary comparators. Design methods of building blocks of combinational logics.

UNIT-3

Sequential Circuits: Basic Bistable element, Latches, SR latch, Application of SR latch, A Switch debouncer. The SR latch, The gated SR latch. The gated D Latch, The Master-Slave Flip-Flops (Pulse-Triggered Flip-Flops): The master-slave SR Flip-Flops, The master-slave JK Flip-Flop, Edge Triggered Flip-flop: The Positive Edge-Triggered D Flip-Flop, Negative-Edge Triggered D Flip-Flop. Characteristic equations, Registers, Counters-Binary Ripple Counter, Synchronous Binary counters, Counters based on Shift Registers, Design of a Synchronous counters, Design of a Synchronous Mod-N counters using clocked JK FlipFlops

UNIT-4

Sequential Design: Introduction, Mealy and Moore models, State machine notation, synchronous sequential circuit analysis and design. Construction of state Diagrams, Counters Design.

UNIT-5

HDL: Introduction, A brief history of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, Simulation and synthesis, Brief comparison of VHDL and Verilog. Data-Flow Descriptions: Highlights of Data flow descriptions, Structure of data-flow description, Data type-vectors.

Text/Reference Books,

1.Digital Logic Applications and Design John M Yarbrough Cengage Learning 2011

2.Digital Principles and Design Donald D Givone McGraw Hill Education 1 st Edition, 2002

3.Logic and computer design Fundamentals M. Morries Mano and Charles Kime Pearson Learning 4 th Edition, 2014

4.Fundamentals of logic design Charles H Roth, JR and Larry L. Kinney Cengage Learning 6th Edition, 2013

5.Fundamentals of Digital Circuits A. Anand Kumar PHI 3rd Edition, 2014

6.Digital Logic Design and VHDL A.A.PhadkeS.M.Deokar Wiley India 1st Edition, 2009

List of practicals:

1)Design and analyze combinational & sequential circuits

2)Design circuits like adder, sub tractor, code converter etc.

3)Understand counters and sequence generators.

4)Circuit Design and Simulation with VHDL Volnei A Pedroni PHI 2nd Edition

ECC-604 (B)
Design for Testability

UNIT- I

Introduction to Testing Process:CMOS Testing, Reliability, Failures & Faults, Levels of Testing, Test economics, Elementary Testing Concepts, System and Field Testing, Burn in boards.

UNIT- II

Logic Simulation & Fault modelling: Delay Models, Event driven simulation, general fault simulation, fault detection and redundancy, fault equivalence and fault dominance. Stuck-at faults, bridging faults, transistor faults, delay faults etc. Fault detection using Boolean Difference, Path Sensitization. Fault Collapsing

UNIT- III

Test generation for combinational & sequential circuits:D-algorithm, PODEM, SPOOF. Automatic Test Pattern Generation. Primitive and Propagation Cubes. Fanout Oriented Test Generation. Controllability and Observability. Testing of sequential circuits as iterative combinational circuits, state table verification, random testing.

UNIT- IV

Design for testability: Ad-hoc methods, Full scan & Partial scan design. Boundary scans. Testability analysis.

UNIT- V

Built-in self-test & IDDQ testing: RAM BIST, Logic BIST Random and weighted random pattern testability BIST Pattern generator and response analyzer Scan-based BIST architecture Test point insertion for improving random testability. IDDQ testing, IDDQ test patterns, IDDQ measurement Case studies, Design for IDDQ testability

TEXT / REFERENCE BOOKS:

- N. Weste and K. Eshraghian, Principles of CMOS VLSI design, Addison-Wesley.
- Parag K. Lala, Fault Tolerant and Fault Testable Hardware Design, BS Publication.

ECC-604 (C)

Radio Frequency Identification

UNIT-1

Characteristics of passive IC components at RF frequencies: Interconnects, resistors, capacitors, inductors and transformers – Transmission lines. Noise – classical two-port noise theory, noise models for active and passive components.

