

SYLLABI

FOR

V SEMESTER

B.TECH.

ELECTRONICS AND

COMMUNICATION

ENGG.

DIGITAL COMMUNICATION

EC 301

Unit – I

Types of signals, sampling theorem, pulse modulation techniques, PAM, natural and flat-top sampling, equalizer, detection of PAM signals, bandwidth of PAM, S/N ratio in PAM, cross-talk, PWM and PPM, methods of generation and detection, synchronous and asynchronous time division multiplexing, synchronization techniques.

Marginal, joint and conditional probability, random signal, random variable, random process, probability density function and probability distribution function, Binomial, Poisson and Normal distribution.

Unit – II

Quantization of signals, PCM, quantization error, companding, inter symbol interference, eye patterns, multiplexing of PCM signals, bandwidth of PCM, output S/N ratio in PCM, delta modulation, adaptive delta modulation, bandwidth of DM, output S/N ratio in DM, differential PCM, M'ary system.

Unit – III

ASK, OOK, BFSK, M'ary FSK, BPSK, DPSK, QPSK, M'ary PSK, QAM, MSK, baseband signal receiver, probability of error, optimum filter, matched filter, correlator, coherent and non-coherent detection.

Introduction to spread spectrum, D-S and F-H spread spectrum, principle of CDMA, applications of spread spectrum.

Unit – IV

Unit of information, entropy, entropy maximization, information rate, joint and conditional entropy, mutual information, channel capacity of various channels, Shannon's theorem, Shannon-Hartley theorem, BW-S/N ratio trade-off, Shannon limit.

Unit – V

Source coding, prefix property, coding efficiency, data compression codes, Shannon-Fano code, Huffman code.

Channel coding, Hamming distance, Minimum Distance, error detection and correction, ARQ and FEC, Parity check code, linear block code, Hamming's single error correction code, convolutional code, cyclic code.

Suggested Text books and references:

1. Principles of communication systems – H. Taub and D.L. Schilling, Tata Mc Graw Hill, 2nd Ed., 1996.
2. Modern digital and analog communication systems – B.P. Lathi, Oxford university Press, 3rd Ed., 1998.

3. Communication Systems: Analog and Digital– R.P.Singh & S.D.Sapre, Tata Mc Garw Hill, 1st Edition, 1995.

DIGITAL SIGNAL PROCESSING

EC 302

Unit – I

Representation and Analysis of discrete system:

Random, deterministic, gaussian signals, discrete time signal & systems, LTI systems and their properties, linear constant-coefficient difference equations. Representation of recursive and non recursive system.

Unit – II

Z-Transform & Inverse Z-Transform:

Definition, Z-transform theorems, properties of ROC for Z-transform.

Inverse Z-transform, Z-transform properties.

Discrete time convolution, stability, time domain and frequency domain analysis.

Unit – III

DFT & FFT:

Discrete Fourier Transform, even and odd properties of DFT.

Fast Fourier Transform: Decimation in time, decimation in frequency, radix-4FFT, power density spectrum.

Unit – IV

Digital Filters:

FIR Filters: Realization of digital filters, rectangular, Bartlett, hamming, Blackman & Kaiser windows and FIR filters of all types and their design.

IIR Filters: butterworth, chebyshev, inverse chebyshev, elliptic filters of all types and their design.

Unit –V

Applications of DSP:

Examples of DSP in communication, speech signal processing, image processing, biomedical, seismology etc.

Suggested Text books and references:

1. Discrete-Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, 2nd edition, Prentice hall.
2. Introduction to Digital Signal Processing–Proakis, Maxwell McMillan.
3. Digital Signal Processing – S. Salivahanan, A. Vallavaraj, C. Gnanapriya.

INTEGRATED CIRCUITS

EC 303

Unit – I

Introduction to micro-electronics, advantages and limitations of integrated ckts.

Monolithic Ics – Planner process, basic steps required in the fabrication of monolithic IC.

Monolithic integrated devices: NPN transistor, punch-through transistors, lateral and substrate PNP transistor, monolithic diodes, schottkey diodes, schottkey transistor, super beta transistor, high frequency transistor, JEFTs, MOSFETs, diffused resistors, epitaxial resistors, junction capacitor.

Thin and thick film technology: Basic process in thin film technology, thin film resistors, capacitors, basic processes in thick film technology, VLSI fabrication technology.

Unit – II

DTL and TTL logic: Basic DTL inverter, modified DTL, DTL Nand gate, fanout, power dissipation, spice simulation.

