

Syllabus 7th SEMESTER (Electronics)

SUBJECT : ELECTRONIC SYSTEM DESIGN

- UNIT-I** Design of Power supply system: Unregulated D.C.. power supply system with rectifiers and filters. Design of emitter follower regulator, series regulators, overload protection circuits for regulators. Design of SMPS: Step up and step down. **15**
- UNIT-II** Design of class A small signal amplifiers: Emitter follower, Darlington pair amplifiers with and without Bootstrapping, Two stage direct coupled amplifier. Design of class A, Class AB audio power amplifier with drivers. **15**
- UNIT III:** Design of sinusoidal oscillators: OPAMP based Wein bridge and Phase Shift oscillators with AGC circuits, Transistor based Hartley, Colpits and Crystal oscillators, Evaluation of figure of merit for all above oscillator circuits. **15**
- UNIT IV:** Design of constant current sources, Design of function generators, Design of tuned amplifiers. Design of Butterworth, Chebyshev filters upto sixth order with VCVS and IGMF configuration. **15**

BOOKS :

1. Regulated Power supply Handbook. Texas Instruments.
2. Electronics : BJT's, FETS and Microcircuits – Anielo.
3. Monograph on Electronic circuit Design : Goyal & Khetan.

PRACTICALS : Practicals based on above syllabus.

Note: 50% practicals should be based on SPICE simulation.

SUBJECT : UHF AND MICROWAVE

- UNIT I:** Causes of failure of conventional tubes at high frequency. Two cavity klystron amplifier, Reflex klystron oscillator. **10**
- UNIT II:** Traveling wave tube, Slow wave structure. Backward wave architecture (Carcinotron) Magnetron: cylindrical magnetron, parallel plate magnetron, voltage tunable magnetron. **10**
- UNIT III:** Microwave components: Attenuators, Tees, Directional couplers, Circulators, Isolators, Gytrators, Phase shifter, Cavity resonator, Transmission line resonator. **10**
- UNIT IV:** Scattering matrices: Scattering matrices of transmission lines, microwave junction and tees, directional coupler, circulator. **10**
- UNIT V:** Microwave filters: Design of microwave filters by Image parameter method Insertion loss method. Microwave measurement: Microwave power measurement- Bolometer method and Calorimeter method,

VSWR measurement, Attenuation measurement, Impedance and Q factor measurement. **10**

UNIT VI: Microwave solid state devices: GaAs oscillator, Parametric amplifier, PIN diode, Detector diode, MASER. Strip lines: Microstrip lines, coplanar, shielded, parallel strip lines. **10**

Text Books: 1) Microwave device and circuits: Samuel Y. Lio
2) Foundations of microwave engineering: R. E. Collins.
3) Microwave engineering: R Chatterjee.

Reference books : 1) Microwave communication :Hund
2) Microwave theory and measurement: G. Lance.

SUBJECT : DIGITAL SIGNAL PROCESSING

UNIT 1: Discrete time signals & systems: Discrete time signals, Discrete time systems, Linearity, causality, stability, static/dynamic, Time Invariance/ Time variance, classification of discrete time system, Linear convolution, Circular convolution Cross Correlation, Autocorrelation. Linear constant coefficient difference equations, sampling theorem & sampling process. Reconstruction of sampling data, convolution. **10**

UNIT II: Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time Fourier transform. **10**

UNIT III: The Z-transform: Definition, properties of the region of convergence for the Z-transform, Z-transform properties, Inverse Z-transform using contour integration, complex convolution theorem, Parseval's, unilateral Z-transform, stability interpretation using Jury's array. **10**

UNIT-IV: Transform analysis of LTI system & structures for discrete-time system: Frequency response of LTI system, relationship between magnitude & phase, all pass systems, minimum phase system, Linear system with generalized linear phase. Block diagram representation & signal flow graph representation of Linear constant. Coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures. **10**

UNIT V: Filter design Techniques: Design of discrete time IIR filters from continuous time filters, frequency transformations of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser window method. Frequency sampling method. **10**

UNIT VI: Discrete Fourier Transform: Discrete Fourier series, properties of discrete fourier series, Discrete fourier transform, properties of DFT, circular convolution using discrete fourier transform. Decimation in time FFT algorithm, decimation in frequency FFT, FFT of long sequences using overlap add and overlap save method. **10**

BOOKS:

1. Discrete time signal processing 2nd Ed. Alan V. Oppenheim, Ronald W. Schafer & Buch, Pearson.
2. Digital Signal Processing-A Computer based approach. Sanjit K. Mitra.

REFERENCE :

1. Digital signal Processing Theory and application. Proakis and Manolakis – 3rd edition PHI Ltd.

PRACTICALS : Practicals based on above syllabus are conducted on MATLAB / Kits

DIGITAL COMMUNICATION

UNIT-I: Digital modulation:- PCM systems, Channel capacity, Delta modulation, Adaptive digital waveform coding schemes, matched filter receiver. Coherent Binary: PSK, FSK, QPSK, MSK, DPSK.

10

UNIT-II: Source coding methods: - Review of information theory, Huffman and L-Z encoding algorithm. Rate distortion theory for optimum quantization, scalar and vector quantization.

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UNIT-III: Waveform coding methods, ADPCM, Adaptive sub-band and transform coding, model based speech coding like LP coding , CELP coding. Introduction to Image compression, Review of techniques used in JPEG and MPEG standards.

10

UNIT- IV: Advanced modulation methods:-The signal space concept, Gram-Schmitt procedure, Signal space representation of modulated signals, nonlinear modulation methods with memory, Error probability and optimum receivers for AWGN channels.

10

UNIT-V: Advanced transmission methods:- Review of channel coding, convolution, encoding and decoding , distance properties, Viterbi algorithm and Fano algorithm. Trellis coded modulation methods.

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UNIT-VI: Spread – Spectrum methods:- Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum. Application of spread spectrum, CDMA.

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BOOKS:

- 1) Digital communication : John G Prokis (TMG)
- 2) Digital communication : Simon Haykin(WEP)

REFERENCEBOOKS

- 1) Modern communication systems (Principles and application):Leon W. Couch II (PHI)
- 2) Digital communication :Shanmugh
- 3) Modern Digital & Analog Communication systems By B. P. Lathi.

ELECTIVE -I

1)SWITCHING THEORY

- UNIT 1:** Switching Algebra and functions, Boolean, Algebra, Boolean, functions, Minimization of Boolean functions using Tabulation Method, sets, Relations and Lattices Venn diagram. **10**
- UNIT II:** Design of combinational Logic circuits contact Networks, Functional Decomposition and symmetric functions. **10**
- UNIT III:** Threshold Logic, threshold elements, capabilities and limitations of threshold logic, elementary properties, linear separability, unate functions, synthesis of threshold functions, cascading of threshold elements. **10**
- UNIT IV:** Reliable Design and fault Diagnosis, Fault Detection in combinational circuits, Fault location experiments, Fault Detection by Boolean Differences, Path, sensitizing method, Multiple fault detection using map method, failure-Tolerant Design. **10**
- UNIT V:** Finite state Machines- Mealy and Moore synchronous sequential circuits, Design, Capabilities, Minimization and Transformation of sequential Machine. Design of fundamental Mode and pulse Mode circuits. **10**
- UNIT VI:** Structure of sequential Machines, lattice of closed partitions, state assignment using partitions, Reduction of output dependency, Input Independence and Autonomous clock. Homing sequence, synchronizing sequence, Adaptive Distinguishing experiment. **10**

BOOKS:

1. Switching and finite Automata Theory by Zvi Kohavi.
2. Modern switching Theory by S.C. Lee.

2) FUZZY LOGIC & NEURAL NETWORK

- UNIT I:** Introduction
1. Fuzzy sets, relations, Approximate reasoning Representing set of rules.
2. Fuzzy knowledge based (FKBC) parameters. Introduction rule and data base inference engine choice of fuzzification and defuzzification processes. **10**
- UNIT II :** Nonlinear Fuzzy Control : Introduction, Control Problem, FKBC as nonlinear transfer element, Types of FKBC **10**
- UNIT III :** **Adaptive Fuzzy Control Introduction, design and performance evaluation ,main approach to design.**
08
- UNIT IV :** Fundamental concepts of ANN. Model of artificial Neural Network (ANN), Learning and adaptation learning rules. Feed forward Networks: Classification Model, features and decision, regions, Minimum distance classification, perceptron, Delta learning rules for multiperceptron layer, Generalized learning rules, back propagation Algorithm, back propagation training, learning factors. **12**

