SYLLABUS PRESCRIBED FOR FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING ELECTRONICS & TELECOMMUNICATION SEMESTER PATTERN (CREDIT GRADE SYSTEM)

FIFTH SEMESTER

5XT1/ 5XN 1 ELECTRONIC DEVICES AND CIRCUITS-II

SECTION-A

Unit I: Linear wave shaping using RC and RL circuits, analysis and calculations of RC low pass and high pass filters, analysis of clipping and clamping circuits using diodes and switching transistors.

Unit II: Switching characteristics of semiconductor devices : Diode as switch, transistor as a switch, characteristics and analysis, FET as a switch, characteristics, JFET, CMOS, switching speed of devices : Schottky diode and transistor, Logic gates.

Unit III: Collector coupled bistable, monostable and astable multivibrators, Time base generators & Sweep Generators. Boolean Algebra, Number systems, Gray codes, Arithmetic operations using Two's compliments.

SECTION-B

Unit IV: Study and analysis of Digital Logic Families : RTL, DTL, HTL, TTL, ECL, IIL, CMOS, and their characteristics, tri-state logic,5400/7400 TTL series.

Unit V: Flip-flops: R-S, J-K, Master slave J-K, D-type, T-type; registers and counters, adders and subtractors using logic gates, D/A converters and types: Weighted resister, R-2R ladder. A/ D converters and Types: Ramp, Dual slope, Successive approximation.

Unit VI: Types of semiconductor memories, sequential memories, 2 and 4 phase ratioless shift registers, static shift registers, implementation of ROM (ROM, PROM, EPROM, EEPROM) BJT RAM cell, MOS-RAM, CCD memories.

Books Recommended:

1) Jacob Millman & Herbert Taub : "Pulse Digital & Switching waveforms", McGraw Hill International Book Co.

2) Taub H. and Schillings D.L., London, : "Digital Integrated Electronics", McGraw Hill Company.

3) R. P. Jain : "Modern Digital Electronics", Tata McGraw Hill, New Delhi 1998.

4) Malvino A.P. & Leach D.P. : “Digital Principles &Applications”, TMH Publishing Co., New Delhi (3rd Edition).

5XT2 / 5XN2 POWER ELECTRONICS

SECTION-A

Unit I: SCR, Triac, LASCR, Diac-construction, characteristics, two transistor analogy for turning ON of a SCR, turn ON mechanism, different methods of turning ON of a SCR, turn OFF mechanism, Thyristor firing circuits. Introduction to GTO, power transistor, power MOSFET, IGBT - their construction & characteristics.

Unit II: Series parallel operation of SCRs, static & dynamic equalizing ckts., equalisation of current in parallel connected SCRs, string efficiency, derating factor, Protection of SCRs against di/dt, dv/dt, radio freq., interference, over voltage, over current.

Unit III: Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load, derivation for output voltage and current, effect of free wheeling diode, single phase dual converters. Three phase half controlled bridge and fully controlled bridge rectifier.

SECTION-B

Unit IV: Classification of ckt. for forced commutation, series inverter, improved series inverter, parallel inverter, output voltage and waveform control, principle of operation for three phase bridge inverter in 120 deg. and 180 deg. mode, single phase transistorised bridge inverter, current source inverter, harmonics reduction techniques.

Unit V: Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper ckt., Jones chopper, step-up chopper and AC chopper. Basic principle of cycloconverter, single phase to single phase cycloconverter.

Unit VI: Speed control of DC series motors using chopper, speed control of DC shunt motor using phase controlled rectifiers, Static ckt. breaker, UPS, fan speed regulator, principle of soft start ckts, electronic ballast.

Text Books:

1) M. Ramamoorthy, Thyristor and their application.

2) M. H. Rashid - Power Electronics Circuits, Devices and Application, Pearson Edu.

3) SCR Manual GE.

Reference Books:

1) Joseph Vithayathil, "Power Electronics: Principles and Applications", McGraw-Hill.

2) Ned Mohan, Tore M. Undeland, William P. Robbins, "Power Electronics: Converters, Applications, and Design", Wiley.

3) K. Hari Babu – Power Electronics, Scitech Pub.

4) Devdatta Y. Shingare, A Text book of Industrial & power electronics, Electrotech Pub. Satara.

5) J. S. Katre, Power Electronics, Tech-max Pub. Pune.