Basic TTL inverter, stored change removed from DTL and TTL, Basic TTL NAND gate and multiple, emitter, BJT, voltage transfer characteristics, TTL fanout, power dissipation LTTL (low power) HTTL (high speed), spice simulation. STTL, ECL, ECL fanout, IIL, ECL gate versatility.

Unit – III

MOS and CMOS logic: Introduction to MOS in digital circuit, MOS inverter, VTC, power dissipation, MOS logic gates (NOR, NAND, OR XOR). NMOS Schmitt triggers and transmission gate.

CMOS inverter, CMOS gates, CMOS tristate gates. CMOS Schmitt trigger gates, CMOS driver, Dynamic CMOS, Comparison and interfacing of logic families, BiCMOS.

Unit – IV

Semiconductor memories: Diode ROM, BJT, ROM, Bioplar ROM Line amplifier, NMOS NOR ROM, NMOS NAND ROM, CMOS pre-charging and discharging of a load capacitance, CMOS ROM, Semiconductor static RAM–static RAM cell with transmission gates, MOSFET static RAM Cell Technologies, BJT RAM cell, gate arrays PLA.

Unit – V

Basic Regulator Circuits: Monolithic voltage regulator, regulator circuits using type 78XX series, 79XX series and 723 series etc. principle of phase locked loops, PLL building blocks, study of PLL, application of

PLL, FM and AM modulation frequency synthesis, translation and multiplication.

Suggested Text books and references:

1. Analysis and design of digital integrated circuits – DAVID A HoDGES, Horgeg Jackson, MC Graw Hill.
2. Digital integrated circuits – Thomesa – DE Massa Zack ciecone, John Willey and Sons.
3. Integrated Electronics, Millman & Halkias, Mc Graw Hill Pub. 1985

**ELECTRONIC INSTRUMENTATION AND MEASUREMENT
EC 304**

Unit – I

Measurement and error, accuracy and precision, significant figures, sensitivity, resolution, types of errors.

Cathode Ray Oscilloscope (CRO): Free running and triggered CROs, dual trace and dual beam CROs, delayed mode facility, CRO probes, multichannel CRO, storage sampling and digital read-out CRO, Z-modulation.

Unit – II

Measurement of voltage, current, impedance and power.

Electronic voltmeters: d.c. Voltmeters with direct coupled and chopper amplifiers, a.c. voltmeters using rectifiers and amplifiers combinations, true rms responding voltmeter, electronic millimeter, differential voltmeter, (Q-meter, RLC-Q data bridge, AC bridges), Wagner earthing, vector impedance meter, vector voltmeter, measurement of power by bolometer and calorimeter.

Unit – III

Waveform Analyzers: Harmonic distortion analyzers, wave analyzer, spectrum analyzer heterodyne frequency meter, frequency, phase and pulse measurement by CRO. Signal function generator, sweep frequency generator, arbitrary wave from generator.

Amplifier Measurements: Input and output impedance measurement, signal to noise ratio and noise figure measurements, square wave testing of an amplifier, swept frequency measurements.

Unit – IV

Measurement of non-electrical quantities: Classification of transducers strain gauges, displacement transducers, LVDT, photo electric

transducers, temperature measurements, thermistor, photosensitive devices, nuclear radiation detection instruments (speed measurement).

Unit – V

Digital Measurements: Advantages of digital instruments, A–D & D–A, conversion, principles of digital voltmeters, ramp type DVM, integrating DVM, successive approximation DVM, frequency counters, displays (LED, LCD, Seven Segment, Fourteen segment etc.)

Suggested Text books and references:

1. Electronics Instrumentation & Measurement System – A.K.Shawney
2. Electronics Measurement and Instrumentation – W.D.Cooper, PHI.
3. Electronics Measurement and Instrumentation– Kalsi, PHI.

COMPUTER NETWORKS

EC 305

Unit – I

Study of the functions of OSI and TCP/IP reference model in computer networks, circuit, message, packet and hybrid switching, broadband ISDN and ATM, polling techniques, multiplexing and concentration, transmission media used in physical layer, X.25 networks.

Unit – II

Queuing theory, introduction to LAN, MAN and WAN, various types of ALOHAs, LAN protocols, IEEE standards for LAN and MAN, Data link layer protocols, error detection and correction codes in data link layer, protocol performance evaluation, protocol specification and verification, data link layer switching.

Unit – III

Network layer design issues, Introduction to routing and congestion in network layer, routing and congestion control algorithms, inter networking, network layer in internet.