UNIT V: Recurrent Networks: Mathematical foundation of discrete time & gradient type Hopfield networks, Transient Response and relaxation modeling. **08**

UNIT VI: Associative Memories & self organizing Networks. Basic concepts and performance analysis of recurrent associative memory, Bidirectional associative memory. Hamming net and MAXNET Unsupervised learning of clusters, counter propagation network, feature mapping, self organizing feature maps, cluster discovery network (ART 1) **12**

BOOKS:

1. Introduction of Artificial Neural Networks, Jacek Zurada (JPH)
2. Neural Network and Fuzzy Systems, Bart Kosko (PHI)
3. Neural Networks: A comprehensive Foundation, Simon Haykin (Maxwell) Macmillan Canada Inc).
4. An Introduction to Fuzzy Control, D. Driankov, Norsa.
5. Fuzzy sets: Uncertainty & information, Klir and Folger (PHI)
6. Digital Image processing (AWPC) By Gonzalez

3) CMOS VLSI DESIGN

UNIT 1: MOS transistors- nMOS enhancement & pMOS enhancement transistor, threshold voltage, body effect, MOS device equations, small signal model for MOS transistor. **10**

UNIT II: CMOS Inverter – Principle of operation, dc characteristics, transient characteristics, β_n/β_p ratio, noise margin, static load MOS inverter, transmission gate, Introduction to BiCMOS inverter. **10**

UNIT III: Study of CMOS logic- combinational logic, gates, compound gates, multiplexers, memory elements. **07**

UNIT IV: Circuit characterization and performance estimation, resistance and capacitance estimation, switching characteristics, power dissipation, charge sharing. **10**

UNIT V: CMOS processing technology- basic CMOS technology, layout design rules, stick diagram representation, Latch up. **11**

UNIT VI: CMOS circuit & logic design – transistor sizing, fan-in, fan-out, physical design of simple logic gates, CMOS logic structures, Clocking strategies. **12**

BOOKS:

- 1) 'Principle of CMOS VLSI Design' – By Neil H. E. Weste, K. Eshraghian . Addison Wesley VLSI Series.
- 2) 'Digital Integrated circuits, A Design Perspective'- By J. M. Rabaey, A. Chandrakasan, B. Nikolic. Prentice Hall.2e, 2003.
- 3) 'CMOS VLSI Design' – By Pucknell , K. Eshraghian.

Syllabus 8th SEMESTER (Electronics)

SUBJECT :- DIGITAL SYSTEM DESIGN

- UNIT-I:** Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements. **10**
- UNIT-II:** Subprograms – Function, Procedures, attributes, generic, generate, package, IEEE std logic library, file I/O, test bench, component declaration, instantiation, configuration. **10**
- UNIT-III:** Combinational logic circuit design and VHDL implementation of following circuits – fast adder, subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits. **10**
- UNIT-IV:** Synchronous sequential circuit design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (pseudorandom and CRC). **10**
- UNIT-V:** Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, clock skew and timing considerations. **10**
- UNIT-VI:** Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx/Altera), FPGA architecture (Xilinx/Altera). **10**

BOOKS:

1. VHDL – 3rd Edition – Douglas Perry – TMH
2. Fundamentals of Digital Logic with VHDL design–Stephen Brown, Zvonko Vranesic – TMH.
3. Digital Design principles – Fletcher
4. VHDL Synthesis – J Bhasker
 1. VHDL Primer – J Bhasker – Pearson Education

REFERENCE:

1. Digital System Design Using VHDL – Chales H. Roth
2. Digital System Design – John Wakerley
3. VHDL – Zainalabedin Navabbi.
4. VHDL – D. Smith.

PRACTICAL: Practicals based on above syllabus**ADVANCED MICROPROCESSORS & MICROCONTROLLERS**

UNIT I: Introduction to 16 bit microprocessors, 8086/8088 CPU architecture, memory organisation, interfacing addressing modes, Instruction set, programming examples, pseudo opcodes, assembler directives. **13**

UNIT II: Interfacing of peripherals 8255, 8253 & 8251. Interfacing of ADC & DAC, stepper motor, serial communication standards RS232, I² C Bus. **10**

UNIT III: Architecture, organization operation & interfacing of 8259, ICWs, OCWS, Cascading 8279- keyboard display mode, sensor matrix mode, command words and programming DTMF transciever(Mittel 8880), real time clock DS 1307, EEPROM. **10**

