EI 501- DIGITAL COMMUNICATIONS

Unit – I Elements of Digital Communication Systems: Elements of digital communication systems: model of digital communication systems, digital representation of analog signal, certain issues in digital transmission, advantages of digital communication systems, bandwidth-s/n tradeoff, hartley shnnon law, sampling theorem.

Unit – II Pulse Code Modulation: PCM generation and reconstruction, quantization noise, non uniform quantization and commanding, DPCM, adaptive DPCM, DM and adaptive DM. noise in PCM and DM.

Digital Modulation Techniques: Introduction, ASK, AKS modulator, coherent ASK detector, non-coherent ASK detector, FSK, bandwidth and frequency spectrum of FSK. non coherent FSK detector, coherent FSK detector, FSK detection using PLL, BPSK, coherent PSK detection, QPSK, differential PSK.

Unit – III Baseband transmission and optimal Reception of digital signal: Pulse shaping for optimum transmissions, baseband signal receiver, probability of error, optimum receiver, optimal of coherent reception, signal space representation and probability of error, eye diagrams, cross talk.

Unit – IV Information Theory: Information and entropy, conditional entropy and redundancy, Shannon fano coding, mutual information, information loss due to noise, source coding – Huffman code, variable length coding, source coding to increase average information per bit lossy source coding.

Unit – V Linear Block Codes: Matrix description of linear block codes, error detection and error correction capabilities of linear block codes, cyclic codes, algebraic structure, encoding, syndrome calculation.

Convolution Codes: Encoding, decoding using state, tree and trellis diagrams, decoding using Viterbi algorithm, comparison of error rates in coded and encoded transmission.

References:

1. Principles of communication systems- Herbert Taub. Donald L Schiling, Goutam Sana, 3rd Edition, McGraw-Hill, 2008
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.
3. Digital Communications – John G. Proakis. Masoud Salehi – 5th Edition, McGraw-Hill, 2008.
4. Digital Communications – Simon Haykin, Jon Wiley, 2005.
5. Digital Communications – Ian A. Glover, Peter M. Grant, Edition, Pearson Edu., 2008.
6. Communication Systems – B.P. Lathi, Bs Publication, 2006.

EI 502- Microprocessor and Microcontrollers

Unit-I History of computers: Timing and control, memory devices: semiconductor memory organization, 8-bit microprocessor (8085): Architecture, types of instructions, instruction set, addressing modes, flag register of 8085, and memory segmentation.

Unit-II 16-bit Microprocessors (8086/8088): Architecture, physical address, flag registers, memory organization, bus cycle, addressing modes, instruction set difference between 8086 and 8088, introduction to 80186 and 80286, assembly language programming of 8086/8088

Unit –III Data Transfer Schemes: Introduction, types of transmission, 8257 (DMA), 8255 (PPI), serial data transfer (USART 8251), keyboard-display controller (8279), Programmable Priority Controller (8259)

Unit-IV Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, interfacing of 8253, applications, ADC and DAC: Introduction, DAC converters, ADC converters, DAC and ADC interfacing and applications.

Unit -V Microcontroller (8051): Introduction, architecture, instruction set, addressing modes, registers, memory organization, timers/counters, interrupts, addressing modes, 8051 instruction set , applications of microcontrollers.

References:

1. Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill .
2. A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw – Hill, 2009 TMH reprint.
3. Kenneth J. Ayala, The 8086 microprocessor: programming and interfacing the PC, Indian -edition, CENGAGE Learning.
4. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
5. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
6. Microprocessor Architecture, Programming and Applications with the 8085 6/e October 2013, Ramesh Gaonkar.

List of Experiment:

1. To study 8085 based microprocessor system.
2. To study 8086 based microprocessor system.
3. Write an Assembly Language Program to add two 16 bit numbers.
4. Write an Assembly Language Program to subtract two 16 bit numbers.
5. To develop and run a program for finding out the largest/smallest number from a given set of numbers.
6. To perform multiplication/division of given numbers.

