

**SYLLABUS PRESCRIBED FOR FOUR YEAR DEGREE COURSE IN BACHELOR OF  
ENGINEERING ELECTRONICS & TELECOMMUNICATION SEMESTER PATTERN  
SEVENTH SEMESTER**

**7SUL1 DIGITAL COMMUNICATION**

UNIT-I: DIGITAL COMMUNICATION SYSTEM:- Elements of digital communication system, source encoder, decoder, channel encoder, decoder, modulator, demodulator, Line coding, Synchronization : Clock synchronization and carrier synchronization. (9)

UNIT-II: DISCRETE COMMUNICATION CHANNEL:- Measure of information, Entropy and information rate of independent and dependent sequences, Source encoding, Shannon's Encoding algorithm, Huffman encoding algorithm, discrete communication channel, capacity of discrete communication channel. Shannon's theorem on channel capacity. (9)

UNIT-III: DIGITAL MODULATION TECHNIQUES:- Digital carrier modulation schemes, binary ASK, PSK, FSK coherent scheme, probability of errors, comparison of digital modulation systems, Basics of DPSK, QPSK, MSK. (9)

UNIT-IV: ERROR CONTROLLING AND CODING:- Introduction to error control coding, methods of controlling errors, type of errors and code, linear block codes, Matrix description of linear block code, error detection and error correction capabilities of linear block code, cyclic code, cyclic code. (9)

UNIT-V: BASE BAND TRANSMISSION:- Base band PAM system, inter symbol interference, Nyquist criteria, pulse shaping, equalization, eye diagram, synchronization, scrambler and unscrambler, Duo binary signaling scheme . (9)

UNIT-VI: MODERN TECHNIQUES OF COMMUNICATION:- Introduction to mobile communication, cellular mobile telephone architecture, frequency assignments, frequency reuse, cell splitting, call initialization, call termination, handover. Multiple access schemes : TDMA, FDMA, CDMA, spread spectrum communication, D.S. spread spectrum, frequency hopping spread spectrum, comparison. (9)

**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., Tokiyo.
3. Wcy Lee : "Mobile Cellular Telecommunications Systems", Mc-Graw Hill International Editions, 1990
4. Glover and Grant : "Digital Communication", Prentice Hall Publication.

## 7SUL2 MICROPROCESSOR PERIPHERALS AND MICROCONTROLLER

UNIT-I: Hardware and Software development aids : Logic analyser, in-circuit emulator, simulator, one pass and two pass assembler, Cross assemblers, linker, loader, compiler, cross compiler, Introduction to operating system : Definition, types and functions. Bus standards : Serial RS 232, Parallel IEE-488. (8)

UNIT-II: Interfacing Devices with 8085 : Architecture and programming of programmable DMA CONTROLLER 8237, Programmable interval timer/counter 8253, Architecture and functioning of programmable floppy disk controller 8272. (9)

UNIT-III: Computer Peripherals and Interfacing : CRT controller 8275, Architecture and function of programmable dot matrix printer controller 8295, USART 8251. (9)

UNIT-IV: Analog to Digital and Digital to Analog Conversion Techniques: Case study of ADC 0809, ADC 1210, DAC 0808, 1008 and their interfacing with microprocessor. Use of ADC in applications like measurement of temperature, flow, speed, pressure, capacitance, inductance and resistance. (10)

UNIT-V: An Introduction to uC 8051: Architecture of 8051, Signal description of 8051, Register set of 8051, Timer structure and their mode and I/O port structure. (10)

UNIT-VI : Instruction set of 8051, Addressing modes of 8051, Memory and I/O addressing by 8051, Programming using 8051. Study of microcontroller based system. (8)

**Practicals:** Eight experiments should be based on above syllabus.

### **Text Books:**

1. Hall D.V. and Douglas V : “Microprocessor and Interfacing Programming and Hardware”, Tata Mc-Graw Hill Book Co., New York (2/e).
2. Gaonkar R.S. :” Microprocessor Architecture Programming and applications with 8085/8080A”, Penram International Publications, India.
3. K.J.Ayala : “The 8051 Microcontroller”, Penram Int. Pubs., 1996.