5XT3 / 5XN3 CONTROL SYSTEM ENGINEERING

SECTION-A

Unit I: Basic definition; closed and open loop systems; transfer function, block diagrams, derivation of transfer functions of physical systems, signal flow graphs, basic control action.

Unit II: Time Response Analysis: Typical test inputs, Impulse response function, Transient Domain specifications, Analysis of first, second & higher order systems, Steady state analysis: steady state error and error constants, Dynamic error coefficients.

Unit III: 1. Stability Analysis: stability of control system, Routh Hurwitz's stability criterion, 2. Roots Locus: Introduction to Root Locus method; Root Locus plots, Rules for constructing root loci, stability analysis of systems using Root locus, concept of dominant closed loop pole pair, Root contour plots, effect of addition of zeros & poles.

SECTION-B

Unit IV: Introduction of frequency response, Bode plots, stability margins on the Bode plot, stability analysis of systems using Bode plots, polar plots, Nyquist stability criterion, relative stability.

Unit V: State Space representation of systems, conversion of state variable models to transfer functions, conversion of transfer functions to state variable models, solution of state equations, concepts of controllability and observability.

Unit VI: Sample Data Control Systems :Representation of sampled data (Discrete) systems, review of Z-transforms, Sampler and hold ckt., Zero order hold, sampling theorem, Z-transform analysis of sampled data control systems (open & closed loop systems), Z transform of systems. Solution of difference equation by Z-transform methods. Response of discrete systems. Pulse Transform functions of open loop, closed loop systems with different sampler locations. Digital

controller & its transfer functions, Stability analysis of discrete time system using bilinear transformation.

Text Books:

1. Nagrath I. J. and M. Gopal, "Control Systems Engineering", 5th Ed. New Age International.

2. K. Ogata : Modern Control Engineering, Fourth Edition (PHI).

Reference Books:

1) Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", 11th Ed., Pearson Education.

2) M. Gopal : Digital Control Systems Principles & Design (TMH).

3) Norman S. Nise, "Control System Engineering", 5th Edition, Wiley.

4) Bhattarcharya: Control System Engineering, 2nd Edition (Pearson Education).

5XT4 / 5XN4 COMMUNICATION ENGINEERING-II

SECTION-A

Unit I: AM Transmitters :Modulation, need of modulation, AM Modulation, Frequency spectrum, Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison, Details of DSBFC Transmitter, Generation of DSB-SC by using balanced modulators (FET & Diodes), DSB-SC Transmitter, Generation of SSB-SC by filter method, phase-shift method & third method (weavers).

Unit II: AM Receivers : TRF receiver, Super heterodyne receiver, Details of each block such as RF amplifier, mixer oscillator, IF amplifier, Diode detector, Audio Amplifier. Need and type of AGC, selectivity sensitivity, fidelity Image rejection ration, communication receiver, SNR of DSB-FC, DSB-SC & SSB-SC.

Unit III: FM Transmitters : FM Modulation, Frequency Spectrum, Circuits & Analysis for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparison, pre-emphasis and De- emphasis. Stereo FM Transmitter.

SECTION-B

Unit IV: FM Receivers : Details of FM receiver blocks such as R.F. amplifier, local oscillator, IF amplifier, Mixer, Audio Amplifier, AGC, Limiter, FM Discriminator, Single Slope and Balanced slope detector, Analysis of Foster Seeley and ratio detectors, Stereo FM receiver, Noise in FM Reception, FM threshold effect.

Unit V: Pulse Modulation Techniques: The sampling theorem, Sampling of Band-Pass Signal, Linear and Non linear quantization, Aliasing effect, Aperture effect, Reconstruction filter, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Time Modulation, PCM, DM, ADM

Unit VI: Telephone Switching Techniques : Introduction to Switching System, Pulse dialing, Touch tone dial telephone, Space Division Switching SPC, Centralized and Distributed SPC, Time Division Switching : Basic Time Division space switching, Time Division time switching, Time multiplexed space switching, Time Multiplexed time switching, EPABX.

Text Books:

(1) Taub and Schilling D.L. : Principles of Communication Systems, McGraw Hill Co, Tokyo, 1994 (II Ed.).

(2) Kennedy G. : "Electronic Communication System" Tata Mc-Graw Hill Co., New Delhi (Third Edition).