7. To perform computation of square root of a given number.
8. To obtain interfacing of RAM chip to 8085/8086 based system.

EI 503 – Power Electronics

Unit-I Power Electronic Devices: Power diodes, power transistors, GTO, Triac, Diac, Power MOSFET, IGBT, LASCR, Fast recovery diode, schottey diode, construction, principle , operation & characteristics of SCR, Two transistor analogy, turn on & off of SCR, commutation techniques (Class A,B,C,D,E, & F Commutation), UJT, ramp triggering, SCR rating & protection, snubber circuit, heating, cooling & mounting of SCR, series and parallel operation of SCR, String efficiency.

Unit-II Rectifier: Single phase half wave & full wave uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load (continuous & non continuous conduction), & RLE loads, average load voltage and load current, active and reactive power, effect of free wheeling diode and source inductance, comparison of mid point & bridge rectifier circuits.

Unit-III Inverter: Series and parallel inverter, Voltage source & current source inverter, Single phase and three phase bridge inverter, Self cumulated inverters,, Mc- murray & MC murray bed ford inverters, Voltage control of single phase and three phase bridge inverter, Harmonics & their reduction.

Unit-IV Chopper: Chopper operation, Step up & step down choppers, chopper configuration (A, B, C, D, & E), Steady state analysis, Current & voltage commutation of chopper circuits, Jones & Morgens chopper.

Unit-V AC voltage controllers: AC voltage controllers using SCRs & traics, single phase full wave controller with R and RL load, RMS load voltage, load current and input power factor, three phase AC voltage controller, Dual converter, Switched mode voltage regulator, buck, Boost, & Chuck regulators, Single phase & three phase cyclo convertor.

References:

1. M.H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson Education, 1993.
2. M Ramsmoorthy, An Introduction to transistor and their application, Affiliated East-West Press.
3. P.C. Sen, Power Electonics, TMH.
4. M.D. Singh, K.B. Khanchandani, Power Electronics, TMH, Delhi, 2001.
5. Chakravarti A., Fundamental of Power Electronics and Drives, Dhanpat Ray & Co.
6. P.S. Bhimbhra, Power Electonics, Khanna Pub.
7. Vedam Subramanyam, Power Electronics New Age International Revised II ed. 2006.

List of Experiments (Extendable):

1. To study V-I characteristics of SCR.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with R load (ii) L load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study single-phase ac voltage regulator with resistive and inductive loads.
6. To study single phase cyclo-converter.

7. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor.
8. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.

EI 504 - Instrumentation & Measurement

Unit I- Introduction: Objectives of measurements,static and dynamic characteristics,analog versus digital measurements, accuracy, precision, sources of measurement, errors in measurement, statistical evaluation of measurement data, standards and calibration.

Unit II- Electrical and Electronics Instruments: Principle and types of analog and digital voltmeters, ammeters, multimeters, Single and three phase wattmeter's and energy meters, frequency meter, phase meter, energy meter, extension of range of instruments, expression for torque of moving coil & moving iron instrument, power factor meters.

Unit III- Potentiometers & Instrument Transformers: D.C & A.C potentiometers, Crompton's DC and AC polar and coordinate types, applications, D.C & A.C bridges, self-balancing bridges, instrument transformers, applications.

Unit IV- Magnetic Measurements: Determination of B-H curve. Magnetic disk and tape Recorders, digital plotters and printers, CRO, CRT display, digital CRO, LED, LCD & dot matrix display, Lloyd-fischer square for measuring iron loss.

Unit V- Transducers and Data Acquisition Systems: Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Piezoelectric, Hall effect, optical and digital transducers, Elements of data acquisition system – A/D, D/A converters – Smart sensors.