UNIT IV: 8086/88 maximum mode ,8087 architecture, 80386 architecture, real and protected mode, 8237 DMA controller, organization, control words. **08**

UNIT V: Introduction to 8051 family architecture, pin diagram, operation, ports, addressing modes, internal & external memory, SFR, flags, organization, counters and timers, serial communication. **09**

UNIT VI: 8051 instruction set, interrupts, programming excercises for interfaced with keyboard, LED matrix, time delays, serial communications. **10**

NAME OF BOOKS RECOMMENDED:

1. Programming & Interfacing of 8086/8088, D.V. Hall, TMH.
2. Intel Reference Manuals, Microprocessors & Microcontrollers : Intel
3. Advanced Microprocessors & Peripherals, A.K. Ray, K.M.Bhurchandi.(TMH)
4. Microcontrollers – Peatman, Mc Graw Hill.

PRACTICAL: Practicals based on above syllabus.**COMPUTER COMMUNICATION**

UNIT-I Network & Services: Communication Network, Approaches to network Design, types of Network, Two Stage, Three stage Network, Time Division Switching, Time Multiplexed Switching. Time Multiplexed Time Switching. **10**

UNIT-II LAN Network & Medium Access layer LAN structure, random access, multiple access protocols, IEEE standard 802 for LAN & MAN. High speed LANS, FDDI, Fast Ethernet. **10**

UNIT-III	Application & Layered Architecture: OSI reference Model, TCP/IP Architecture, TCP/IP protocol, IP packets, IP addressing , subnet addressing, address resolution & reverse resolution, TCP/IP utilities.	10
UNIT-IV	Physical Layer & Data Link Layer: Transmission media, wireless Transmission, X.25 network, Narrow band & Broadband ISDN, ATM. Data link Layer design, Error detection & correction Elementary data link protocols, sliding window protocols.	10
UNIT-V	Network Layer & Transport Layer: Network layer design, Routing, congestion, Internetworking Transport layer design issues, Transport services primitives, Internet transport protocol, wireless TCP and UDP.	10
UNIT-VI	Application Layer: Network security cryptography, secret key, public-key digital signature, Domain Name system, Electronic Mail system, Multimedia, Real Time Transport protocol.	10

BOOKS :

Telecommunication Switching systems & Networks by Vishwanathan
Communication Networks by Leon- Gracia, Indra Widjaja
Computer Communication by W. Stanlling.
Computer Networks Tanenbaum.

OPTICAL COMMUNICATION

UNIT 1:	Principle of optical communication-Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers-Ray mode, Numerical aperture and multipath dispersion in step index and graded index fibers. Material dispersion and frequency response.	10
UNIT II:	Electromagnetic wave equation in step index and graded index fibers Modes and Power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.	10
UNIT III:	Signal degradation in fibers - Attenuation, material dispersion, waveguide dispersion, pulse broadening, mode coupling.	10
UNIT IV:	Optical sources - LED and LASER. Structures and properties. Source launching and coupling.	10
UNIT V:	Photo detector - Pin and Avalanche Photo-detectors. Structures and Properties. Optical receiver-Operation and performance.	10
UNIT VI:	Transmission link - Point to point links, WDM, Data buses, star and T-coupler, NRZ, RZ and block codes. Measurement in optical fibers-Attenuation, dispersion, Refractive index profile and optical source characteristic measurements.	10

BOOKS:

- Optical fiber communication, principles and practice: John M. Senior (PH International Service).
1. Optical fiber communication : B. Keiser (Mc Graw Hill)
 2. Optical communication system : J. Gower (Prentice Hall of India)

4. Optical Fiber System : Kao (Tata Mc Graw Hill)

ELECTIVE-II

1) SATELLITE COMMUNICATION

UNIT-I: Introduction:- Origin of Satellite communication .Current state of satellite communication. Orbital aspect of satellite communication:- Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, orbital perturbation. Space craft subsystem:- Attitude and orbit control system, Telemetry tracking and command power system , communication subsystem. **10**

UNIT-II: Satellite link design:- System noise temperature and G/T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C/N). **10**

UNIT-III: Multiple access techniques:- FDMA, FDM/FM/FDMA , effects of intermodulation, companded FDM/FM/FDMA. TDMA, TDMA frame structure and design, TDMA synchronization and timing, code division multiple access , SS transmission and reception applicability of CDMA to commercial system, multiple access on board processing, SCPS system, digital speech interpolation system, DAMA. **10**