UNIT-2.

High frequency amplifier design: Zeros as bandwidth enhancers, shunt-series amplifier, fTdoublers, neutralization and Unilateralization.

UNIT-3.

Low noise amplifier design and Mixer's: LNA topologies, power constrained noise optimization, linearity and large signal performance Nonlinear systems as linear mixers, multiplier-based mixers, subsampling mixers, diode-ring mixers.

UNIT-4.

RF power amplifiers: Class A, AB, B, C, D, E and F amplifiers, modulation of power amplifiers, design andlinearity considerations

UNIT-5 .

Oscillators & synthesizers: Basic topologies, VCO, describing functions, resonators, negative resistance oscillators,synthesis with static moduli, synthesis with dithering moduli, combination synthesizers –phase noise considerations.

Text Books:

1. Thomas H. Lee, The Design of CMOS Radio-Frequency Integrated Circuits, 2nd ed.,

Cambridge, UK: Cambridge University Press, 2004.

2. BehzadRazavi, RF Microelectronics,2nd Ed., Prentice Hall, 1998.

Reference Books:

1. A.A. Abidi, P.R. Gray, and R.G. Meyer, eds., Integrated Circuits for Wireless

Communications, New York: IEEE Press, 1999.

Elective-IV

ECC-605(A)Global Positioning system

UNIT-1

.Introduction to Geodesy: Definitions and fundamentals of Geodesy,Earth, Geoid and Ellipsoid of rotation,Reference surface, Geodetic systems, IndianGeodetic System, Coordinate systems andtransformation.

UNIT-2.

Introduction to GPS: History: Transit, Timation, NAVSTAR GPS,GLONASS, GALILEO.GPS design objectives and details of segmentsspace, control and user, blocks ofGPS- Block I, II/IIA, IIR Satellites, IIF,Advantages and current limitations of GPS,Status of GPS Surveying, Applications.

UNIT-3

GPS Signal structure: Carriers, GPS codes: C/A, P, navigationalmessage, GPS receiver: Types and Structureof receivers, Principles of GPS position fixing:Pseudo ranging.

UNIT-4.

GPS Orbits:Determination of GPS satellite coordinates, Types of ephemerides, GPS data formats:RINEX, SP3.Satellite geometry based measures: Geometry dependent (Dilution of Precision:DOP), User Equivalent Range Error UERE.

UNIT-5.

GPS errors and accuracy: Satellite dependent: Ephemeris errors andorbit perturbations, Forces on GPS satellites,Effects of orbital bias, Types of satelliteephemerides, Satellite clock bias, Selectiveavailability.Receiver dependent: Receiver clock bias.

References:

1. P. R. Wolf, and C. D. Ghilani, 1997. Adjustment Computations: Statistics and Least Squares in Surveyingand GIS, Publisher: John Wiley & Sons, New York (USA),pages 564.
2. J. V. Sickle, 2001. GPS for Land Surveyors Publisher: Ann Arbor Press, Michigan(USA), pages 284.

3. B. Hofmann-Wellenhof, H. Lichtenegger and J. Collins, 1994. Global Positioning System: Theory and Practice, Publisher: Springer, Berlin (Germany), pages 355.

4. Gunter Seeber, 2003. Satellite Geodesy, Publisher: Walter deGruyter, Berlin (Germany), pages 612.

ECC-605 (B) Computer Networks

Unit I

Computer Networks Introduction, applications, types of networks, network software, reference models- OSI model, TCP/IP model, comparison of OSI and TCP/IP models, example networks. The Physical layer Design Issues, review of data communication concepts (configuration, topology, transmission mode, media guided and unguided, types of switching etc).

Unit II

The Data Link layer Design issues, error detection and correction, data link protocols- stop and wait and sliding window ARQ, utilization of ARQ techniques, example of data link protocol-HDLC. The Medium Access Control Layer Static and dynamic channel allocation, multiple access protocols- Pure and slotted ALOHA, CSMA, Collision free protocols, limited contention protocols, CSMA/CD (ETHERNET), fast Ethernet, Gigabit Ethernet.