(3) T. Vishwanathan : " Telecommunication Switching systems and Networks", PHI learning Private Ltd., 2009.

Reference Books:

(1) Wayne Tomasi, "Electronic Communication Systems", Pearson Education, third edition.

(2) Simon Haykin : "Communication System, John Wiley and Sons Ltd., New York, (Third Edition), 1994.

(3) B. P. Lathi : " Modern Digital and Analog Communication systems" 4th Edition Oxford University Press.

(4) Hari Bhat: "Analog communication", 2nd Edition Pearson India, 2010.

(5) S. Kundu: " Analog and Digital communication", Pearson India 2010.

FREE ELECTIVE- I

5FEXT5 / 5FEXN5 (1) CONSUMER ELECTRONICS

SECTION-A

Unit I: Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalizers and Mixers, Electronic Music Synthesizers, Commercial Sound, Theater Sound System (8 Lectures)

Unit II: Video Systems and Displays: Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Remote Controls, Video Telephone and Video Conferencing. (8 Lectures)

Unit III: Domestic Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, Computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System. (8 Lectures)

SECTION-B

Unit IV: Recording and Reproduction Systems: Disc recording and reproduction, Magnetic Recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System (8 Lectures)

Unit V: Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM, Dish washers (8 Lectures)

Unit VI: Calculators: Structure, internal organization, servicing; In-Car-Computers: electronic ignition, electronic ignition lock system, Antilock Braking System (ABS), Electronically controlled Suspension (ECS), Instrument panel displays, ultrasonic car safety belt system, Air Bag System, Vehicle proximity detection system, car navigation system (8 Lectures)

Text Book:

1. Consumer Electronics S P Bali Pearson Ed 2005.

FREE ELECTIVE- I

5FEXT5 /5FEXN5 (2) FIBER OPTICS

SECTION-A

Unit -I: Light Ray Theory Propagation of light in different media : propagation of light in an optical fiber, Basic structure and optical path of an optical fiber, Acceptance angle and acceptance cone, Numerical aperture(NA) (General), Modes of propagation, Meridional and skew rays, Number of modes and cut-off parameters of fibers. (8 Lectures)

Unit - II: Losses and Dispersion in Optical Fiber Fiber Losses : Attenuation in optic fibers, Materials losses, Rayleigh scattering losses, Absorption loss, Leaky modes, Bending losses,

Radiation losses. Dispersion in optical fiber: Electrical Vs. optical bandwidth. Bandwidth-length product, Intermodal dispersion, Mixing modes, Material chromatic dispersion. (8 Lectures)

Unit-III: Light Sources and Detectors for Optical Fiber Light Sources : Introduction, LED (Light Emitting Diode), Processes involved, structure material and output characteristics of LED, Fiber LED coupling, Bandwidth, Spectral emission of LEDs, LASERS : Operation types, Spatial emission pattern, Current Vs. output characteristics. Detectors : Introduction, Characteristics of photo detectors (General), Photoemissive type, Photoconductive and photo voltaic devices, PN junction type, PIN photo diode, Avalanche photo diode (APD). (8 Lectures)

SECTION-B

Unit -IV: Fiber optic Communication systems and Modulation Fiber Communication systems : Transmitter for fiber optic communication, High performance transmitter circuit LED – Analog transmitter, LASER transmitter, Digital laser transmitter, Analog laser transmitter with A/D conversion and digital multiplexing, Fiber optic receiver, Fiber based modems : Transceiver. Modulation : LED analog modulation, Digital modulation, Laser modulation, Pulse code modulation (PCM), Intensity modulation (IM). (8 Lectures)

Unit -V: Optical Fiber Communication application Optical fiber communication systems : Introduction, Important applications of integrated optic fiber communication technology, Long haul communication, Coherent optical fiber Commun-ication, Principle of coherent detection. (8 Lectures)

Unit -VI: Measurements on Optical Fibers Introduction, Measurements of numerical aperture (NA),Measurements of Fiber- attenuation, Optical time Domain Reflectometry (OTDR), measurements of dispersion losses, Measurements of refractive index, Cut-off wavelength measurement, Measurements of Mode Field Diameter (MFD), (8 Lectures)

Text Books:

1. Optical Fiber Communications : Principles and Practices- John M. Senior (PHI).

2. Optical Fiber and Optical Fiber Communication Systems S. K. Sarkar (S. Chand and Comp.

5XT6 / 5XN 6 COMMUNICATION SKILLS

Unit I: Comprehension over an unseen passage. Comprehension – A -word study :- Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage. Comprehension - B - Structure study :-Simple and compound sentences, types of conjunctions, singular and plural, tenses and

their effect on verb forms. Use of - not only – but also, if clause, since, may, can, could, would, too etc. Active and passive forms, negative and interrogative, punctuation and capitalization.