UNIT-IV: Propagation on satellite:- Earth's path—propagation effects, atmospheric absorption, Scintillation effects. Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of Attenuation. Rain effects on Antenna noise temperature. Eliminating propagation effects:- Attenuation, Site diversity, Depolarisation. **10**

UNIT –V: Encoding and forward error correction: Error detection and correction, channel capacity, error detecting codes, linear block codes, error correction with linear block codes, performance of block error correction codes, convolution codes, cyclic codes, BCH and codes, error detection on satellite link **10**

UNIT- VI: Earth Station technology – Earth Station design antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization. Tracking, equipment for earth stations. **10**

BOOKS:-

- 1) Satellite Communication by T. Pratt
- 2) Satellite Communication by D.C. Agrawal
- 3) Satellite Communication by Dennis Roddy
- 4) Satellite Communication by T.T. Hai

2) MOBILE COMMUNICATION

UNIT-I: The cellular concept: Evolution of mobile radio communication. Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system. **10**

- UNIT II:** The mobile radio environment: causes of propagation path loss, causes of fading -long term and short term, definition of sample average, statistical average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, intersymbol interference.
- UNIT III:** Modulation techniques for mobile communication: BPSK, QPSK. Transmission and detection techniques, 4 QPSK transmission and detection techniques. QAM, GMSK.
- UNIT IV:** Equalisation, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity, fundamentals of channel coding.
- UNIT V:** Multiple access techniques: Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access, frequency hopped multiple access(FHMA), code division multiple access (CDMA), space division multiple access.
- UNIT VI:** GSM- global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard.

TEXT BOOKS:

1. Wireless Communication – Principles and practice by T S. Rappaport. (Prentice Hall PTR, upper saddle river, New Jersey.)
2. Mobile Communications – Design fundamentals by William C. Y. Lee, (John Willey)

REFERENCEBOOKS:

1. Wireless digital communication by Kamilo Feher (PHI)
2. Mobile Cellular Communication by W.C.Y.Lee (Mc Graw Hill)
3. The Mobile Radio Propagation channel by J.D. Parson.

3) DIGITAL IMAGE PROCEESSING

- UNIT-I:** Digital image representation, elements of digital image processing systems. Sampling & quantization simple image model, basic relationships between pixels image geometry. **10**
- UNIT-II:** Image transforms – introduction to Fourier transform, DFT, properties of 2- dimensional DFT, FFT, other separable image transforms- DCT, DST, Walsh, Haar, start transforms. **10**
- UNIT- III:** Image enhancement- Basic gray level transformations, Histogram processing enhancement using arithmetic/logic operations, spatial filtering, smoothing & sharpening filters, smoothing frequency domain filters, sharpening frequency domain filters. **10**

UNIT-IV: Image Compression – fundamentals, image compression models, information theory, error- free compression, lossy compression, Image compression standards. **10**

UNIT-V: Image Segmentation- Detection of discontinuities, Edge linking & boundary detection, thresholding region based segmentation. **10**

UNIT-VI: Representation & description- Representation, boundary descriptors, Regional Descriptors. **10**

BOOKS:

- 1) Digital Image Processing, R.C Gonzaleez, R.E. Woods, Pearson Edition, 2nd edition
- 2) Fundamentals of digital image processing , A.K. Jain (PHI)

4) EMBEDDED SYSTEMS

Unit 1. Introducing the 68HC12, Subroutines and Stacks, 68HC12 Arithmetic.

Unit 2. WHYP—An Extensible Language, Branching and Looping, Interrupts, Parallel Interfacing.

Unit 3. The Serial Peripheral Interface (SPI).

Unit 4. Analog-to-Digital Converter, Timers.

Unit 5. The Serial Communications Interface (SCI).

Unit 6. Strings and Number Conversions, Program Control and Data Structures.

TEXT BOOK :

1. Design of Embedded Systems Using 68HC12/11 Microcontrollers , Richard E. Haskell, Prentice Hall
2. Morton, Todd Embedded microcontrollers. Prentice Hall 2001
3. Valvano, Jonathan W. Embedded Microcomputer Systems: Real Time Interfacing. Brooks/Cole 2000