References:

1. A.K.Sawhney, A Course in Electrical and Electronics Measurements and Instruments- Dhanpat Rai and Sons, Delhi,2005.
2. Umesh Sinha, Electrical and Electronics Measurements & Instrumentation, Satya Prakashan.
3. F.W.Golding and Widdis, Electrical Measurements and Measuring Instruments, 5th Edition-2010.
4. Electrical and Electronics Measurements ,Bakshi
5. Kalsi H. S. "Electronic Instrumentation", Tata McGraw-Hill Education, 2nd Ed., 2004 .

List of Experiments (Extendable):

1. To study the front panel controls of CRO.
2. To analyze analog and digital multi meter for various measurements.
3. Determination of B-H curve.
4. Measurement of high resistance by loss of charge method.
5. Calibration of a induction type single phase energy meter.
6. Study of various types of Indicating Instruments.

EI 505 – Energy Conservation & Management

Unit-I General Energy Problem: Energy use patterns and scope for conservation, energy audit, energy monitoring, energy accounting analysis, and targeting, energy management, types of energy audit, qualities and function of energy managers, language of an energy manager, check list for top management, loss of energy in material flow, energy performance, maximizing system efficiency, input energy requirements, energy auditing instruments, material load energy balance diagram.

Unit- III Thermodynamics of Energy Conservation: Basic principle, irreversibility, second law, efficiency analysis of systems, primary energy sources, optimum use of prime-movers, energy recovery in thermal systems, waste heat recovery techniques, thermal insulation, thermal energy audit in heating, ventilation and air conditioning, friction, lubrication, predictive and preventive maintenance.

Unit-III Load curve analysis: Load curve analysis & load management, DSM, energy storage for power systems (mechanical, thermal, electrical & magnetic), restructuring of electric tariff from energy conservation consideration, economic analysis depreciation method, time value of money, evaluation method of projects, replacement analysis, pay back period, energy economics, cost benefit risk analysis,

Unit-IV Energy Efficient System: Energy efficient electric drives, energy efficient house keeping energy efficient motors, energy flow networks, simulation & modeling, alternative option, matrix chart.

Unit-V Energy conservation: Energy conservation policy, energy conservation task before industry, energy conservation equipment's , co-generation, energy conservation process, energy conservation in transportation system especially in electric vehicle industry- sugar, textiles, cement , electrical energy conservation in building, heating and lighting, domestic gadgets .

References:

1. Energy Management – W.R. Murphy & G. Mckey Butler worths.
2. Energy Management Head Book- W.C. Turner, John Wiley.
3. Energy Management Principles- Craig B. Smith, Pergamon Press.
4. Energy Conservation- Paul O Callagan- Pergamon Press.
5. Design & Management of energy conservation. Callaghan.
6. Elect, Energy Utilization & Conservation. Dr. Tripathi S.C.

EI- 506 Matlab & simulation Lab.

Course Content: Introduction to matlab /scilab, study of matlab /scilab programming, simulation, modeling, design and development of programs, application of the software in the field of control systems and communication systems.

List of Experiment (Expandable)

1. Space model for classical transfer function using MATLAB.
2. Program for the Bode response of a type one transfer function.
3. Program for the Bode response of a type two transfer function
4. Program to determine the time response of a given transfer function for step input and also determine maximum overshoot and peak time.
5. Program to determine the time response of a given transfer function for impulse input, maximum overshoot and peak time.
6. Program for sketching root locus open loop transfer function
7. Program to add the time delay for a specified input.
8. Program for sketching Nyquist plot for open loop transfer function.

References:

1. Proakis: Contemporary Communication System Using MATLAB; Thomson Cengage.
2. Kuo: Automatic Control Systems, PHI Learning.
3. Chapman Stephen J.: MATLAB Programming for Engineers, Thomson Cengage.
4. Singh and Chaudhari: Matlab Programming, PHI Learning.
5. http://ekalavya.it.iitb.ac.in/contents.do?topic=Scilab
6. http://www.scilab.in
7. http://www.matlab.in