Bachelor of Engineering (Electronics & Communication Engineering) Semester – V

Theory
COMMUNICATION ENGINEERING
ELECTRONIC MEASUREMENT AND INSTRUMENTATION (EL,EI, IC,EE, EEE, AEI)
ANALOG ELECTRONIC CIRCUITS (EL,EI, IC,EE, EEE, AEI)
ANTENNA AND WAVE PROPAGATION
COMPUTER ARCHITECTURE AND ORGANISATION (EL, EI, IC, Common with IV sem. CSE, IT)
MICROPROCESSORS AND INTERFACING (EL,EI, IC,CSE,IT, EEE, AEI)
Practicals
ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB (EL,EI, IC,EE)
ANALOG ELECTRONIC CIRCUITS LAB (EL,EI, IC)
MICROPROCESSORS AND INTERFACING LAB (EL,EI, IC,CSE,IT, EEE, AEI)
ELECTRONIC CIRCUIT SIMULATION LAB (COMMON WITH VI SEM. – IC, AEI)
PRACTICAL TRAINING-I

COMMUNICATION ENGINEERING

Unit 1 Spectral Analysis :

Fourier Series, Fourier tranforms, Convolution Theorem, Correlation, Cross-Correlation and autocorrelation.

Unit 2 Information Theory :

Introduction to information and entropy, channel capacity for discrete and continuous channels, Shannon's Theorem, Shannon-Hartley Theorem, Noisy channels, coding theory : Shannon-Fano coding, minimum redundance coding, maximization of entropy of a continuous message transmission rate, effect of medium on the information, selection of channels ,effect of noise and its minimization.

Unit 3 Random Signal Theory :

Representation of random signals, concept of probability, probability of joint occurrence, conditional probability, discrete probability theory, continuous random variables, probability distribution function, probability density function, joint probability density functions. Statistical average and moments, Ergodic processes, correlation function, power spectral density, central limit theory, response of linear system to random signals. Error function, regularity, covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities, optimum filters.

Text Book :

1. Principles of Communication Systems : Taub Schiling; TMH

Reference Books.

1. Communication Systems : Singh and Sapre ; TMH

2. Communication Systems : A Bruce Carlson; TMH

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

Unit 1. Oscilloscope:

Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

Unit 2. Electronic Instruments:

Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

Unit 3. Generation & Analysis Of Waveforms:

Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

Unit 4. Frequency & Time Measurement:

Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

Unit 5. Display Devices:

Nixie tubes, LED's LCD's, discharge devices.

Unit 6 Transducers:

Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

Unit 7 Introduction To Signal Conditioning:

DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

Text Book:

1.   A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

Reference Books.

1.   Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

ANALOG ELECTRONIC CIRCUITS

Unit1. Single And Multistage Amplifiers:

Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier .

Unit2. Feedback Amplifiers :

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

Unit3. Oscillators:

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, generalform of oscillator circuit, wien-bridge oscillator, crystal oscillator.

Unit4. Power Amplifiers:

Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

Unit5. Operational Amplifiers :

Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

Unit6. Linear Applications Of Operational Amplifiers :

Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

Unit7. Non-Linear Applications Of Operational Amplifiers :

Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

Text Book:

1.   Integrated Electronics: Milman Halkias, TMH.

2.   Microelectronic Circuits : Sedra & Smith.

Reference Books:

1.   Operational Amplifiers:Gaikwad

2.   Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

ANTENNA AND WAVE PROPOGATION

Unit 1. Radiation Of Electromagnetic Waves :

Retarded potential, field of short dipole, Antenna pattern & antenna parameters.

Unit 2. Antenna Parameters :

Antenna pattern, Gain, Directivity, Radiation resistance, Aperture, Beam-width etc, Reciprocity theorem for antenna.

Unit 3. Elemental Antenna:

Wave equation for radiated fields from current and voltage sources in terms of electric scalar potential and magnetic vector potential .Fields and pattern of an infinitesimal dipole. Definition of various potentials used in antenna theory .

Unit 4. Practical Linear Antennas:

Relation between current distribution and field pattern of an antenna, linear antenna, half wave dipole, Antenna impedance, Directivity, Radiation resistance, Directional properties, Effect of ground on antenna pattern, Input impedance Broad band matching. Mutual impedance .

Unit 5. Antenna Arrays :

Two element array, broad side, End fired pattern, Beam width pattern multiplication, multi element array and their properties, Synthesis of an array.

Unit 6. Various Types Of Antenna :

parabolic feeds, conical, helix, log periodic, horn, Microwave antenna .

Unit 7. Propagation :

Ground waves, Space waves, Effect of Earth, Duct formation, Ionosphere, and sky waves.

Text Books :

1. Antennas by J.D.Kraus, TMH.

2. Antenna & Wave Propagation by K.D Prasad.

Ref. Books :

1.Antenna & Radiowave Propogation by Collin,TMH

2.Electromagnetic Waves & Radiating Systems by Jordan & Balman, PHI.