Unit II: Theoretical background - importance of communication, its process, model of communication its components & barriers. Verbal communication, its significance, types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.), Important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content. Non-verbal communication, types of graphics and pictorial devices.

Unit III: Specific formats for written communication like – business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc. Oral communications - Important objectives of interpersonal skills, (verbal and non-verbal), face to face communications, group discussion and personal interviews. methodology of conduction of meetings, seminars, symposia, conference and workshop.

Books Recommended:

1) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.

2) Chrissie Wright (Editor) : Handbook of Practical Communication Skills, Jaico Publishing House.

3) Raman Sharma “Technical Communication”, Oxford University Press..

4) F. Frank Candlin : General English for Technical Students, University of London Press Ltd.

5XT7: Electronic Devices & Circuits-II Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 5XT1(Electronic Devices & Circuits-II).

5XT8: Power Electronics Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 5XT2(Power Electronics).

5XT9: Communication Engineering-II Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 5XT4 (Communication Engineering-II).

5XT10: Communication Skills Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 5XT6 (Communication Skill).

SYLLABUS PRESCRIBED FOR FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING ELECTRONICS & TELECOMMUNICATION SEMESTER PATTERN (CREDIT GRADE SYSTEM)

SIXTH SEMESTER

XT1/ 6XN1 DIGITAL INTEGRATED CIRCUITS

SECTION-A

Unit I: Combinational Logic Design: Function of binary variables, Boolean Algebraic Theorems, Standard form of logic functions, K-Map up to 5 variables, Quine McCluskey Method, Don't Care Conditions and its effects, Synthesis using AND-OR Gates. (8 Lectures)

Unit II: Combinational Logic Design using 74/54 MSI chip series concerning to MUX, DEMUX, Decoders, Encoders, Comparators, Code converters, Priority Encoders, Parity Generator/Checker and BCD to Seven Segment Decoders. (8 Lectures)

Unit III: Combinational Logic Design using ROM array, PLA, PAL, preliminary design concepts using FPGAs, N-bit binary adder using 7480, Look-ahead carry adder construction. (8 Lectures)

SECTION-B

Unit IV: Design of counters and sequential networks. Analysis of clocked sequential networks, general models of sequential machines, equivalence and minimization networks, deviation of state graphs and tables, reduction of state assignments, SM charts. (8 Lectures)

Unit V: Analysis of asynchronous sequential networks, derivation and reduction of primitive flow tables, state assignments and realization of flow tables, hazards, asynchronous sequential network design. (8 Lectures)

Unit VI: Fault detection and location in combinational circuits. Paths sensitizing method, equivalent – normal – Form method (ENF), two level fault detection, fault detection and location in sequential circuit using circuit test approach. (8 Lectures)

Text Books:

1. Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication.

2. Lee S. C., "Digital Circuit and Logic Design", PHI.

3. Jain R. P. "Modern Digital Electronic Circuits and Systems", TMH.

Reference Books:

1. Digital IC Reference data manuals.

2. Texas Instruments Inc. Design with TTL ICs.

3. Morris Mano, “Digital Electronics: Circuits and Systems”, PHI.

4. Parag K. Lala, “Fault tolerance and fault testable hardware design, B. S. Publications, Hyderabad.

6XT2 /6XN2 LINEAR INTEGRATED CIRCUITS

SECTION-A

Unit I: Operational Amplifier, block diagram of op-amp, Differential amplifier: gain expressions using h - parameters, constant current source, level shifting, transfer- characteristics, frequency response, frequency compensation methods, study of ICuA741, measurement of parameters of op-amp and offset nulling and their importance.

Unit II: Linear Applications of Op-Amp: Inverting and non inverting amplifiers, voltage followers (AC & DC), integrator, differentiator, differential amplifier, instrumentation amplifiers, precision rectifiers, RMS to DC converter, voltage to current converter, sinusoidal RC oscillators, constant voltage sources, frequency to voltage and voltage to frequency converter.