Unit III

Wireless Protocols The 802.11, the 802.16, Bluetooth, RFID, Data link layer switching- uses of repeaters, hubs, bridges, switches, routers and gateways. The Network Layer Design Issues, Virtual Circuit and datagram networks, routing algorithms- adaptive and nonadaptive algorithms, congestion control algorithms, quality of service, internetworking, Network layer in the Internet-IPv4 protocol, IP addresses, IPv6 protocol, Internet control protocols, Mobile IP.

Unit IV

The Transport Layer Design issues and services, Transport protocols, congestion control, UDP and TCP protocols, performance issues.

Unit V

The Application Layer The Domain Name System, E-mail, World Wide Web, streaming audio and video, content delivery.

References: 1. Tanenbaum: Computer Networks, Pearson Education.

2. Bertsekas and Gallager: Data Networks, PHI Learning.

3. Black: Computer Networks, PHI Learning.

4. Forouzan: Computer Networks, TMH.

5. Stallings: Computer Networking and Internet Protocol, Pearson Education.

6. Keiser: Local Area Network, TMH.

ECC-605 (C)

Safety & Reliability Engineering

Unit I:

Introduction to reliability and indices: Review of probality theory, Density and distribution function of continuous and discrete random variable.

Unit -II

Component reliability: Hazard function, failure laws, exponential failure law, wear in period and its importance, Safety and reliability, replacement, methods of reliability improvement.

Unit -III

Reliability evaluation: Evaluation of series, parallel, and series–parallel network. Complex network reliability evaluation using event, space, decomposition, tie-set, cut-set and, Satand by system and load sharing system, multi state models.

Unit -IV

Evaluation methods: Markov process, state diagram, availability and unavailability function, Evaluation of time dependent and limiting state probabilities, MTTF calculation. concept of frequency and durations. State enumeration method for evaluating failure frequency, MUT, MDT,frequency balance approach.

Unit -V

Reliability Testing: Estimation of reliability function, failure function and MTTF from grouped and ungrouped datas, censoring and accelerations, parametric methods.

References:

1. Introduction to reliability engineering –E.E.Lewis, John Wiely and Sons, 1987
2. Reliability and maintainability engineering, C.E. Ebeling, TMH, 2006
3. Reliability Engineering : Probability Models and maintanance methods –Joel A.Nochlas,Taylor and Prancis 2005
4. Reliability evaluation of engineering system: concept and techniques-R. Billinton, R.N.Allon, Pitman, 1984

Open Elective

Ecc-606 (A) TCP-IP

Unit-I

Introduction to Network Managements, Network Management Framework, Network Based Managements, Evolution of Network Management: SGMP, CMIP, SNMP. Network Implementation and Management Strategies, Network Management Categories: Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy.

Unit -II

Management Information Base (MIB), Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface(DMI), DMI Architecture, DMI Browser, DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

Unit-III

Introduction, layering, OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARP Packet format, RARP Examples, RARP server design

Unit-IV

Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragmentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation (NAT).

Unit -V

Internet Control Message Protocols (ICMP):- Types of message, message format, error reporting, query, checksum, ICMP Package. IGMP, IGMP Message and its Operation, IGMP Package.Transmission control protocol, Process-to-Process Communication, TCP Services Flow Control, TCP Timers. TCP Operation, TCP Package.. Application layers protocol, Telnet Protocol, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), X-Window system protocol, Remote procedure call, and Network file system.

References:

1. Forouzan, TCP/IP Protocol Suite 4th edition, TMH

2. J.Richard Burkey, Network Management Concept and Practice, PHI

3. Stevens, TCP/IP Illustrated Volume-I, Pearson

4. Tittel: TCP/IP, Cenage Learning

5. Uyless Black, TCP/IP and related protocols, McGraw Hill.

6. Doughals E. Comer, Internetworking with TCP/IP Vol. I, Principles, Protocols, and Architecture, Prentice Hall, India.

ECC-606 (B)
Fuzzy Logic

Unit-I

Fuzzy system introduction, Fuzzy relation, Membership function, Fuzzy matrices and entropy, Fuzzy operation and composition.