### **Reference Books:**

1. National Semiconductor : Data Acquisition Linear Devices Data Book.
2. Embeded Microcontrollers and Processors:-Volume-I-Intel.
3. 8085/8086 Microprocessor Book-Intel.
4. Intel Peripheral Devices Data Book.
5. B.B.Brey : The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor (4/e).
6. A. K. Ray and K. M. Burchandi : Advanced Microprocessor and Peripherals, Architecture Programming and Interfacing, Tata McGraw, Hill Publishing Co. Ltd., New Delhi (TMH).

## **7SUL3 DIGITAL SIGNAL PROCESSING**

UNIT-I: Introduction to DSP, Frequency domain description of signals & systems, Discrete time sequences systems, Linearity unit sample response, Convolution, Time invariant system, Stability criteria for discrete time systems, Solutions of linear difference equations. (9)

UNIT-II: Introduction to Fourier transform of Discrete Time Signal and its properties, Inverse Fourier transform, Sampling of continuous time signal, reconstruction of continuous time signal from sequences, Z- transform and its properties, complex Z-plane, ROC determination of filter coefficients, relationship between Fourier transform and Z-transform, inverse Z-transform. (12)

UNIT-III: DFT and its properties , Circular convolution, Linear convolution from DFT, FFT, Decimation in time and frequency algorithm. Introduction to wavelet transform. (10)

UNIT-IV: Filter categories, Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter, Frequency sampling structures for F.I.R. filter, Steps in Filter Design, Design by Pole Zero Placements, FIR filter design by Windowing method, Rectangular, Triangular and Blackman window. (8)

UNIT-V: Analog filter types, Butter worth, Elliptic filter, Specification and formulae to decide to filter order, Methods to convert analog filter into IIR digital, Mapping of differential, Impulse invariant, Bilinear, Matched Z transformation. (8)

UNIT-VI: Multi rate DSP, Introductory concept of multi rate signal processing, Design of Practical sampler, Rate converters, Decimators and Interpolator, Filter Bank application and examples. (8)

**Practicals:** Eight experiments should be based on above syllabus.

### **Text Books:**

1. Oppenham & Scheffer : Discrete time Processing (PHI).
2. Proakis & Monolakis D.G. : Digital Signal Processing (PHI).
3. Mitra S.K. : Digital Signal Processing (PHI).

### **Reference Books:**

1. Roman Kuo : Digital Signal Processing (MCW).
2. Ifeacher E.C., Jervis B. W. : Digital Signal Processing (Addison Wesley).
3. P. P. Vaidyanathan : DSP and Multirate Systems (PHI).
4. Rabiner and Chrocherie : Multirate DSP (PHI).

## **7SUL4 DIGITAL IC'S & DESIGN**

UNIT-I: Combinational Logic Design: Function of binary variables, Boolean Algebraic theorems, standard form of logical functions, K-map up to five variables, Quine Mcclusky method, Don't care conditions and it's effects, Synthesis using AND - OR gates. (08)

UNIT-II: Combinational logic design using 74/54 series MSI chip series concerning to multiplexers, demultiplexers, decoders, encoders, comparators, code converters, priority encoders parity generator/ checker & BCD-Seven segment decoder. (09)

UNIT-III: Combinational logic design using ROM array, PLA, PAL, preliminary design concepts using FPGA's N-bit binary adder using 7480, Look-ahead carry adder construction. (08)

UNIT -IV: Design of counter and sequential networks: Analysis of clocked sequential networks, General models of sequential machines, Equivalence and minimization networks, Deviation of state graph and tables, reduction of state assignments, S. M. Chart. (08)

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. (08)

UNIT-VI: Fault detection and location in combinational circuits : Path sensitizing method, Equivalent - Normal-Form (ENF) method, Two-level fault detection. Fault detection and location in sequential circuits using circuit test approach. (09)

**Practicals:** Eight experiments should be based on above syllabus.

### **Text Books:**

1. Charles H. Roth : “Fundamental of Logic Design” , 4<sup>th</sup> ed. Jaico Publication.
2. Lee S.C. : “Digital Circuit and Logic Design”, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Jain R.P. : “Modern Digital Electronics Circuits and Systems”, Macmillan Press, London.

### **Reference Books:**

1. Fleatcher : An Engineering approach to Digital System Design “, PHI.
2. Morris N.M. : “Digital Electronics Circuits & Systems”, MacMillan Press, London.
3. Digital IC reference data manual.
4. Texas Instru. Incorporated : Designing with TTL IC’s.
5. Parag K. Lala : Fault Tolerant and Fault Testable Hardware Design, B.S. Publication, Hydrabad.

## **7SU5/7SL5/7SI5 ELECTIVE - I**

### **(1) FUZZY LOGIC AND NEURAL NETWORKS**

UNIT-I: Introduction :- Biological Neurons and their artificial models, introduction to neural computing, Components of neuron, input and output weight, threshold, weight factors, transfer functions, concepts of supervised and unsupervised learning. (8)

UNIT-II: Supervised Learning :- Single layer network, perceptron, Linear separability, Training algorithm and limitations. Multilayer Network : Architecture of feed forward network, Learning rule, generalized delta rule, learning function. Back propagation algorithm. (9)

UNIT-III: Unsupervised Learning:- Introduction, Counter propagation networks, Kohonen's self organizing maps. Hopfield networks. (8)

UNIT-IV: Introduction :- Uncertainty in information, basic concepts of Fuzzy sets, operations on fuzzy sets, properties. Fuzzy relations : operations, properties, value assignments. (8)

UNIT-V: Membership functions :- Features, fuzzification, membership value assignments, Fuzzy Rule based systems, Graphical technique of inference. Defuzzification : Lambda-cuts for Fuzzy sets and Fuzzy relations, Defuzzification methods. (9)

UNIT-VI: Applications:- 1. Fuzzy pattern Recognition - feature analysis, partitioning of feature space, single sample identification multifeature pattern recognition. 2. Simple Fuzzy logic controller - Control system design stages, Assumptions in a Fuzzy control system design, general fuzzy logic controllers, simple examples. (9)

### **Text Books:**

1. J.M. Zurada : "Introduction to Artificial Neural Systems", Jaico Publishing House.
2. Meherotra Kishan, Mohan C.K., Ranka Sanjay : "Elements of artificial neural networks", Penram Int. Pub., Mumbai.
3. Timothy Koss : "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition.

### **Reference Books:**

1. N. K. Bose and P. Liang : "Neural Network Fundamental with Graphs, Algorithms and Applications", Tata McGraw Hill Edition.
2. G.J. Klir and T.A. Folger : Fuzzy sets, Uncertainty and Information", PHI Publication.
3. Kosko Bart : "Neural Networks & Fuzzy systems", Prentice Hall of India Pvt.Ltd., New Delhi.

## **7SU5/7SL5 ELECTIVE - I**

### **(2) FIBER OPTIC COMMUNICATION**

UNIT-I: OPTICAL FIBER WAVEGUIDE :- Total internal reflection, Snell's law, Theory of circular wave guide, Modes in optical fibres, Single mode fibre, multimode fibre, N.A., power flow. (8)

UNIT-II: TRANSMISSION CHARACTERISTICS OF FIBER:- Attenuation, absorption losses, scattering losses, bending losses, dispersion, intra model - intermodel dispersion, bandwidth. Nonlinear effects in single-mode fiber. (8)

UNIT-III: OPTICAL SOURCES:- Optical emission from semiconductors, LED, power, efficiency, double heterojunction LED, Basic concept of Lasers, Semiconductor injection lasers. (8)

UNIT-IV: OPTICAL FIBERS:- Manufacturing, fiber splicing and connectors different manufacturing techniques, diff. splicing tech. and connectors. (8)

UNIT-V: DETECTORS:- Optical detection principle, absorption, quantum efficiency, responsivity, PIN photo diode, APD and noise in photodiode. MSM Photodetectors. (8)

UNIT-VI: OPTICAL ELECTRONIC SYSTEM :- Optical transmitter, receiver, digital system planning consideration, power budgeting coherent and noncoherent systems, modulation and demodulation scheme, wavelength multiplexing, Optical switches. (8)

### **Text Books:**

1. Senior J.M. : "Optical Fiber Communication and Application", Prentice Hall of India Pvt. Ltd., New Delhi.
2. G.Keiser : "Optical Fiber Communication", Mc-Graw Hill International Book Co., New York.

### **Reference Books:**

1. Gowar : "Optical Communication System", Prentice Hall.
2. J. H. Franz and V. K.Jain : "Optical Communications, Components and System", Narosa Publication.
3. Ghatak & Thyagarajan : "Optical Electronics", Cambridge foundation.
4. Djafar K. Mynbaev, Lowell I. Scheiner : "Fiber Optic Communication Technology", LPE, Pearson Education, 2001.

## **7SU5 / 7SL5 ELECTIVE-I**

### **(3) BIOMEDICAL ENGINEERING**

UNIT-I: INTRODUCTION TO BIOMEDICAL ENGINEERING:- Physiological system of heart, Man instrument system, Sources of bioelectric potentials, Different bioelectric signals like ECG, EMG and EEG, Biopotential Electrode theory, Basic electrode, Electrodes for EEG, ECG, EMG, Biochemical electrodes. Skin contact Theory : skin contact impedance measurement of skin contact impedance, motion artifacts, nearest equation Nernst Equation . (9)

UNIT-II : BIOMEDICAL RECORDER AND MEASUREMENT:- Biomedical recorders for EEG, ECG, EMG, Blood pressure variation as a function of time, relationship of heart sounds to a function of the cardiovascular system, Measurement of Blood Pressure (Direct & Indirect), Blood flow, Heart sound. (8)

UNIT-III: MEDICAL IMAGING SYSTEM:- Instrumentation for diagnostics X-ray , X-ray basics properties , X-ray machine , Special imaging technique. Ultrasonic imaging system : Physics of Ultrasound, Biological effect of ultrasound. Ultrasonic A-scan, M-scan, B-scan, Real-time ultrasonic imaging systems. (8)

UNIT-IV: THERAPEUTIC EQUIPMENTS:- Need of Physiological and electrotherapy equipments. Cardiac pacemaker machine, Cardiac Defibrillators, Nerve and Muscle stimulators. Diathermy : short wave, microwave, ultrasonic. (8)

UNIT-V: PATIENT CARE AND MONITORING AND SAFETY:- System concepts, Bedside patient monitors, central monitors, Average reading heart monitor, Intensive care monitoring, Ambulatory monitoring. Biotelemetry : Single channel and Multichannel biotelemetry, telephonic data transmission. PATIENT SAFETY : Electric shock hazards, leakage current. Types of Leakage current, measurement of leakage current, methods of reducing leakage current, precautions to minimize electric shock hazards. Telemedicine. (9)

UNIT-VI: COMPUTERS IN BIOMEDICAL ENGINEERING:- Computerized Axial Tomography (CAT) Computerized Aided ECG analysis Computerized patient monitoring system. Computerized Catheterization. (8)

### **Text Books:**

1. Khandpur R.S. : “Handbook of Biomedical Instrumentation”, Tata Mc-Graw Hill, New Delhi.
2. Cromwell L. & Weibell F.J. : “Biomedical Instrumentation and Measurement”, Prentice Hall of India.

### **Reference Books:**

1. Dr. Lele R.D. : “Computer Applications of Medicine”, Tata Mc-Graw Hill, New Delhi.
2. Webster J.G. : “Medical Instrumentation”, IIIed., John Wiley & Sons.
3. Carr and Brown : Biomedical Equipment Technology.



## 7SU5 ELECTIVE - I

### (4) PROCESS CONTROL & INSTRUMENTATION

UNIT I: Introduction to Process Control: Process control principles, Introduction to Discrete state control systems, Process control block diagram, Process control drawings, Sensor time response. Dynamic elements in control loop, single capacity and multicapacity process, interacting and noninteracting elements, Concepts of Gains and its types. (8)

UNIT II: Basic Control Actions: On-off control, P, I, PI, PD, & PID controllers and their implementation using electronic components. Optimal controller settings-various methods. Complex Control Actions : Feed back control, Ratio control systems, Split range control, Cascade control, Selective control, Feedforward control, Adaptive control. (10)

UNIT III: Multivariable process control : Choosing controlled variables, pairing controlled and manipulated variables, coupling and decoupling control systems. Control Valves :Classification, characteristics, Determination of effective characteristics, selection of control valves. (8)

UNIT IV: Digital Control: Discrete state control system, Relay controllers, Programmable logic controllers: structure of PLC, basics of ladder diagram, applications of PLC, Digital control schemes, Data input, Control algorithms, Digital electronic methods. (9)

UNIT V: Computer Based Process Control: Data logging, SCADA (supervisory control & data acquisition) and case studies, DDC (direct digital control) and case studies, Process control networks. (8)

UNIT-VI: Typical process control : Control of pumps, heat exchangers, furnaces, distillation columns, steam boilers, pH and chemical reactor. Process instrumentation for : Steel plant, paper and pulp industries. (7)

#### **Text Books:**

1. Johnson C. : “Process Control Instrumentation Technology”, (7<sup>th</sup> Ed.) Prentice Hall of India, New Delhi.
2. Harroit P. :”Process Control”, TMH, New Delhi.
3. Shinsky F.G. : “Process Control”, Mc-Graw Hill Book Co., New York.

#### **Reference Books:**

1. Patranabis D.: “Principle of Process Control”, Tata Mc-Graw Hill Pub. Co., New Delhi (IInd Edition).
2. Eckman : “Automatic Process Control”, Wiley Eastern Pvt. Ltd., New Delhi.

3. Krishna Kant : “Computer Based Industrial Control” , PHI.

4. Liptak B.G. : “Process Control Instrument Engineers Handbook”, Chitton Book Co., Radnor.

## **7SU5 ELECTIVE-I**

### **(5) ROBOTICS & AUTOMATION**

UNIT-I: Definition of a Robot, A brief introduction to Robot Technology, Sensory perception, Intelligence, End Effectors, Sensory feedback, Robot Vision / Computer Vision and its fundamental components, Tactile Sensing, Range finding and real world navigation Speech synthesis and recognition. Robot control fundamentals : The Artificial intelligence view point, comparison of human brain and computer in the context of intelligent behavior, problem representation in A.I. system problem solving technique in A.I. (12)

UNIT-II: Definition of knowledge, Domain and logic : Elements of logic, propositional calculus, predicate calculus, pros and cons of logic, production system and their basis elements, semantic Nets and their characteristics, Frames, A Brief about Expert system comparison of various methods of knowledge representation. (10)

UNIT-III: Elements of speech, Time Domain Analysis / Synthesis of speech and waveform digitization, frequency Domain Analysis / Synthesis of speech phoneme Speech Synthesis, various type of speech recognition Systems and their basics ideas, Isolated word Recognition, Connected Speech understanding. (12)

UNIT-IV: Elements of vision, Image Transformation, Image Analysis, Image Understanding of Machine perception, Industrial Vision System. (9)

UNIT-V: Triangulation Method, Time of Flight (TOF), Ranging Method, Robot Position and Proximity Sensing, Tactile-Sensing System, Sensing Joint Forces and their importance in Robot programming, sensing touch and slip. (9)

UNIT-VI: Various Robot Programming Languages and their characteristics, characteristics of Robot Task Level language, comparison of Robot programming language, features of the high level languages used in conventional programming language, featuring with the high level language used in conventional programming. (12)

#### **Text Books:**

1. Staugard A.C. : “Robotic and AI”, Prentice Hall, Engle Wood Cliff N.J. 1987.

2. Lee C.S.G., Fu K. S., Gonzalez R.C. : “Robotic-Control, Sensing and Intelligence”, Mc-Graw Hill, Singapore, 1987.

## **Reference Books:**

1. Klafferetal : “Robotics”.
2. Parent M. and Laugreau C. : “Robot Technology (Vol.4 : Logic and Programming”, Kogan Page, London, 1985.
3. Aleksander I. ,Farreny H. and Ghallab M. : “Robot Technology” (Vol-1).
4. Decision and Intelligence “Kogan Page”, 1986.

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**8SUL1 UHF & MICROWAVES**

UNIT-I: MICROWAVE TUBES :- Two cavity and reflex klystron, magnetron, TWT, noise in microwave tubes. (8)

UNIT-II: SEMICONDUCTOR MICROWAVE DEVICES AND APPLICATIONS :- Varactor diode, step recovery diode, parametric amplifiers, tunnel diode, gunn diode, negative resistance amplifier, PIN diode, IMPATT & TRAPATT diodes, MASER'S. (9)

UNIT-III: TRANSMISSION OF MICROWAVES:- Field analysis of transmission line, Rectangular wave guide, (TE and TM modes), Striplines- Microstrip lines characteristics, impedance losses in microstrip lines, types of strip lines. (9)

UNIT -IV: WAVE GUIDING SYSTEM (PASSIVE COMPONENTS):- Microwave passive components, terminator, Attenuator, phase changer, directional coupler, hybrid junction, microwave propagation in ferrites, devices employing Faraday rotation Scattering matrix formulation for N port junction. (9)

UNIT-V: MICROWAVE RESONATORS AND FILTERS:- Basic Resonant circuits RLC, transmission line resonators, Fabry perot resonator, rectangular and circular cavities and their Q. Transmission line filter, quarter wave & direct coupled cavity filter. (8)

UNIT-VI: PRINCIPLES OF MICROWAVE COMMUNICATION:- Microwave link, tropospheric scatter link, line of sight system (Ground base) Microwave absorption in atmosphere (fading) . Noise in microwave communication system. (8)

**Practicals:** Minimum 8 practicals based on syllabus.

**Text Books:**

1. Liao, Samuel Y. : "Microwave devices & circuits", Tata Mc\_Graw Hill Co.Ltd., New Delhi.
2. Collin, Robert E. : "Foundations for Microwave Engineering", Mc-Graw Hill, New York.

**Reference Books:**

1. Kennedy G. : "Electronics Communication Systems", Tata Mc-Graw Hill Book Co., New Delhi.
2. K.C. Gupta : "Microwave Engg.", (WEL).
3. Reich, Scolnik, Ordnung, Krangs : "Microwave Principles", PHI.

4. M. Kulkarni : “Microwave and Radar Engineering”, Umesh Publication.
5. M.L. Sisodiya and G.S. Raghuwanshi : “Microwave Circuits and Passive devices”, (WEL).
6. Mathew M. Radmanesh : RF and Microwave Electronics – Illustrated.

## **8SUL2 ELECTRONIC CIRCUIT DESIGN**

UNIT-I: Design of regulated power supply using transistor as a regulated power supply, design of DC amplifier, comparator, window detectors, scaling and summing amplifier using IC 741 / IC 3245 or equivalent. (8)

UNIT-II: Design of waveform generator using IC 741, IC 8038, IC 566, IC 555. Design of sweep generator, voltage controlled oscillator. Design of first and second order filters, design of notch filter. (8)

UNIT-III: Design of instrumentation amplifier, Temperature controller / indicator using thermocouple, resistance thermal detector & thermister. Design of IC 555 based circuits. (8)

UNIT-IV: Introduction to CMOS / VLSI Circuits, MOS transistor switch, realization of universal gates and compound gates using MOS transistors, Fundamentals of circuit characterization and performance estimation, basics of R, L and C estimation, CMOS circuits and Logic design, transistor sizing, basic physical design of simple logic gates. (9)

UNIT-V: Introduction to VHDL, Behavioral Modeling, sequential processing, data types, attributes, configurations, synthesis and synthesis issues, RTL simulation, place and route. Introduction to VERILOG. (9)

UNIT-VI: Design of combinational blocks such as multibit address, ALU, MUX, DEMUX , encoders, decoders, Design of sequential circuits, asynchronous and synchronous design issues, state machine modeling (Moore and Mealey machines). (8)

**Practicals:** Minimum Eight Practical based on the above. Using Hardware/Software.

### **Text Books:**

1. R.A. Gayakwad : “OP-AMP and Linear Integrated Circuits”
2. J. Bhaskar : “VHDL Primer”, (Person Education).

### **Reference Books:**

1. Goyal-Khetan : “A Monogram on Electronic Circuit Design.
2. Paul Horowitz - W.Hill : “The art of Electronics”, (Cambridge Publication).

3. National Semiconductor Data Book.
4. Douglas L. Perry : VHDL (3<sup>rd</sup> Ed.) , McGraw Hill.
5. Neil Weste - K. Eshraghian : Principle of CMOS / VLSI Design (Person Education).
6. Carver Mead, Lynn Conway : Introduction to VLSI Systems.

### **8SUL3 COMMUNICATION NETWORK**

UNIT-I: Introduction to communication network, types of network - LAN, MAN, WAN, layer architecture, OSI reference model, LAN topologies- Bus, ring, star. Introduction to Circuit switching, packet switching and message switching. (8)

UNIT-II: Overview of transmission media:- Point to point protocol and links: ARQ retransmission strategy, selective repeat ARQ, sliding window, framing and standard data link control protocol - HDLC, SDLC, LAPD, queuing models in communication network. (8)

UNIT-III: Multiple access protocol:- Channel allocation, LAN access techniques, Random access methods, ALOHA, slotted ALOHA, CSMA, CSMA/CD, control access scheme, token ring, token bus, Performance modelling and analysis. (8)

UNIT-IV: Networking devices and routing techniques:- Hubs, repeaters, bridges, routers, gateways, switches and routing switches, routing algorithms : Fixed routing, random routing, flooding and adaptive routing. (8)

UNIT-V: Network architecture and connecting services : Ethernet, X.25, frame relay, FDDI, Introduction to SONET / SDH, Introduction to ISDN and Broad band ISDN, ATM. (8)

UNIT-VI: TCP/IP Protocols, Overview of TCP/IP, UDP, IP address type, IP addressing and related issues, IP address resolution techniques, IP datagram and datagram forwarding. (8)

#### **Text Books:**

1. Amdrene S. Tanenbaum : “Computer Networks”, PHI.
2. W. Stallings : “Data and Computer Communications”, (Maxwell Mechmillan).