Unit III: Non Linear Applications of Op-Amp and Filter Circuits: Clipping and clamping circuits, comparator, zero crossing detector, Schmitt trigger, peak detector, astable, monostable and bistable multivibrator, voltage sweep generator. Active filters : Butterworth filters using op-amp. Log and Antilog amplifiers.

SECTION-B

Unit IV: Voltage Regulator: Block schematic of regulator IC 723,regulated power supply using IC 723, short circuit protection, switch mode power supply, dual tracking regulators, regulator using 78**, 79**, and LM 317.

Unit V: 1. Timers : Block schematic of IC 555, application of timer 555 as astable, monostable and bistable multivibrators, frequency divider, pulse stretcher, sawtooth generator, free running ramp generator, FSK generator.

Unit V: 2.Sample & hold circuit.

Unit VI: 1. PLL: Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC-LM 565 and its applications as AM detector, FM detector and frequency translator.

Unit VI: 2. Introduction to Audio Function Generator IC 8038.

Text Books:

1) Gayakwad R.A. : OP-Amps and Linear Integrated Circuits, Prentice Hall of India Pvt. Ltd., New Delhi (Second Edition), 1980.

2) Robert F. Coughlin, Frederick F. Driscoll: Operational Amplifier and Linear Integrated Circuits, Sixth Edition, PHI Pub.

Reference Books:

1) Tobey J.E. and Grame J.E. : Operational Amplifier Design and Applications, International Student Edition, 1983.

2) T.R. Ganesh Babu, B. Suseela: Linear Integrated Circuits, Third Edition, Scitech Pub.

6XT3/6XN3 INTRODUCTION TO MICROPROCESSORS

SECTION-A

Unit I: 8085: Architecture, Register Structure, Addressing modes, Instruction set of 8085, Timing diagrams.

Unit II: Assembly Language Programming of 8085, Introduction to assemblers, Simulators, Stack, Subroutine. Address space partitioning schemes : Memory mapped I/O and I/O mapped I/ O, Address decoding techniques.

Unit III: Interrupt system of 8085, software and hardware interrupts, Data transfer schemes: Serial data transfer through SOD and SID, USART 8251 and its interfacing.

SECTION-B

Unit IV: Internal architecture, programming and interfacing of PPI 8255, Programmable interval Timer/ Counter 8254, Introduction to DMA data transfer , DMA Controller 8237 and its interfacing.

Unit V: 8086 : CPU architecture, internal operations, addressing modes, instruction formats, execution timing.

Unit VI: Instruction set of 8086, Assembly language programming (ELEMENTARY PROGRAMMING) Assembly Directives, Operators.

Text Books:

1) A. K. Ray and K. M. Bhurchandi: Advanced Microprocessors and Peripherals, Architecture Programming and Interfacing, TMH.

2) Gaonkar R.S. : Microprocessor Architecture Programming and Applications with the 8085, Penram International Pub. (Third Edition), 1997.

2) Gibson G.A., Liu Y.C. : Microcomputer system the 8086/8088 family, Prentice Hall India Pvt. Ltd.

Reference Books:

1) Hall D.V. : Microprocessor and Interfacing Programming and Hardware, McGraw Hill Co., New York, 1986.

2) Data sheet manuals by INTEL.

6XT4 DIGITAL COMMUNICATION

SECTION-A

Unit 1: Introduction to Digital Communication System Functional Blocks of Digital Communication System; Source Encoder and Decoder; Channel Encoder and Decoder; Modulator and Demodulator Line Coding:-Need for Line coding; Properties of Line Coding; Unipolar RZ and NRZ; Polar RZ and NRZ; Bipolar NRZ (AMI); Split Phase Manchester Coding; Polar Quaternary NRZ Coding; HDB3 Coding Scrambler and Unscrambler. (6)

Unit 2: Information Theory Measure of Information; Entropy and Information Rate of Long Independent and Dependent Sequences; Markoff Statistical Model for Information Sources; Entropy and Information rate of Markoff Sources Source Encoding: - Huffman Encoding; Shannon's Encoding Algorithm; Shannon-Fano Algorithm; Discrete Communication Channel: Noiseless Channel; Deterministic Channel; Binary Symmetric Channel; Rate of Information Transfer over Discrete Channel; Capacity of Discrete Memoryless Channel Continuous Channel: Shannon Hartley Theorem for channel capacity; Signal to Noise Ratio-Bandwidth Tradeoff. (12)