Computer Architecture & Organization

Unit-1: Basic Principles: Boolean algebra and Logic gates, Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder), Sequential logic blocks(Latches, Flip-Flops, Registers, Counters)

Unit-2: General System Architecture: Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

Unit-3: Instruction Set Architecture: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid); Language of the machine: 8086 ; simulation using MSAM.

Unit-4: Basic non pipelined CPU Architecture: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining.

Unit-5: Memory Hierarchy & I/O Techniques: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations.

Unit-6: Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction level parallelism (pipelining, super scaling –basic features); Processor level parallelism (Multiprocessor systems overview).

Unit-7: Computer Organization [80x86]: Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro- program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy.

Text Books:

•   Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.

•   Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

Reference Books:

•   Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall

Upper Saddle River, New Jersey

•   Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, Safwat Zaky.

•   Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern

Economic Edition.

•   Computer Organisation & Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.

•   Computer System Architecture by M. Mano, 2001, Prentice-Hall.

•   Computer Architecture- Nicholas Carter, 2002, T.M.H.

MICROPROCESSORS AND INTERFACING

PART A

Unit1. The 8085 Processor :

Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and assembly language programming.

Unit2. The 8086 Microprocessor Architecture :

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

Unit3. Instruction Set Of 8086 :

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

PART B Unit4. Interfacing Device :

The 8255 PPI chip: Architecture, control words, modes and examples.

Unit 5. Dma :

Introduction to DMA process, 8237 DMA controller,

Unit6. Interrupt And Timer :

8259 Programmable interrupt controller, Programmable interval timer chips.

Text Books :

1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.

2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

Reference Books:

1. Microprocessors and interfacing : Hall; TMH

2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI

3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn

A Gibson; PHI.

4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

E ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB

List of Experiments:

1.   Measurement of displacement using LVDT.

2.   Measurement of distance using LDR.

3.   Measurement of temperature using R.T.D.

4.   Measurement of temperature using Thermocouple.

5.   Measurement of pressure using Strain Guage.

6.   Measurement of pressure using Piezo-Electric Pick up.

7.   Measurement of distance using Capacitive Pick up.

8.   Measurement of distance using Inductive Pick up.

9.   Measurement of speed of DC Motor using Magnetic Pick up.

10.   Measurement of speed of DC Motor using Photo Electric Pick up.

ANALOG ELECTRONIC CIRCUITS LAB

List of Experiments:

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.

2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth

3. Study the effect of voltage series, current series, voltage shunt, and current shunt feed-back on amplifier using discrete components.

4. Design & realize inverting amplifier, non-inverting and buffer amplifier using 741 Op Amp.

5. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.

6. Verify the operation of a integrator circuit using 741 op amp and show that it acts as a low pass filter.

7. Design and verify the operations of op amp adder and subtractor circuits.

8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.

9. Design & realize using op amp 741, Wein -bridge oscillator.

10. To design & realize using op amp 741, square wave generator.

11.To design & realize using op amp 741, logarithmic amplifier & VCCS.

MICROPROCESSORS AND INTERFACING LAB

List of Experiments:

1. Study of 8085 Microprocessor kit.

2. Write a program using 8085 and verify for : (a). Addition of two 8-bit numbers.

(b). Addition of two 8-bit numbers (with carry).

3. Write a program using 8085 and verify for : (a.). 8-bit subtraction (display borrow)

(b). 16-bit subtraction (display borrow)

4. Write a program using 8085 for multiplication of two 8- bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.

5. Write a program using 8085 for multiplication of two 8- bit numbers by bit rotation method and verify.

6. Write a program using 8085 for division of two 8- bit numbers by repeated subtraction method and test for typical data.

7. Write a program using 8085 for dividing two 8- bit numbers by bit rotation method and test for typical data.

8. Study of 8086 microprocessor kit

9. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double

Word division and verify.

10. Write a program using 8086 for finding the square root of a given number and verify.

11. Write a program using 8086 for copying 12 bytes of data from source to destination and verify.

12. Write a program using 8086 and verify for:

(a). Finding the largest number from an array. (b). Finding the smallest number from an array.

13. Write a program using 8086 for arranging an array of numbers in descending order and verify.

14. Write a program using 8086 for arranging an array of numbers in ascending order and verify.

15. Write a program for finding square of a number using look-up table and verify.   .

16. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI.

17. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

ELECTRONICS CIRCUIT SIMULATION LAB

List of Experiments:

1.   Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows

2.   Simulate and study diode clipper and clamper circuits using PSPICE windows

3.   Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, and determine quiescent conditions.

4.   Simulate a common emitter amplifier using self biasing and study the effect of variation in emitter resistor on voltage gain , input and output impedance using PSPICE windows .

5.   Determine the frequency response of Vo/Vs for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.

6.   Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage .

7.   Study an operational amplifier using PSPICE windows and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.

8.   Simulate and study active low pass, high pass, and band pass filters using PSPICE windows.

9.   Simulate and study class A, B, C, and AB amplifier using PSPICE windows.

10.   Study the operation of 555 timer oscillator using PSPICE.

11.   Simulate logic expression………………..and determine its truth table.

12.   Simulate logic expression of full adder circuit and determine its truth table.

13.   Simulate a synchronous 4-bit counter and determine its count sequence.

14.   Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear .