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 hoping spread spectrum, comparison. (9)

Text Books:


Reference Books:


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:

Reference Books:
1. National Semiconductor : Data Acquisition Linear Devices Data Book.
3. 8085/8086 Microprocessor Book-Intel.
4. Intel Peripheral Devices Data Book.

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-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. Oppenhavm & Scheffer: Discrete time Processing (PHI).

Reference Books:

4. Rabiner and Chrocherie: Multirate DSP (PHI).

7SUL4 DIGITAL IC’S & DESIGN

UNIT-I: Combinational Logic Design: Function of binary variables, Boolean Algebric 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-Sev en 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:

Reference Books:
1. Fleatcher: An Engineering approach to Digital System Design, PHI.

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


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.

Text Books:


Reference Books:


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-III: OPTICAL SOURCES:- Optical emission from semiconductors, LED, power, efficiency, double hetero junction 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:

Reference Books:

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 Nearnst Equation.

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 cardio vascular system, Measurement of Blood Pressure (Direct & Indirect), Blood flow, Heart sound.


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

Text Books:


Reference Books:


3. Carr and Brown : Biomedical Equipment Technology.


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:

Reference Books:


7SU5 ELECTIVE-I

(5) ROBOTICS & AUTOMATION


UNIT-II: Definition of knowledge, Domain and logic : Elements of logic, proportional 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: Triangularation 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 tough and slip. (9)

UNIT-VI: Various Root 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:


**Reference Books:**

1. Klaffer et al.: “Robotics”.


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, MASAER’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:

Reference Books:
3. Reich, Scolnik, Ording, Krangs : “Microwave Principles”, PHI.

**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)

(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:**

**Reference Books:**

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, CSMD/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.

Reference Books:

8SUL4/8SL4 ELECTIVE-II

(1) DIGITAL IMAGE PROCESSING


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

Text Books:


Reference Books:


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:


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-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:


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.

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. (9)

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. (10)

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)


**Text Books:**


**Reference Books:**


**8SUL5 PROJECT & SEMINAR**