Unit 3: Bandpass Modulation and Demodulation techniques BPSK, BFSK, ASK and DPSK generation and reception; Signal space diagram, PSD and Bandwidth of BPSK and BFSK systems; QPSK and MSK Transmitter and Receiver; Signal space diagram, PSD and Bandwidth of QPSK and MSK; Probability of Error of ASK,BPSK and BFSK systems; Comparison of Digital modulation systems Coherent Detection: - Integrate and Dump Filter (SNR and Probability of Error); Optimum Filter (Transfer function and Probability of Error); Matched Filter (Impulse response and Probability of Error). (10)

SECTION-B

Unit 4: Base Band Transmission Base Band Binary PAM systems, Inter Symbol Interference, Base Band Pulse Shaping and Nyquist Criterion; Eye Diagram Correlative Coding: Duobinary Encoder with Pre-coder; Modified Duobinary Encoder; Modified Duobinary Encoder with Pre-coder Equalization: Need for equalization; Transversal Equalizer (Problems Expected); Preset Equalizer; Adaptive Equalizer, Clock and Carrier Synchronization. (8)

Unit 5: Error Control Coding Introduction to Error Control Coding; Types of Errors; Methods of Controlling Errors; Linear Block Codes: Matrix Description of Linear Block codes, Hamming Distance; Hamming Weight; Minimum Hamming Distance; Hamming Codes; Encoder for Linear Block code; Syndrome Decoding; Syndrome Decoder for (n,k) Linear Block Code; Error Detection and Correction capability of Linear Block Codes (Derivation expected) Cyclic Codes: Properties of Cyclic Codes; Systematic and Non-Systematic generator Matrix, Parity Check Matrices for Cyclic Codes; Encoders for Cyclic Codes; Syndrome Decoding for Cyclic Codes Convolution Codes: Time Domain Approach and Transform domain approach for convolution code generation; Code Tree and Code Trellis for Convolution code. (8)

Unit 6:- Multiple Access Schemes and Spread Spectrum Communication Multiple Access schemes: Time Division Multiple Access, Frequency Division Multiple Access; Code Division Multiple Access; Space Division Multiple Access Spread Spectrum Systems: Notion of Spread Spectrum; PN Sequence Generation (Problems Expected); Direct Sequence Spread Spectrum (DSSS); Jamming Margin; Processing Gain; Eb/No Ratio; Frequency Hopped Spread Spectrum; Slow and Fast frequency Hopping. (6)

Text Books:

1. Shanmugam K.S. :"Digital & Analog Communication Systems", John Wiley & Sons, New York, 1996.

2. Lathi B. P. :"Modern Digital and Communication Systems", Holt Rinchart and Winston Inc., New York, 1993.

3. Simon Haykin : "Digital Communication" , John Wiley and Sons, Pvt. Ltd., Singapore.

Reference Books:

1. Proakis J. K. :"Digital Communication", Mc-Graw Hill Book Co., London (Second Edition)

2. Taub, Herbert, Schilling D.L : "Principles of Communication Systems", Mc-Graw Hill International Book Co., Tokyo.

3. W.C.Y. Lee : "Mobile Cellular Telecommunications Systems", Mc-Graw Hill International Editions, 1990.

4. Glover and Grant : "Digital Communication", Prentice Hall Publication.

FREE ELECTIVE II

6FEXT5/ 6FEXN5 (1) INTRODUCTION TO WIRELESS TECHNOLOGY

SECTION-A

Unit I: Introduction to networking: the Internet reference model, layering and protocols, OSI and other models, Network types, network media, network topologies, connectivity devices, evolution of networking, types and range of wireless communication, wireless technologies. (8 Lectures)

Unit II: Wireless LAN, satellite communication, wireless application protocol (WAP), antennas, narrow-band and spread-spectrum technologies, cellular telephony, propagation, frequencies and spectrum and personal communication system. (8 Lectures)

Unit III: Wireless Application Protocol model, WAP architecture component, Trends: technology and culture, 3G, wireless in local proximity, Bluetooth: design and principle of operation, transmitter characteristics, spurious emissions, baseband characteristics, physical channel, channel control, Bluetooth security, inter-operability requirements for blue-tooth as a WAP bearer. (8 Lectures)