Unit – IV

The transport service, Elements of transport protocols, protocols of transport layer, internet transport protocol (TCP & UDP).

Unit – V

Data security and cryptography techniques, access management in application layer, world wide web(www), electronic mail (E-mail), concept of virtual terminals.

Study of common types of networks like ARPANET, USENET etc.

Suggested Text books and references:

1. Computer Networks – Tanenbaum, PHI 2001
2. Data Communication and Network – W. Stallings.
3. Data Networks – Dimitris Bertsekas and Robert Galliger, EEE 2nd Edition.

ELECTROMAGNETIC FIELDS AND WAVES

EC 306

Unit – I

Cartesian, cylindrical and spherical co-ordinate systems, scalar and vector fields, gradient, divergence and curl of a vector fields, Divergence theorem and Stokes theorem.

Unit – II

Electric field, Coulomb's law, electric field due to several charges, viz: line charges, sheet charge, field due to a continuous volume.

Gauss's law – Electric field due to simple charge bodies, equipotential surface, Poisson's equation, capacitance, energy stored in an electric field, conservative and non-conservative fields, solution of two dimensional Laplace's equation, finite difference method, method of moments.

Unit – III

Magnetic field, magnetic flux density, magnetic intensity, magneto motive force, energy stored in magnetic field. Ampere's law, vector magnetic potential, amperes circuital law, Lorentz force equation.

Unit – IV

Derivation of Maxwell's equations in differential and integral form for static and time varying field, boundary conditions for conductor and dielectric.

Unit – V

Wave equations for free space, uniform plane waves, linear elliptical and circular polarization, wave equations for conducting medium, wave propagation in conductors and dielectric, depth of penetration, reflection and refraction of plane waves by conductor and dielectric, Poynting vector and flow of power, wave between parallel planes, concept of TE, TM & TEM waves.

Suggested Text books and references:

1. Elements of Electromagnetics– Mathew N.O. Sadiku, Oxford Pub, 3rd Edition
2. Engineering Electromagnetics – W.H. Hayl, Tata Mc Graw Hill Edition, 5th Edition
3. Introduction to Electrodynamics– David J. Griffithe, Prentice Hall India, 3rd Edition

LAB – I (DIG. COMM./ DSP)

EC 341

Digital Communication Lab.

Design, assembly and testing of following systems:

1. PAM
2. PPM
3. PWM
4. PCM
5. DM
6. ADM
7. BFSK
8. BPSK
9. DPSK
10. QPSK

Digital Signal Processing

1. Implementation of FIR/IIR filters with DSP processor (TMS 32010/32020).
2. Realization of matrix multiplication on TMS 32010 and TMS 32020.
3. Realization of floating point arithmetic on TMS 32010 and TMS 32020.
4. Implementation of FFT using radix-2 DIT FFT butterfly.
5. Butter worth digital and analog filter design using MATLAB, signal-processing toolbox.
6. To generate unit sample, unit step and unit ramp signal using MATLAB.
7. To find the linear convolution of two sequences using MATLAB.
8. To generate a square wave on 8255 – 1 & 2 at port A.
9. To generate a ramp on DAC.

To input analog signal and observe the output at D/A.

LAB – II (INTEGRATED CIRCUIT/ MEAS.)

EC 342

Integrated Circuit Lab.

1. To construct a 1 to 4 line demultiplexer.
2. To construct a 4 to 1 line multiplexer.
3. Study and testing of BCD to seven segment decoder.
4. To design a regulator circuit using 7805, 7812 IC.
5. To construct and verify full and half adder circuit using TTL IC's.
6. To calculate the percentage regulation of an adjustable voltage regulator using IC LM317.
7. To design a high voltage regulated power supply using IC 723.
8. To design a low voltage regulated power supply using IC 723.
9. Interface CMOS IC to TTL and vice versa.
10. Demonstration of PLL using IC 4046 and to determine the lock range and capture range.

Measurements Lab.

1. Measurement of displacement using LVDT.
2. Measurement of L, C and q of a coil using Q-meter.
3. Measurement of unknown frequency using Z-modulation.
4. Measurement of strain using strain gauge.
5. Measurement of intensity of light using LDR.
6. Measurement and control of temperature of a oven using thermistor.
7. Calibration of temperature using thermocouple.
8. Measurement of temperature using RTD.
9. Study of piezoelectric pickups.
10. Study of inductive and capacitive pickups.