Unit-II

Fuzzy Variables, Linguistic variables, measures of fuzziness, concepts of defuzzification, Fuzzy control applications.

Unit-III

Fundamentals of Artificial Neural networks- Biological prototype – Artificial neuron, Activation functions, Single layer and multiplayer networks. Training Artificial neural networks, Preceptrons, Exclusive Or Problem – Linear seperability, Storage efficiency, Preceptron learning, perceptron training algorithms. Back propagation, Training algorithm, network configurations, Network paralysis, Local minima, temporal instability.

Unit-IV

Counter propagation networks, Kohonen layer, Training the kohonen layer, Pre processing the inputted vectors, Initialising the wright vectors, Statistical properties, Training the grosberg layer. Full counter propagation networks, Applications. Statistical methods, Boltzman training, Cauchy training, Artificial specific heat methods, Applications to general non-linear optimization problems. Back propagation and cauchy training.

Unit-V

Hopfield nets, Recurrent networks, Stability, Associative memory, Thermodynamic systems, Statistical Hopfiled networks, Applications. Bi-directional associative memories, Retrieving on stored association, Encoding the associations.

References :

Laurence Fausett, “Fundamentals of Neural Networks”, Prentice Hall. Zmmermann H.J., “Fuzzy Set Theory and its Applications”, Allied Publishers Ltd. Klir G.J., and Folger T., “Fuzzy Sets, Uncertainty and Information”, Prentice Hall. Limin Fu., “Neural Networks in Computer Intelligence”, McGraw Hill. Zuroda J.M., “Introduction to Artificial Neural Systems”, Jaico Publishing. Haykin S., "Artificial Neural Network: A Comprehensive Foundation: Asia Pearso G

ECC-606(C)

Telecommunication Technology Management Processing.

UNIT-1 .

Principlesof telecommunication: Basics of switching system, manual switching system, rotary dial telephone, signaling tones, Strowger switching components, step-by-step switching, design for 100 line, 1000 line, 10,000 line exchange, touch tone dial telephone, cross bar switching and exchange organization. Four wire concept, operation of hybrid, echo suppressors. Centralized and distributed SPC, software architecture, application software.

UNIT-2.

Space Division Switching: Two, three and multistage space division networks, blocking probability calculations using Lee‟s method. Time Division Switching: Basic time division space switching, time division time switching, time multiplexed space switching, time multiplexed time switching. Combination Switching: S-T, T-S, S-T-S, T-S-T and other multistage combination switching.

UNIT -3.

Traffic Engineering: Network traffic load and parameters, GOS and blocking probability, modeling switching systems, incoming traffic and service time characterization, blocking models and loss systems, delay systems.

UNIT-4.

Telephone Networks: Subscriber loop systems, high data rate digital subscriber loop, asymmetric digital subscriber loop, VDSL, transmission plan, transmission systems, numbering plan, charging plan, basics of signaling, In channel signaling, common channel signaling.

UNIT-5.

Data Networks: Data transmission in PSTN, switching techniques for data transmission, OSI reference model, Satellite based data networks, fiber optic networks, protocol stacks, internetworking. ISDN services, transmission channels and user network interface in ISDN, ISDN protocol architecture, ISDN standards, ISDN numbering and addressing. Introduction to the basic principles of frame relay, TCP/IP and ATM.

Text Books:

1. ThiagarajanViswanathan, “Telecommunication Switching Systems and Networks”, PHI Learning, New Delhi, 2008.

2. John C. Bellamy, “Digital Telephony”, John Wiley and Sons, Third edition, 2000.

Reference Book:

3. J.E.Flood, “Telecommunication switching traffic and networks”, Pearson Education Ltd, New