#### **Reference Books:**

1. D Bertsekas and R.G. Gallager: “Data Networks”, (2/e), Pearson Ed., (PHI).
2. Behrouz A Forouzan : “Data Communication and Networking”, (TMH).
3. Uyles Black : “Computer Networks”, (PHI).

4. Doglus E. Comer : “Computer Networks and Internets”, ( Pearson Education).

## **8SUL4 /8SL4 ELECTIVE-II**

### **(1) DIGITAL IMAGE PROCESSING**

UNIT-I : Introduction to digital image processing, Digital Image Fundamental, Elements of Visual Perception, Simple Image Model, Sampling and Quantization, Basic Relationships between Pixel Imaging Geometry, Gray scale image representation. (8)

UNIT-II: Image Transforms: Introduction to the Fourier Transform, DFT, Properties of Two Dimensional Fourier Transform, FFT, Hadamard, Harr DCT, Slant Transform. (8)

UNIT-III: Image Enhancement : Basic Techniques, Enhancement by point processing, Spatial Filtering, Enhancement in Frequency domain, histogram based processing, homomorphic filtering. (8)

UNIT-IV: Image Restoration: Degradation model, Diagonalisation concept, Algebraic approach to Restoration. Inverse filtering, Weiner (CNS) filtering Restoration in Spatial domain, Basic morphological concept, morphological principles, binary morphology, Basic concepts of erosion and dilation. (9)

UNIT-V: Image Compression: Fundamentals, Image compression models, Elements of Information theory, Lossy and predictive methods, vector quantization, runlength coding, Hauff coding, and lossless compression, compression standards. (9)

UNIT-VI: Image Segmentation : Detection of discontinuities, Edge Linking and boundary detection, Thresholding, Regional oriented Segmentation. (8)

#### **Text Books:**

- 1) Gonzalez and Woods: “Digital Image Processing”, Addison / Wesley.
- 2) Milan Sonka, Vaclav Hlavac, Roger Boyle : Image processing Analysis and Machine Vision” , Book / Cole 2<sup>nd</sup> Edition.

#### **Reference Books:**

- 1) A.K.Jain : “Digital Image Processing”, PHI.
- 2) William K. Pratt : “Digital Image Processing”, 3<sup>rd</sup> ed. , John Wiley and Sons Publi.

## **8SUL4 ELECTIVE - II**

### **(2) SATELLITE COMMUNICATION**

UNIT-I: Satellite frequency bands, Satellite types – LEO, MEO, GEO, HEO Communication satellite system, orbit, modulation, transmission and multiplexing. (8)

UNIT-II: Orbital aspects of satellite communication : Orbital period and velocity, Effects of orbital inclination, azimuth and elevation, converge angle and slant range. Orbit determination,orbital effects in communication, system performance. (9)

UNIT-III: Satellite channel : Electromagnetic field propagation, antennas, Atmospheric losses, receiver noise, carrier to noise ratio, satellite link analysis, Frequency reuse and depolarization. (8)

UNIT-IV: Satellite Transponder: The transponder model, satellite front end, satellite signal processing, transponder limiting, nonlinear satellite amplifier. (8)

UNIT-V: Multiple access : Principles of frequency multiple access system, FDMA channelization, AM-PM conversion with FDMA, principles of TDMA system, satellite effects on TDMA performance, Code division multiple access, synchronised, non-synchronised CDMA. (9)

UNIT-VI: Earth Station technology and satellite services : Earth Station design, tracking, equipment for earth stations, domestic satellite systems using small earth stations , VSAT, Global positioning system. (8)

#### **Text Books:**

1. Gagliardi Robert M. : “Satellite Communication”, CBS publications & Distributors, New Delhi.
2. Pratt Timothy and Bostian W. Charles: “Satellite Communication”, Willey International Publication, New York.
3. Roddy D. : “Satellite Communications”, Mc-Graw Hill Pub. Co. New York.

## **8SU4 / 8SL4 ELECTIVE-II**

### **(3) ADVANCED MICROPROCESSORS**

UNIT-I: Overview of Intel 8086 architecture : Bus timing diagrams, Interrupt structure, ISRs, Minimum and Maximum mode. (8)



UNIT-II: Multiprocessor System : Numeric processor 8087 : Architecture and interfacing. I/O processor 8089 : Architecture and interfacing. Bus arbitration and control, tightly coupled and loosely coupled systems. (8)

UNIT-III: Introduction to 80286 : Architecture, hardware features, operation in real mode and protected virtual address mode basic bus operation minimum system configuration, 80287 Numeric co-processor. (8)

UNIT-IV: Intel 80386 : Architecture, real mode operation, protected mode operation, segmentation, virtual 8086 mode. (9)

UNIT-V: Intel 80386 conventional interfacing strategies, cache memory systems, 80486 family, internal architecture memory and I/O organization, interrupt, internal exceptions. (8)

UNIT-VI: Pentium processor : Salient features of 80586 (Pentium), system architecture, branch prediction, MMX, MMX data types, wraparound and saturation arithmetic, Basic architecture of Pentium –IV. (7)

### **Text Books:**

1. A.K. Ray and K.M. Bhurchandi : “Advanced Microprocessors and Peripherals”, TMGH Publ.
2. S. K. Venkataram : “Advanced Microprocessor and Microcontrollers”, Laxmi Publ.
3. Walter A. Triebel : “ The 80386, 80486 and Pentium Processor – Hardware, software and interfacing”, PHI Publ.
4. K. R. Venugopal and Rajkumar : “Microprocessor X86 programming”, BPB Publ.
5. B.B.Brey : The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Proprocessor. (4/e).

## **8SUL4 ELECTIVE-II**

### **(4) WIRELESS COMMUNICATIONS**

Unit-I: Introduction to Cellular Mobile System : evolution of cellular mobile systems (1st, 2nd, 3rd generation), A basic cellular system, cell shape, concept of frequency reuse, hand off strategies, power control operation of cellular systems. Example of cellular calls. (8)

Unit II: Cellular radio system design fundamentals : frequency assignments, channel assignment strategies, co-channel and non-co-channel interference, cellular system capacity, performance

criteria, trucking and grade of service, improving coverage and capacity in cellular system, multiple access schemes. (9)

Unit III: Mobile Radio propagation & Antennas : Radio propagation mechanism, path loss modelling and signal coverage, multipath propagation, fading, doppler shift, fast and slow fading, control of fading in mobile systems, Antennas at cell site, mobile antenna, diversity. (10)

Unit IV: Digital Cellular Systems : GSM : system architecture, radio subsystem, channel types, frame structure, signal processing in GSM, CDMA (IS 95) : frequency and channel specifications, forward & reverse CDMA channel. (9)

Unit V: Cordless systems and WLL : Introduction to cordless systems, CT2 and DECT standards, DECT architecture, DECT frame format and radio link, DECT operation. WLL : role of WLL, propagation considerations for WLL, LMDS and MMDS. (9)

Unit VI: Wireless LAN : overview of wireless LAN, wireless LAN technologies ; infrared, spread-spectrum, narrow band microwave LAN, mobile data networks : CDPD, GPRS, WAP. Bluetooth : overview, radio specification, base band specification, link manager specifications. (9)

### **Text Books:**

- 1) William C. Y Lee : “Mobile Cellular Telecommunications”(second edition) McGraw Hill Inc. (1995).
- 2) Theodore S. Rappaport : “Wireless Communications : Principles & Practice”, second edition, Pearson Education (2002).

### **Reference Books:**

- 1) William Stallings : “Wireless Communications and Networks” Pearson Education Asia Publication (2002).
- 2) K.Pahlavan and P.Krishnamurthy : “Principles of Wireless Networks”, Pearson Education Asia Publication (2002).
- 3) Jochen Schiller : “Mobile Communications”, Pearson Education Asia Publication (2002).
- 4) Andy Dornam : “The Essential Guide to Wireless Communication Applications”, Pearson Education Asia Publication.

## **8SUL5 PROJECT & SEMINAR**