SECTION-B

Unit IV: Cellular telephony, history of cellular telephony, design and principle of cellular operation, cellular telephony operation, analog cellular telephones, digital cellular telephones, digital networks, personal communication systems, the third generation, recent events in cellular telephony. (8 Lectures)

Unit V: Wireless LAN: introduction, benefits of WLANs, design and principle of operation, WLAN configuration, micro-cells and roaming, types of WLANs, WLAN customer consideration, wireless LAN standards, IEEE 802.11, 802.11b and 802.11a, selecting the WLAN, microwave LANs. (8 Lectures)

Unit VI: Communicating with a satellite, LEOs, MEOs, GEOs and HEOs systems, design and principle of operation of Global Positioning System (GPS); satellite, control and user segments, Differential GPS, geometric earth models and future of GPS. (8 Lectures)

Text Book:

An Introduction to Wireless Technology by Garry S. Rogers and John Edwards, Pearson Education.

FREE ELECTIVE II

6FEXT5/ 6FEXN5 (2) ELECTRONIC TEST INSTRUMENTS: ANALOG AND DIGITAL

SECTION-A

Unit I: Analog meters, digital meters, dc voltmeter, ac voltmeters, RF probes, ammeters, ac ammeters, ohm-meters, 4-wire ohm measurements, multi-meters, meter range, other multi-meter functions: continuity indicators, diode tests, frequency counters, minimum, maximum, average read-outs, capacitance and temperature measurements, specifications. (8 Lectures)

Unit II: Floating and grounded outputs, sine wave sources, imperfections in sine wave sources,: frequency accuracy, frequency stability, amplitude accuracy, distortion, spurious responses, close-in-sidebands , Function Generators: Arbitrary waveform generators, arbitrary waveforms, AM and FM modulation, bursts, Frequency Shift Keying, Frequency sweep, sync output, phase locking, pulse generators, RF signal generators. (8 Lectures)

Unit III: Oscilloscopes: the concept of oscilloscope, digital scope block diagram, sample rate, real time and repetitive sampling, triggering, acquisition/sweep control, vertical amplifier, vertical resolution, ac and dc coupling, bandwidth limit, X-Y display mode, High impedance inputs, 50 ohm inputs, digital acquisition and display techniques, specifications of oscilloscopes, mixed signal oscilloscope, oscilloscope probes, probe compensation, active probes, differential measurements, high voltage probes, current probes. (8 Lectures)

SECTION-B

Unit IV: Oscilloscope measurements, basic waveform measurements, voltage gain measurements, phase measurements, frequency measurements, digital signal measurements, frequency response measurements, square wave tests, linearity measurements, curve tracer measurement techniques, diode I-V and resistor I-V characteristics, amplitude modulation

measurements, power measurements, FFT measurements, basic time domain reflectometry. (8 Lectures)

Unit V: Spectrum and network analyzers: spectrum analyzer, bank-of-filters spectrum analyzers, FFT spectrum analyzers, wave-meters, resolution bandwidth, narrow-band and broadband measurements, swept spectrum analyzers, spectrum analyzer measurements, Network Analyzers, distortion analyzers, RF power measurements, RF power meter. (8 Lectures)

Unit VI: Logic Analyzers: logic probes, oscilloscope logic measurements, logic analyzers, timing analyzers, glitch detect, state analyzers, data formats, state displays, timing displays, microprocessor measurements, trigger events and sequencing, microprocessor program flow, logic analyzer probing, combined scope and logic analyzer, PC-hosted logic analyzers. (8 Lectures)

Text Book:

Electronic Test Instruments: Analog and Digital by Robert A. Witte, Second Edition, Pearson Education.

6XT6: Integrated Circuits Lab

Minimum 4 experiments uniformly distributed based on the syllabus of 6XT1 (Digital Integrated Circuits) and 4 experiments uniformly distributed on the syllabus of 6XT2 (Linear Integrated Circuits).

6XT7: Introduction to Microprocessors Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 6XT3 (Introduction to Microprocessors).

6XT8: Digital Communication Lab

Minimum 8 experiments uniformly distributed based on the syllabus of 6XT4 (Digital Communication.